



Elizabeth Box

Evaluation of pre-driver education interventions using the Theory of
Planned Behaviour

Driving Research Group, School of Aerospace, Transport and
Manufacturing
Doctor of Philosophy

PhD
Academic Year: 2017 - 2023

Supervisor: Dr Lisa Dorn
Associate Supervisor: Professor Phil Webb
July 2023



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ABSTRACT

Young drivers are at disproportional risk of death and serious injury, especially within the first 6–12 months of licensure. Pre-driver education interventions are typically provided to young people, between the ages of 16–18, who have not passed their driving test but maybe learning to drive. Using the Theory of Planned Behaviour (Ajzen, 1991), the role and potential of pre-driver education to support young and novice driver safety is evaluated with reference to the literature and a negatively framed fear appeal testimonial intervention called Safe Drive Stay Alive (SDSA) Surrey. The results conclude that only small, short-term effects on antecedents to behaviour (i.e., attitudes, subjective norms, perceived behavioural control and intentions) have been found using this approach. A positively framed, theoretically grounded intervention called DriveFit was designed and evaluated with a cluster Randomised Controlled Trial conducted with 22 schools/colleges in Devon, UK. DriveFit consisted of a 40-minute film delivered in the classroom followed by a 45-minute online facilitated workshop delivered within two-weeks of watching the film, which employed active learning components. The film was delivered in a talk show style, with expert guests providing demonstrations, information and tips. The workshop was delivered by a professional facilitator, using the ORID (Objective; Reflective; Interpretive and Decisional) focused conversation framework and encouraged participants to commit ‘if-then’ implementation intentions to postcards to retain after the workshop. Small, but longer lasting and more significant effects were found at 8–10 weeks post-intervention for DriveFit, which was developed using the Theory of Planned Behaviour and Behaviour Change Techniques (BCTS). This comparison of a positively and negatively framed pre-driver intervention has not been conducted previously. Results are discussed with reference to the use of active learning approaches and BCTs for pre-driver interventions. Future research should consider whether pre-driver interventions can lead to road safety improvements for this vulnerable group through applying the blueprint for developing and evaluating road safety education demonstrated within this thesis research.

Keywords:

Young Drivers, Pre-drivers, Road Safety Education, Behaviour Change Techniques, Cluster Randomised Controlled Trial, Theory of Planned Behaviour, Implementation Intentions, Process Evaluation

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“Just because you’ve had a room full of 200 people, it doesn’t mean you’ve made an impact, right?”

(Facilitator 1, DriveFit)

I was inspired to complete this PhD research after noticing a concerning pattern in young driver road safety education in the UK – namely that intervention effectiveness was largely being measured by the number of young people that had received an intervention, rather than whether the intervention was having any discernible effect on behavioural outcomes. I even remember suggesting on several occasions that someone really should investigate running some national trials to test current provisions against evidence-based alternatives. As it turns out, this ended up being the start of my six-year PhD journey. Undertaking a part-time PhD alongside a job and family commitments has not been without its challenges. It has involved drawing on levels of grit, determination and perseverance which I have not had to summon before. I have however enjoyed the learning process immensely, with the driving force throughout being my desire to produce research to help inform interventions which can support young and novice driver safety.

This endeavour would not have been possible without the support of the many people who have encouraged and supported me throughout this journey. I am deeply indebted to my supervisor Dr Lisa Dorn for all of her support, guidance and sage advice throughout this six-year journey. Thank you Lisa. You have been instrumental in getting me to the finishing line, with research and skills that I can be proud of. I am also grateful to the wider supervisory (Dr Anders Af Wåhlberg and Professor Phil Webb) and review teams at Cranfield University, who have played an important support and review role throughout. I would also like to recognise the role that Dr Mark Sullman played in encouraging me to pursue my PhD studies in the first place. Whilst a promotion overseas meant Mark was only my PhD supervisor for a short time, his guidance in those early months when I was getting started was appreciated.

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LIST OF ABBREVIATIONS

ADVS	Attitudes to Driving Violations Scale
ALCO	Drink Driving
ANOVA	Analysis of Variance
AR	Anticipated Regret
ATT	Attitudes
BCT	Behaviour Change Techniques
cRCT	cluster Randomised Controlled Trial
DCQ	Driver Coping Questionnaire
DfT	Department for Transport
EFF	Efficacy
ETSC	European Transport Safety Council
GDL	Graduated Driver Licensing
GEE	Generalized estimating equation
INT	Intentions
IVDR	In-Vehicle Data Recorder(s)
KSI	Killed or Seriously Injured
MOB	Mobile phone use
NFCC	National Fire Chiefs Council
PBC	Perceived Behavioural Control
PdTWER	Pre-driver Theatre and workshop Education Research
PMT	Protection Motivation Theory
P_RISK	Perception of Risk Scale
PRM	Parallel Response Model
RAT	Risk Allostasis Theory
RSE	Road Safety Education
SDSA	Safe Drive Stay Alive
SES	Socioeconomic Status
SNORM	Subjective Norms
TPB	Theory of Planned Behaviour
WHO	World Health Organisation

LIST OF PUBLICATIONS AND SUBMITTED MANUSCRIPTS COMPRISING THIS THESIS

Box, E., Dorn, L. (2023). A cluster randomised controlled trial (cRCT) evaluation of a pre-driver education intervention using the Theory of Planned Behaviour. *Transportation Research Part F: Traffic Psychology and Behaviour*, 94, p.379-397 <https://doi.org/10.1016/j.trf.2023.03.001>

CONFERENCE PAPERS, PRESENTATIONS AND AWARDS RELATED TO THIS THESIS

Box, E. (2020). Pre-Driver Workshop & Education Research (PdTWER): Project Overview. *National Fire Chiefs Councils Road Safety Group Meeting*, 7 Jan 20, Dockhead Fire Station, London.

Box, E. (2020). Pre-Driver Workshop & Education Research (PdTWER): Project Overview. *Road Safety Performances Forum, Devon & Somerset FRS HQ*, 28 Jan 20, Exeter.

Box, E. (2020). Pre-Driver Workshop & Education Research (PdTWER): Project Overview. *National Fire Chiefs Councils Road Safety Group Meeting*, 8 Jul 20, Online.

Box, E. (2020). Pre-Driver Theatre & Workshop Education Research (PdTWER) Reviewing current practice and trialling a new approach in the UK, *National Fire Chiefs Council Road Safety Group Meeting*, 9 Dec 20, Online.

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1 INTRODUCTION

This chapter outlines the research which is presented in this paper format thesis. In the sections that follow, the rationale for the research is provided and the aims and objectives are specified. The scope of the research programme and the structure of the thesis are also outlined.

1.1 Rationale for the research

1.1.1 Young driver safety

Road traffic injuries are the leading of cause of death of 5–29 year olds worldwide (World Health Organisation, 2018) making young driver safety a global public health concern. In Great Britain, young drivers between the ages of 17–24 are involved in 24% of all killed and seriously injured (KSI) collisions, despite accounting for a much smaller percentage of all licence holders (7%) (RAC Foundation, 2020).

Jurisdictions throughout the world have sought to put in place robust road safety systems to support the safety of young and novice drivers. Several researchers have investigated the possible causal factors responsible for increased risk amongst young and novice drivers. In a critical ecological systems-based review, Cassarino and Murphy (2018) concluded that incomplete development of cognitive skills (i.e., hazard perception, visual scanning and managing distractions) as well as a greater vulnerability to social influence were particularly important areas of risk for young people. Inexperience, mobile phone distraction, drink driving and speeding were also found to be common causes of road traffic collisions for this age group. Other authors have also identified impairment from fatigue as a risk factor for young driver collision risk (Alvaro et al., 2018). Researchers, policy makers and practitioners throughout the world are seeking to improve the safety of young and novice drivers, making further research into the preventative action which can be taken to improve outcomes for this group an important area of enquiry.

1.1.2 Road Safety Education

Road safety education (RSE) is commonly delivered to road users but is often ineffective. Research on the effectiveness of RSE over the past twenty years has found that interventions have consistently failed to deliver on their safety objectives and have not assisted in enhancing protective licensing approaches for young and novice drivers, such as Graduated Driver Licensing (GDL) (Mayhew, 2007). RSE has also been found to have little or no direct effect on the collision risk of new drivers (Helman et al., 2010). Studies have either shown RSE to have had neutral effects on collisions and convictions (Mayhew et al., 2017) or have demonstrated and/or predicted small positive effects on collision outcomes (Mayhew et al., 2017; Raftery & Wundersitz, 2011) and road safety behaviours (Alonso et al., 2018, 2020).

Several limitations of existing RSE for young driver and/or pre-driver audiences have been noted by previous research. It has been argued that RSE interventions do not adequately address critical age and experience factors (Mayhew & Simpson, 2002) or emphasise enough of the higher levels (e.g., skills for self-control) of the Hatakka et al. (2002) Goals for Driving Education (GDE) Matrix (Brijs et al., 2014). In addition, frequently RSE focuses on improving road safety knowledge, despite the fact that young people have been found to be knowledgeable about key road safety risks (Senserrick & Kinnear, 2017). Providing information about risk has also not been found to lead to lasting behaviour change (Mayhew et al., 2014b; Raftery & Wundersitz, 2011).

Pursuing an evidence-based approach to RSE delivery is an important strategy for improving young driver safety (Mayhew, 2007), however the timing and focus of RSE is also crucial to its impact and success. Mayhew (2006) in their circular on the future of driver education states that for RSE to be an effective safety measure, it should be clearly focused on addressing the high crash rates novice drivers face in their first few months of driving. Poulter and McKenna (2010), in their study of the effectiveness of a RSE intervention for pre-drivers, noted that young people start driving with well-established attitudes. Risky driving attitudes have been associated with sensation seeking and deviant behaviour in children

between the ages of eleven and sixteen (Waylen & McKenna, 2008) and therefore this thesis positions that earlier interventions may be more effective at influencing positive attitudes, rather than seeking to influence attitudes once they are formed. Consequently, pre-driver education, when it is referred to in this thesis, refers to education provided to young people between 16–18 years old, who are approaching the age for driving licensure eligibility.

1.1.3 Intervention framing

Road safety interventions are often negatively framed by emphasising consequences using threat appeal. Research on the impact of threat appeal within the overall public health field dates back to the early 1950s (Carey & Sarma, 2016; Witte & Allen, 2000) where an evaluation of threat appeal research by Higbee (1969) found high threat appeal approaches to have a superior effect in comparison to those employing low threat. High arousal was also found to be more effective than low arousal when the message was delivered by a credible source. Whilst the terms ‘threat appeal’ and ‘fear appeal’ are used as synonyms throughout this thesis, it is important to acknowledge that whilst threat appeals typically aim to illustrate undesirable consequences from certain behaviours, fear is just one of the many emotions (e.g., fear, shame and guilt) that might be elicited by an intervention.

Several review studies and meta-analyses (e.g., Ruiter et al., 2001; Witte and Allen, 2000) have found fear appeal interventions to be less effective than is often assumed. Witte and Allen (2000) in a non-time bounded meta-analysis of more than 100 fear appeals found that an appeal was more persuasive the stronger the fear aroused. They suggested that strong fear appeals encouraged a higher level of perceived severity and susceptibility, which was more persuasive than low or weak fear appeals. Their review also considered that fear appeal can motivate both message acceptance as well as defensive avoidance. The right conditions for a threat appeal message described by Witte and Allen (2000) include there being a high-threat message, with a high-response efficacy (i.e., behaviour recommended likely to be effective) and high self-efficacy (i.e. achievable by the individual). The authors conclude that fear appeals should be

used with caution, given the potential for them to backfire if an audience does not think they have the resources to address the threats presented.

Similar to findings from the broader public health literature, fear appeal use in road safety has been described as less effective than is often assumed (SWOV, 2009) although overall much less is known about the effect of threat appeals in the road safety context. Whilst threat appeals can affect the fear aroused, threat appeals have not been reliably found to effect road safety behaviours (Carey et al., 2013) and efficacy studies on the impact of threat appeals on driving and risk are also inconsistent (Carey & Sarma, 2016). Lewis et al. (2007a, 2007b) in their studies reviewing the role of fear appeals in road safety orientated public communications conclude that physical harm information has a questionable influence on the young male high-risk group, with positive approaches showing more promise. Similarly, Guttman (2016) in their review of persuasive appeals in road safety reported on recommendations being made to denormalize unsafe driving, through focusing interventions on positive social norms (i.e., Rimal et al., 2005). In agreement with Witte and Allen (2000) research has concluded that threat appeals should be used with caution in road safety (Elliott et al., 2003, 2005; Lewis et al., 2007a). This thesis seeks to investigate whether a negatively framed fear appeal intervention for pre-drivers has a sustained effect on attitudes, intentions and behaviours.

Several evidence-based alternatives to fear appeals exist. Job (1988) in their study evaluating the effectiveness of fear in public health promotion campaigns concluded that a positive reinforcement approach may be more effective than a fear appeal alternative. Messages that are neither excessively arousing (e.g., fear appeal) or disengaging (e.g., purely factual presentation) have also been found to support optimal message processing (Rhodes, 2017). The use of positive emotion in road safety advertisements has been identified as key for contributing to their overall persuasiveness. The future exploration of positive emotional appeals in this field has been recommended (Cutello et al., 2020a; Lewis et al., 2007b). Positive emotional appeals when applied to the road safety context involve representing and demonstrating safe driving behaviours and the positive

outcomes which can result. Appeals can include humour, with content that encourages empathy, role-modelling, hope and compassion. Based on the available public health research, it has been posited that positively framed emotional appeals may provide an effective persuasive approach for high-risk male drivers (Lewis et al., 2008). A recently published study by Cutello et al. (2020a), which evaluated an intervention to reduce risky driving behaviours, found that self-reported risky driving behaviours were significantly decreased when participants were shown positively framed films in both 2D and virtual reality (VR) formats, although it was especially true in the VR format. The fear appeal film did not reduce risky driving behaviours when shown in VR and was found to increase young driver's self-reported risky driving behaviours. The rationale for the present research is to evaluate the comparative effects of a negatively framed fear appeal and a positively framed intervention.

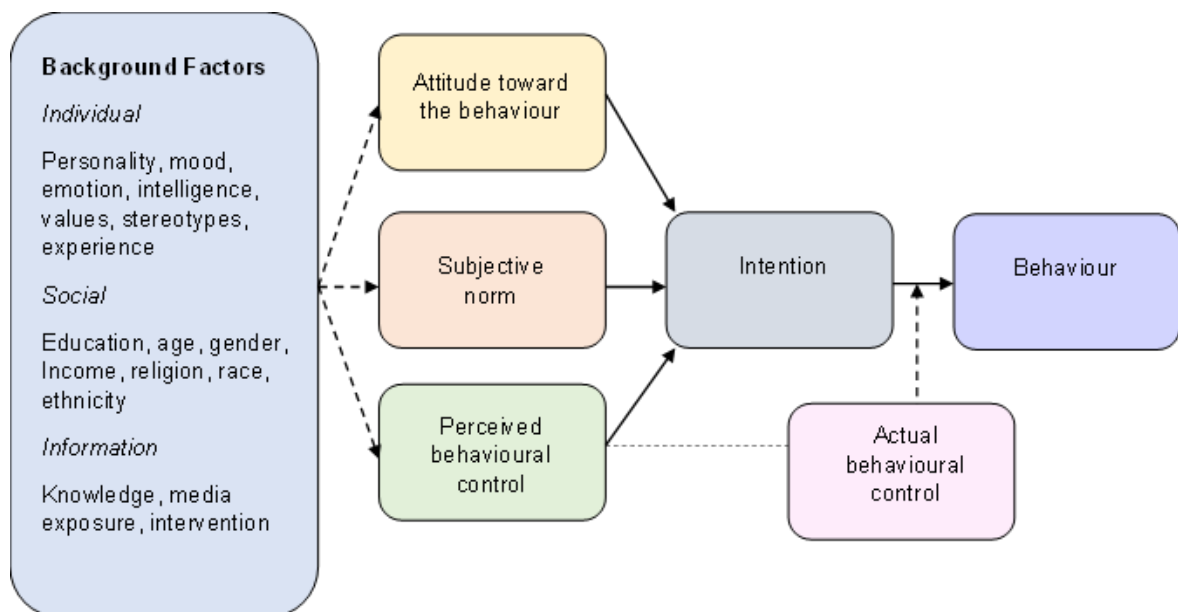
1.1.4 Intervention design

1.1.4.1 Theory of Planned Behaviour

The use of psychological theory to provide an evidential basis for intervention design is recommended, but remains relatively uncommon within pre-driver interventions (Kinnear et al., 2013b). Many studies on the effectiveness of pre-driver education have been conducted on existing interventions that have typically been developed based on practitioner priorities and intuition (Launchbury et al., 2007). It is therefore important, to support the development of a robust evidence base about the effects of interventions, that interventions are developed and evaluated with reference to psychological theory. The sections that follow outline the background to and rationale for applying the chosen theoretical approaches to this research.

For this thesis, the Theory of Planned Behaviour (TPB) (Ajzen, 1991) (See Figure 1-1) has been used as the theoretical basis for the design of a pre-driver intervention and its evaluation, as recommended by previous studies (Poulter & McKenna, 2010). The TPB which is developed from the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) is based on the premise that attitudes (i.e., favourable/unfavourable evaluation of behaviour), subjective norms (i.e., beliefs about other's approval of the behaviours) and perceived behavioural control (i.e., perception of ease or difficulty of performing the behaviour) as well as actual behavioural control shapes an individual's intentions (i.e., cognitive readiness to perform a behaviour) and behaviours, which is also influenced by background factors (i.e., Individual, social and information). Whilst the TPB is not explicitly an intervention design tool, it is often used and recommended for this purpose (e.g., Poulter & McKenna, 2010). It is one of the most commonly applied theories in psychosocial interventions for health promotion (Solomon & Cavanaugh, 2015), with demonstrable effects on achieving positive health outcomes (e.g., Webb et al., 2010), including within road safety (e.g., Stead et al., 2005).

Figure 1-1 Main constructs in the Theory of Planned Behaviour



Source: Ajzen (1991, 2012)

The TPB has been employed in a significant amount of road safety related research over the past 20 years. The theory has been most commonly employed as a framework for evaluating a range of driving beliefs and behaviours related to distracted driving (e.g., Chen et al., 2016), driving violations (e.g., Castanier et al., 2013; Efrat & Shoham, 2013; Forward, 2009; Palat & Delhomme, 2012; Parker et al., 1992a), seatbelt wearing (e.g., Ali et al., 2011; Ledesma et al., 2018; Tavafian et al., 2011), intentions to drive whilst tired (e.g., Lee et al., 2016), using a mobile phone whilst driving (e.g., Sedaghati Shokri et al., 2017; Sullman et al., 2018; White et al., 2010; Zhou et al., 2012), lane changing behaviours (e.g., Wang et al., 2019), speed choice (e.g., Elliott et al., 2003; Lheureux et al., 2016; Paris & Van den Broucke, 2008; Warner et al., 2009; Warner & Åberg, 2006) and drink driving (Moan & Rise, 2011).

The TPB has also been employed to evaluate the specific beliefs and behaviours of young driver outcomes related to speed selection (e.g., Elliott et al., 2013; Horvath et al., 2012a, 2012b; Leandro, 2012), drink driving (e.g., Chan et al., 2010; Marcil et al., 2001; Rivis et al., 2011), passenger behaviours (e.g., Guggenheim et al., 2020; Moan, 2013), risk taking (e.g., Eherenfreund-Hager & Taubman – Ben-Ari, 2016; Rowe et al., 2016), mobile phone use (e.g., Bazargan-Hejazi et al., 2017; Gauld et al., 2016a 2016b; Gauld et al., 2017; Holland & Rathod, 2013; McBride et al., 2020; Nemme & White, 2010; Wang, 2016) and attitudes towards IVDRs (McNally & Bradley, 2018).

Only a small number of studies have used the TPB to develop persuasive anti-speeding messages for all drivers (Elliott & Armitage, 2009) and interventions specifically focused on youth safety traffic behaviours (Ranaei et al., 2021), drink driving (Warner & Forward, 2016) and driver inattention (McDonald et al., 2018). The use of TPB as an intervention design tool is more explicit in some studies than others. For example, Elliott and Armitage (2009) developed an intervention based on elicited beliefs (behavioural, normative and control) related to drivers' intentions to comply with speed limits (Elliott et al., 2005) and found that the intervention – a hard copy booklet targeting elicited beliefs – had a significant effect on one control belief and increased perceived behavioural control which

influenced behaviour at one-month post-baseline. McDonald et al. (2018) also used the TPB to elicit beliefs about mobile phones and peer passenger distractions to inform the intervention “Let’s choose ourselves”, a 45-minute web-based, fact orientated and interactive intervention which provided realistic scenarios of how to deal with mobile phone use and driver distraction. A subsequent randomised controlled simulator-based trial (McDonald et al., 2021) found the intervention had no significant effects on mobile phone use engagement nor increased use of peer passengers to manage behaviours three-months post-intervention in comparison to the control condition.

Other studies describe the use of TPB as an intervention design more generally. For example, the quasi-experimental study conducted by Ranaei et al. (2021) stated that “*The research team designed the educational contents by applying experts’ opinions with an emphasis on effective constructs of TPB and using appropriate strategies to change them*” (p.5). The controlled study by Warner and Forward (2016) described the road safety messages developed for testing as being influenced by the TPB in more general terms. Ranaei et al. (2021) found that the educational video, booklet and pamphlet delivered a significant ($p < .05$) improvement in the intervention group, over and above the control and Warner and Forward (2016) found that the emotional and factual message combined demonstrated the largest effect on variables included within the TPB. Collectively, these studies demonstrate that there is merit in designing interventions using the TPB and that different methods are employed in doing so.

In recent years a lively debate has ensued within the academic literature about the continued value of the TPB within the behavioural sciences. Sniehotta et al. (2014) in their editorial titled ‘Time to retire the theory of planned behaviour’ argue that despite the significant amount of empirical health related research conducted employing the TPB as a theoretical framework for the design and evaluation of behavioural interventions, systematic reviews have typically found the TPB to account for only small variants in health behaviours, a criticism which has also been supported by other commentators (e.g., Ogden, 2015; Trafimow, 2015). Ajzen (2015) in response stated that such criticism was unfounded as it illustrated

a misunderstanding of the theory and misinterpreted findings of studies which had been poorly conducted as evidence against the theory. Whilst the discussion started by Sniehotta et al. (2014) was recognised to be of value in simulating debate (Schwarzer, 2015), several subsequent commentators have reported recognising the value of TPB as part of a broader theoretical toolkit (Abraham, 2015) and for its contribution to the development of other relevant principles (i.e., implementation intentions (Gollwitzer & Oettingen, 2015)). The case has been made by several researchers for extending and building on the TPB to ensure that it can better inform interventions designed to influence behaviours (Armitage, 2015; Conner, 2015; Rhodes, 2015). The rationale for the present research is to use the TPB as an evidential basis for the design of a pre-driver intervention.

1.1.4.2 Behaviour Change Techniques

A further criticism of road safety and broader public health evaluation research is that it is often difficult to understand intervention component composition, making study findings difficult to compare with other intervention outcomes (Abraham & Michie, 2008; Fylan & Stradling, 2014). Abraham and Michie (2008) outlined a standardised definition of Behaviour Change Techniques (BCTs) used within behavioural interventions to support the identification and replication of effective components within studies. This began as a 26-item taxonomy which was subsequently expanded to a 93-item taxonomy following a Delphi-type exercise (Michie et al., 2013). BCTs have been defined as “*Observable, replicable and irreducible component[s] of an intervention designed to alter or redirect causal processes that regulate behaviour*” (Michie et al., 2013, p.82). Fylan and Stradling (2014) in their evaluation of BCTs present in six road safety interventions in the UK, using the 26-item taxonomy (Abraham & Michie, 2008), found only a small subset of BCTs were employed, with a focus on increasing awareness of risks and highlighting consequence severity. This finding was further confirmed by Dale et al. (2017), who evaluated the BCT content within a pre-driver intervention using the 93-item taxonomy (Michie et al., 2013) and found seven negatively framed BCTs included, with a focus on consequences. Fylan and Stradling (2014) recommended that the range of BCTs deployed within road safety interventions should be increased and that they should be clearly specified in intervention

manuals and evaluation studies to support the ongoing collation of evidence about BCT effectiveness. The rationale for this thesis is to evaluate BCT intervention component composition within a sample of negatively framed pre-driver interventions to inform the design of a positively framed pre-driver intervention.

1.1.4.3 Implementation intentions

Implementation intentions have been recommended as technique to enhance the effectiveness of pre-driver interventions (Poulter & McKenna, 2010). The concept of implementation intentions was introduced by Gollwitzer (1993, 1999) who recognised that when people experience difficulties with translating goals into actions, there is value in relying on pre-defined automatic processes to assist individuals to meet their goal intentions, consequently helping to bridge the well-known intention-behaviour gap (Sheeran, 2002). Implementation intentions have been described as designating “*the control of goal-directed responses to anticipate situational cues, which (when actually encountered) elicit these responses automatically*” (Gollwitzer, 1999, p.493). Self-regulatory implementation intentions are also referred to as ‘if-then’ plans (e.g., ‘IF circumstance X occurs, THEN I will take Y action’). The effect of implementation intentions has been evaluated by several studies in the field of public health (e.g., Sheeran & Orbell, 1999), with a meta-analysis (Gollwitzer & Sheeran, 2006) finding a medium-large positive effect ($d = .65$) in a range of health, social, personal, household, career and business goals ($n = 94$). Specifically, the meta-analysis found evidence for implementation intentions being effective at promoting goal setting instigation, protecting goals from potentially negative influences, encouraging withdrawal from inadequate courses of action and protecting an individual’s capacity for future goal motivation. However, it is important to note an important qualification raised by Kok et al. (2016), who report that implementation intentions have been very effective when applied appropriately (i.e., when a pre-existing intention exists to perform the behaviour, as opposed to a wholly new intention), indicating that the context of their application has important implications for the outcomes achieved.

In the road safety arena, a limited number of studies (i.e., Brewster et al., 2015; Elliott & Armitage, 2006; Gwyther & Holland, 2015; Tekeş & Özkan, 2021) have been conducted to evaluate the effect of implementation intentions on road safety outcomes. Implementation intentions have been found to assist with attaining safe driving goals (Gwyther & Holland, 2015), intensifying goal intentions (Elliott & Armitage, 2006), supporting compliance with speed limits (Brewster et al., 2015; Elliott & Armitage, 2006) and preventing increased speed (Tekeş & Özkan, 2021). Whilst the effectiveness of implementation intentions on road safety outcomes, particularly beyond speeding behaviours, is sparse, there have been several calls within existing evaluation research for implementation intentions to be trialled within pre-driver interventions (Cuenen et al., 2016; Poulter & McKenna, 2010). Cuenen et al. (2016) stress in their pre-driver testimonial intervention evaluation, that interventions should not be vague about what is asked of people and that implementation intentions may be a good technique to apply to pre-driver interventions to help attendees convert behavioural intentions into desired behaviour. These studies support the rationale for including implementation intentions in the design of the pre-driver intervention reported in this thesis.

1.1.4.4 Active learning and resilience education

The active engagement of a target audience is one strategy that can be used for maintaining and managing attention (Markl, 2016). Cuenen et al. (2016) describe how simple energising strategies such as self-activation and social interaction can be used to avoid non engagement. Active classroom education has been found to be more effective than other methods, through increasing engagement and enhancing cognitive ability (Michel et al., 2009; Riaz et al., 2019). Deighton and Luther (2007) note that road safety interventions seem to be more successful when they include active participation and discussion. They also comment on the positive impact of personal experiences and reflective thinking and recommend the use of such interactive elements in future interventions.

Workshops can support active learning approaches and are often used within road safety education initiatives. Studies assessing workshop programmes delivered to young people have reported subsequent reductions in collisions (Senserrick et al., 2009), improvements to road safety knowledge and attitudes (Treviño-Siller et al., 2017) and other socio-cognitive variables (Riaz et al., 2019). In contrast, other studies have reported no impacts on perceived risks associated with unsafe driving (Glendon et al., 2014).

Resilience education focuses on building strengths and competencies by encouraging young people to reflect on their behavioural tendencies, strengths and weakness. It can also support young people to develop strategies for coping with risky circumstances and assist them with bouncing back from adversity (Senserrick & Kinnear, 2017). The focus is not only on managing ones' own risk, but also that of peers and friends by looking out for them and promoting safety orientated social norms (Senserrick & Kinnear, 2017). A non-driving focused resilience education programme implemented in Australia, reported a 44% reduction in relative crash involvement amongst young drivers (Senserrick et al., 2009). The rationale for the research reported in this thesis is to incorporate active learning and strengths and competencies development into the design of a pre-driver positively framed intervention.

1.2 Research aims and objectives

The overall aim of this programme of research has been two-fold: To comprehensively evaluate the role and potential of pre-driver education to support young and novice driver safety; and to design and demonstrate a blueprint for the development and evaluation of road safety interventions. Specifically, the research aims to evaluate the effectiveness of positively and negatively framed road safety interventions on responses to Theory of Planned Behaviour components (Ajzen, 1991). The objectives of the research are to:

1. Critically review pre-driver education interventions as reported by published literature since 2000 to establish their stated goals and effectiveness in delivering planned outcomes (See Paper 1);

2. Evaluate the content of and the extent to which a sample of negatively framed testimonial pre-driver theatre interventions employ Behaviour Change Techniques (BCTs) (See Paper 2);
3. Evaluate young driver safety risk factors reported by the published literature to inform intervention content creation (See Paper 3);
4. Evaluate deliverer perceptions of current testimonial performances to inform intervention design and delivery considerations (See Paper 4);
5. Evaluate pre-driver beliefs and perceptions of preventative messages to inform the intervention design (See Paper 5);
6. Design and pilot a theoretically grounded and positively framed pre-driver film and workshop intervention (DriveFit) (See Paper 6);
7. Investigate the effect of the DriveFit film and workshop intervention on TPB components immediately before and after delivery and 8–10 weeks post-intervention via a Cluster Randomised Controlled Trial (See Paper 7);
8. Investigate the effect of the SDSA Surrey intervention on TPB components immediately before and after delivery and 8–10 weeks post-intervention using a comparison study; (See Paper 8) and
9. Conduct a process evaluation of DriveFit and SDSA Surrey to explore how participants and programme deliverers experienced the intervention to establish learning for future intervention design (See: Paper 9).

These nine research objectives are addressed in turn by nine papers reported as part of this thesis in Chapters 2–10.

1.3 Scope of the research programme

This programme of research has been largely based on self-reported survey responses from students, teachers and deliverers. Whilst there are recognised limitations associated with the application of self-reported methods (Hessing et al., 1988), including poor reliability (Af Wåhlberg & Dorn, 2015), socially desirable responding and common method variance (Af Wåhlberg et al., 2010), as the

research was focusing on a pre-driver audience it was not within the scope of the study to measure actual (or simulated) driving behaviours as has been conducted by previous studies (e.g., Tapp et al., 2013). Despite the limitations of self-report survey data, this measurement approach provides important information about precursors to behaviour, which have been found to have acceptable levels of validity (Zhao et al., 2006) and can be corroborated using other sources of data (Taubman - Ben-Ari, 2010).

The research has focused on the delivery of pre-driver education within school/college environments, with an explicit focus on driving and to a lesser extent passenger behaviours. Other modes of transport which might be used by the pre-driver age group (i.e., walking, cycling, public transport, e-scooters and/or mopeds) were not addressed by this programme of research. The empirical research conducted was also delivered in three geographic areas in the UK (i.e., Devon, Kent and Surrey) and therefore the findings of the studies may not have wider applicability to other geographical locations.

1.4 Structure of the dissertation

Paper 1 presents available evidence on the composition and effectiveness of pre-driver education interventions which include theatre, film and/or workshop/group discussion components. The study finds that pre-driver education interventions can have small-scale, short-term beneficial effects on some antecedents to behaviour, although null or non-beneficial effects are also possible. The study concludes that future interventions should be designed with reference to behavioural theory and evaluated using high-quality research designs (i.e., randomised trials) alongside valid and reliable outcome measures to ensure that intervention effects can be better understood and replicated. In addition, it is recommended that future interventions ensure intervention dosage is optimised to minimise the waning effects of interventions over time. Finally, it is suggested that future interventions should be designed and evaluated to test developing theories about the role of positively framed interventions. This critical review assesses the composition and effectiveness of pre-driver education interventions and contributes to knowledge by confirming the magnitude and duration of effects

that can be expected from interventions of this type. The study also identifies promising intervention elements and knowledge gaps which can be built on by future research. The findings in this paper inform the subsequent studies reported in this thesis.

Paper 2 evaluates the content of a sample of negatively framed testimonial pre-driver theatre interventions and identifies the Behaviour Change Techniques (BCTs) employed by the performances which aim to improve road safety outcomes amongst pre-drivers. The study found that there was an over-reliance in the performances on emergency service personal testimonials related to road traffic collision consequences using a threat appeal approach. Very little content was either positively framed or focused on the strategies and coping mechanisms that can support young people with managing their on-road behaviours. Consequently, the BCTs identified within the performances were largely negatively framed and focused heavily on a few specific techniques (i.e., Information about antecedents, Information about health consequences, Salience of consequences, Information about social and environmental consequences, Information about emotional consequences, Credible source and Vicarious consequences). Whilst there were some variations in the themes and BCTs employed within the different performances reviewed, the study's overall conclusions apply across all interventions reviewed. This study adds to the research literature by providing clarity about the content, themes and BCTs that are included within a sample of pre-driver testimonial performances. The study also suggests how intervention content and BCT inclusion can be improved in future pre-driver education interventions. These findings have directly informed Papers 3 - 6 in this thesis.

Papers 3 - 6 report on the design and piloting of a pre-driver intervention which aims to improve the road safety attitudes and intentions of 16–18 year old pre-drivers. The DriveFit intervention was designed with reference to systematic and critical literature reviews on young driver road safety risks (See Paper 3) and the Theory of Planned Behaviour was used as the underlying theoretical framework for the design and evaluation of the intervention (See Chapter 1). Workshops and

focus groups run with intervention deliverers (See Paper 4) and the target audience (See Paper 5), in addition to piloting the intervention with two schools, informed the final intervention design (See Paper 6), which also employed BCTs and implementation intentions as recommended by Paper 2. These studies contribute to the field of young driver safety by demonstrating an iterative, evidence-based approach to developing a positively framed intervention to improve pre-driver attitudes and intentions towards road safety behaviours. As demonstrated in Papers 1 and 2, current pre-driver interventions are rarely designed based on theoretical model of behaviours and are typically negatively framed (e.g., consequence focused). It is also unusual for the process of intervention design to be documented in detail, which allows for study scrutiny, replication and further development.

Paper 7 reports on the findings of a cluster randomised controlled trial evaluation of the DriveFit pre-driver education intervention on 16–18 year old road safety intentions, attitudes and other risk outcome measures. The study concludes that the DriveFit intervention led to some small improvements in risk intentions, attitudes and other measures, which differed by sub-group. Whilst previous research has found that education interventions deliver small self-reported effects, that diminish over time, this study finds small, but longer lasting attitude effects (which diminish in magnitude over time) and a trend towards improving intentions, over and above the control group. This paper contributes to existing knowledge in several ways. The study demonstrates good practice in experimental design through the application of a high-quality, robust cluster randomised controlled trial to establish the effects of the DriveFit intervention. In addition, this evaluation captures the impact of the intervention on several young driver risks (i.e., speeding, drink driving, mobile phone use and driving tired), whereas it is more common for studies to only focus on one area of risk (i.e., speed See Paper 1). Finally, this paper, alongside Paper 6, documents the development and evaluation of a theoretically-based and positively framed intervention, which fills a substantial gap in current knowledge, by providing a blueprint for researchers and practitioners to apply in the design and evaluation of future interventions.

Paper 8 reports on the findings of an evaluation of the SDSA Surrey pre-driver intervention on the same outcome measures used for DriveFit evaluation reported in Paper 7. The aim of this study was to establish the effectiveness of the intervention both immediately post-intervention and at 8–10 weeks post-intervention using the DriveFit control condition as a comparison group. This study found that the SDSA Surrey intervention had some small positive, immediate effects, which largely disappeared by the 8–10 week measurement point. This study contributes to knowledge through confirming and adding to the findings of other studies, which have found that negatively framed testimonial studies typically deliver small, short-term effects (See Paper 1). By running this study in parallel with the DriveFit evaluation, reported in Paper 7, using the same evaluation metrics, it has been possible to compare the findings from each of the studies. This adds significantly to current knowledge as there are currently no known examples of a comparative evaluation of two differently framed pre-driver interventions.

Paper 9 reports on the process evaluations conducted for the DriveFit and SDSA Surrey interventions (reported in Papers 7 and 8). The purpose of this study was to examine student, teacher, deliverer and facilitator experiences and perspectives of the DriveFit and SDSA Surrey interventions. The study found that, overall, the interventions were delivered as intended and that trial recruitment procedures were adhered to. Both interventions were rated as having a positive cognitive impact (i.e., credible, useful, interesting, important and informative) and good levels of face validity (e.g., I am now more aware of my responsibilities as a passenger). SDSA Surrey was rated as having a negative emotional effect (i.e., shocking, worrying and frightening), whereas DriveFit was not rated as having this effect. Some sub-group differences were also noted for DriveFit. The paper concludes with recommendations for the design and delivery of future process evaluations and makes some recommendations for potential developments to the DriveFit intervention.

2 PAPER ONE - EFFECTIVENESS OF PRE-DRIVER EDUCATION AT INCREASING YOUNG DRIVER SAFETY: A CRITICAL REVIEW

2.1 Abstract

Young drivers are at a disproportional risk of death or serious injury during their first year of solo driving, largely as a result of their age and lack of experience (McCartt et al., 2009; O'Brien et al., 2016; Roman et al., 2015). Pre-driver educational interventions are typically delivered with the express purpose of reducing death and serious injury amongst this at-risk group. The rationale for intervening during the pre-licensure stage typically relates to supporting the development of road safety attitudes, intentions and behaviours ahead of on-road exposure. This paper presents a critical review of pre-driver education interventions to establish stated goals and effectiveness in delivering planned outcomes. Interventions selected for this review targeted pre-drivers between the ages of 16–18, had clearly stated aims and measured outcomes, included a theatre, film and/or workshop/discussion group component and had at least one evaluation study published in English since 2000. A comprehensive search of four databases in January 2021, updated in December 2022, identified 29 articles representing 22 interventions. Promising intervention elements have been highlighted and knowledge gaps to be addressed by further research have been identified. Overall, this review finds that pre-driver education interventions can have small-scale, short-term beneficial effects on antecedents to behaviour. It is recommended that future interventions should be designed with reference to behavioural theory and evaluated using high-quality research designs (i.e., randomised trials) alongside valid and reliable outcome measures to ensure that intervention effects can be better understood and replicated. In addition, it is recommended that future interventions ensure intervention dosage is optimised to minimise the waning effects of interventions over time.

2.2 Introduction

Road Safety Education (RSE) is one of many intervention options available to jurisdictions seeking to improve the safety of young and novice drivers. RSE is the delivery of any activity that aims to facilitate learning, with road safety training more narrowly describing the instruction associated with the development of a specific skill set (Senserrick & Kinnear, 2017). Despite various challenges experienced with the delivery of effective RSE (e.g., the provision of theoretically informed interventions delivered consistently to protocol), RSE is recognised to be an important component within the overall road safety system (Senserrick & Kinnear, 2017), providing its delivery is based on evidence of 'what works' to reduce collisions and improve road safety behaviours (Mayhew & Simpson, 2002; Senserrick & Kinnear, 2017).

Pre-driver education is one type of RSE and although there is no one accepted definition, pre-driver interventions are typically provided to young people, between the ages of 16 and 18, who have not passed their driving test but maybe learning to drive. The delivery of pre-driver education is one way in which authorities seek to reduce death and serious injury amongst this at-risk group. Given the significant health risks posed by driving to young people, intervening at this age is common (Deighton & Luther, 2007) and considered appropriate from a developmental perspective as an association between sensation seeking, deviant behaviour and attitudes towards risky behaviour has also been found between the ages of eleven and sixteen, peaking at age fourteen (Waylen & McKenna, 2008). Attitudes held at the pre-driver and learner stage are also important for determining later solo driving behaviour (Helman et al., 2013), with one longitudinal study conducted in New Zealand finding that pre-driver attitudes were correlated with self-reported driving violations (Mann & Sullman, 2008). Rowe et al. (2016) argue that modifying pre-driving beliefs has the potential to reduce novice driver crash involvement, which is particularly important given the well documented risks associated with speeding and distracted driving during the early months of driving licensure. As has been suggested for RSE more generally, Rowe et al. (2016) suggest that interventions with small effects can have a strong impact, if targeted at the right time for pre-drivers (i.e., around the

point of licensure for independent driving). The evidence for pre-driver intervention delivery to effect positive change has however not been universal. A longitudinal questionnaire study from the UK found that baseline attitudes in pre-drivers did not predict violations in fully-qualified drivers at follow-up, whereas learner and fully-qualified driver attitudes at baseline were predictive of violations at follow-up (Rowe et al., 2013). These findings led the authors to caution deliverers about delivering attitudinal interventions to non-drivers. Helman et al. (2013) argue that driver education and training should be considered as an area of research, rather than a validated public health intervention given the absence of robust evaluation data from randomised trials.

Pre-learner interventions in the UK, typically delivered in schools and colleges, are often led by local authorities and road safety partnerships, as well as emergency service providers. It is common for whole year groups of students over the age of 16 to take part, either by watching theatre-based education, taking part in interactive workshops, or a combination of the two (e.g., Cutello et al., 2020b; Poulter & McKenna, 2010). Interventions delivered often seek to improve safety by influencing pre-driver attitudes, knowledge and/or skills (Kinnear et al., 2013b). They typically fall into three broad categories: providing information to support safe driving and passenger behaviours; emphasising the risks and consequences of collisions with the aim of dissuading poor driving and passenger behaviours; and encouraging and supporting reflection on the development of coping mechanisms for managing risks. Out of these three broad categories, the first two are the most prevalent (e.g., Cuenen et al., 2016; Dale et al., 2017; Poulter & McKenna, 2010), which are largely designed and delivered using a fear or threat appeal approach (See Chapter 1).

This critical literature review aims to bring together the available evidence on the composition and effectiveness of pre-driver education interventions to guide a new intervention design (reported in Paper 6) and inform the evaluation of this new intervention in comparison to a testimonial style provision (See Papers 7-9). Promising intervention elements and knowledge gaps will be identified.

2.3 Method

The inclusion criteria for this review are pre-driver education interventions delivered either by using a theatre, film and/or workshop/discussion group format, with clearly stated aims and measured impact outcomes, targeted to pre-drivers between the ages of 16 and 18. In addition, the interventions were required to have at least one evaluation study published in English since 2000. To identify interventions, a systematic search of peer-reviewed and grey literature using Scopus, PsycINFO, ScienceDirect and PubMed databases as well as other sources identified through a snowballing reference approach was conducted using the Boolean search terms set out in Table 2-1 below. The way in which these searches were conducted was adapted to the search functions available within the databases.

Table 2-1 Boolean search terms for pre-driver intervention article identification

Database	Search terms	No. articles
Scopus	(TITLE(("teen*" OR "new" OR "inexper*" OR "adolescent" OR "novice" OR "learner" OR "pre-teen" OR "pre-test" OR "pre" OR "under17" OR "U17" OR "permit" OR "young" OR "learn*")) AND "driv*" AND ("intervention" OR "evaluation")) AND PUBYEAR > 2000 AND PUBYEAR > 2000) OR (KEY(("teen*" OR "new" OR "inexper*" OR "adolescent" OR "novice" OR "learner" OR "pre-teen" OR "pre-test" OR "pre" OR "under17" OR "U17" OR "permit" OR "young" OR "learn*")) AND "driv*" AND ("intervention" OR "evaluation")) AND PUBYEAR > 2000 AND PUBYEAR > 2000)	2,159
PsycINFO/ EBSCO host	KEY (("teen*" OR "new" OR "inexper*" OR "adolescent" OR "novice" OR "learner" OR "pre-teen" OR "pre-test" OR "pre" OR "under 17" OR "U17" OR "permit" OR "young" OR "learn*") AND "driv*" AND ("intervention" OR "evaluation")) - Years 2000-2023	54
ScienceDirect	TIT ABST KEY ("Pre-driver" AND ("intervention" OR "education"))	11
	TIT ABST KEY (("Pre-test" AND "driver") AND ("intervention" OR "education"))	10
	TIT ABST KEY (("teenage" AND "driver") AND ("intervention" OR "education"))	48
	TIT ABST KEY (("pre-teen" AND "driver") AND ("intervention" OR "education"))	0
	TIT ABST KEY (("u17" AND "driver") AND ("intervention" OR "education"))	0
	TIT ABST KEY (("under-17" AND "driver") AND ("intervention" OR "education"))	0
PubMed	("pre"[Text Word] AND "driver"[Text Word]) AND ("intervention"[Text Word] OR "evaluation"[Text Word])	267
Other sources	Snowball review from other studies	34
TOTAL		2,583

The initial database search was conducted in January 2021 and updated in December 2022. Keyword searches using the Boolean search string in Table 2-1 was designed to capture a wide range of interventions targeting pre-drivers. All types of interventions were considered for inclusion including simulator, classroom, VR, film etc. All possible methods of data collection for evaluating the intervention were also considered for inclusion. This approach necessitated the use of broad search string and returned a large number of papers ($n = 2,585$).

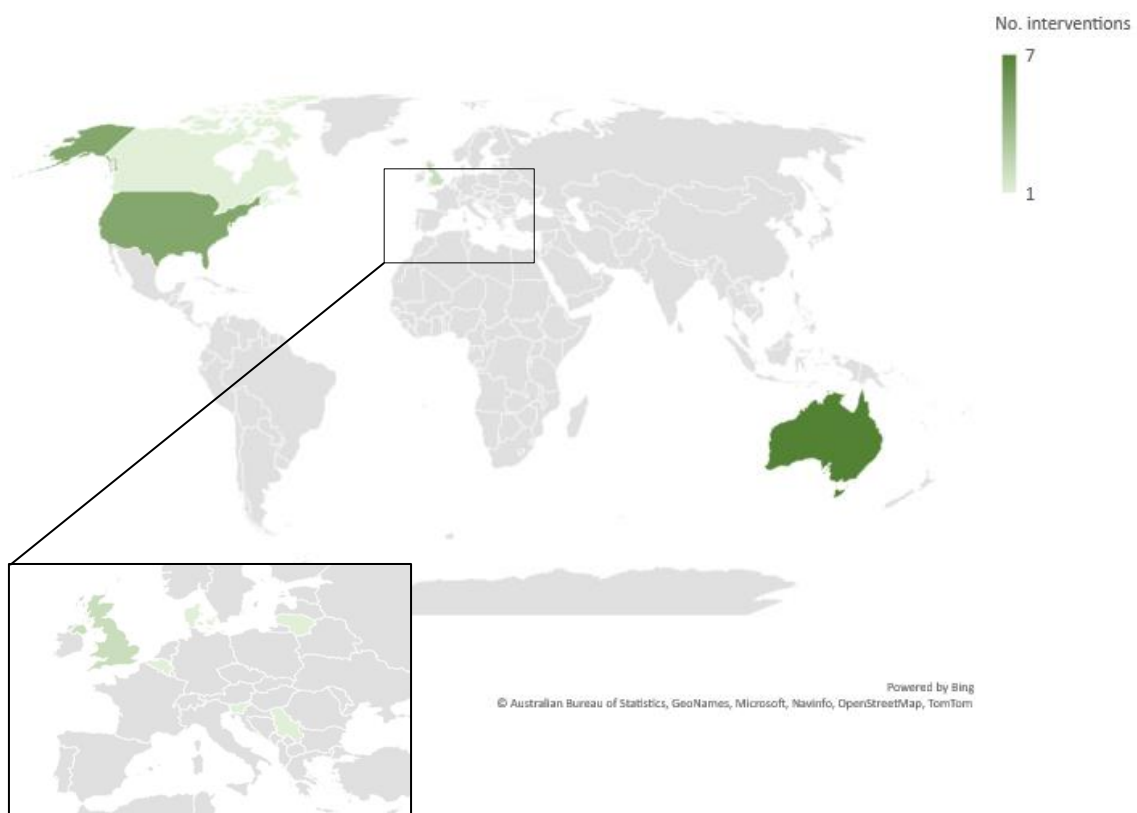
A title sift ($n = 244$) followed by an abstract sift was then conducted by the main researcher to identify the articles to be selected for detailed review ($n = 74$). A review spreadsheet was developed to extract data from each included study. A second researcher then checked a random sample of the search returns and compared this to the review spreadsheet to identify whether relevant literature had been deselected in error. The second researcher agreed with the first researcher that the 74 papers selected be considered for analyses. The papers were then downloaded for a full paper review by the main researcher. Following reading the full article text, 29 articles were identified for inclusion based on the criteria set. The 22 interventions which qualified for evaluation were grouped according to their delivery mechanism components (i.e., positively or negatively framed). Negatively framed interventions are defined in this study as those that take a fear or threat appeal approach. Positively framed interventions are defined in this study as those that either promote positive emotions (i.e., pride, empathy) or support the development of strengths and competencies (See Chapter 1 for a further discussion). A summary of each intervention is provided (See Appendix A.1). Studies were excluded where there was not sufficient statistical analysis to determine the effect of the intervention (i.e., where full results not provided, or when only the percentage of survey responses to item outcomes were provided) and where studies addressed other elements of pre-driver education (i.e., parental interventions, on-road driving).

2.4 Results

2.4.1 Descriptives

Of the interventions identified ($n = 22$) from the studies selected ($n = 29$), 27.3% ($n = 6$) were predominantly positively framed, with the remaining 72.7% ($n = 16$) interventions negatively framed. The interventions were delivered in ten different countries, with the incidence of intervention in each country outlined in Figure 2-1. The greatest number of interventions found were in Australia ($n = 7$), followed by the USA ($n = 5$). Two-thirds of the interventions delivered in both Australia and the USA were negatively framed. Seventy-five percent ($n = 12$) of the negatively framed interventions evaluated were run in school environments, with the remaining 25% ($n = 4$) delivered within hospitals. In contrast, the positively framed interventions were predominantly delivered in schools (5 out of 6).

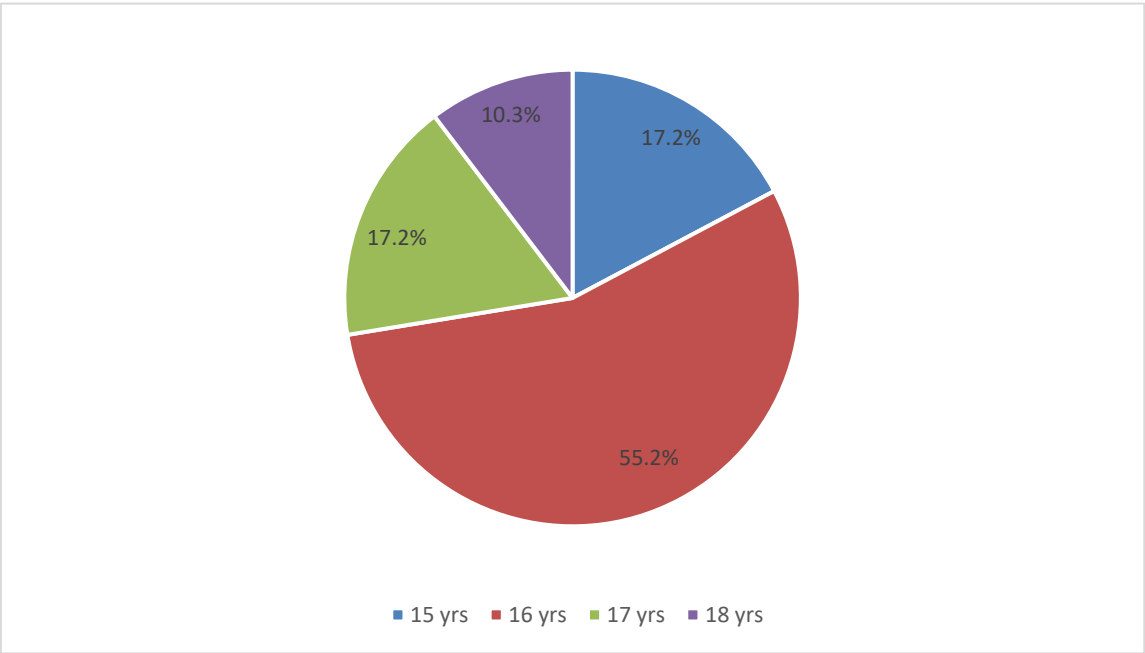
Figure 2-1 Positively and negatively framed interventions per country ($n = 22$)



All negatively framed interventions evaluated included a crash reconstruction, simulation, or personal testimonial element, with 81% of these interventions also including some element of follow-up activity. All the positively framed interventions included classroom discussion and active learning elements including the development of coping strategies and skills.

There was a large variation in evaluation study sample sizes referenced in this review ($M = 2,420.89$, $SD = 5,203.56$, $Mdn = 800$, $MIN: 89$, $MAX: 20,822$, $n_{studies} = 29$). Males made up, on average, just under half of participants in the studies reviewed ($M = 46.8\%$, $SD = 6.64$, $MIN: 33.5\%$, $MAX: 60\%$, $n_{studies} = 27$). The interventions were delivered to 13–18 year olds, most commonly to 16 year olds ($M_{age} = 16.2$, $SD = 0.86$) in 55.2% of the studies reviewed ($n = 29$) (See Figure 2-2). It should be noted that the age of licensure differs by country. Studies were included in this review where specific reference was made to the intervention being delivered to pre-drivers.

Figure 2-2 Mean age for intervention delivery, by study ($n = 29$)



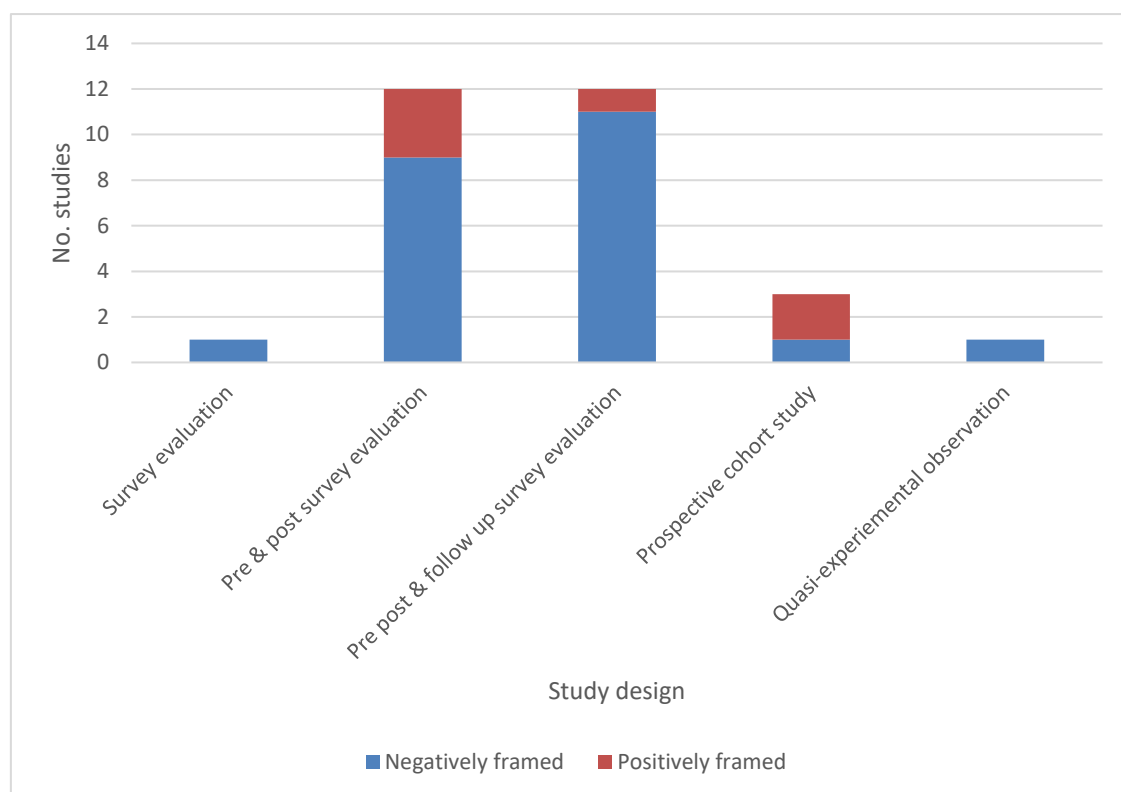
The duration of the interventions varied from 1.5 hrs in length, to activities taking place over a ten-week period (See Table 2-2). Pre- and post-survey evaluations (with and without follow-ups) were the main study design used to evaluate both positively and negatively framed interventions (See Figure 2-3).

Table 2-2 Duration of interventions (*n* = 22)

		Days/weeks					TOTAL
		n.a.	1 day	3 days	2-4 wks	10 wks	
Hours	n.a.		4	2	1	1	8
	1.5hrs		2				2
	2hrs		5				5
	3hrs		4*				4
	4hrs	1	2				3
	TOTAL	1	17	2	1	1	22

* One intervention, evaluated by two studies varied in duration (1 day and follow-up at 3-months) (See Appendix A.2). As most of the intervention was delivered in 1 day, the intervention has been categorised as such in this table.

Figure 2-3 Study design for pre-driver intervention evaluations (*n* = 29)



Of the studies reviewed ($n = 29$) 55.2% included a control or comparison group. A slightly higher proportion of the negatively framed intervention studies (56.5%, $n = 23$) included a control or comparison group than the positively framed intervention studies (50%, $n = 6$).

A breakdown of the study designs and their inclusion of a control/comparison group is outlined in Figure 2-4, which shows that pre-post only, pre-post and follow-up survey evaluations were the study designs most likely to lack a control or comparison group in the studies reviewed. The analysis approaches used by the studies were also reviewed (See Figure 2-5). Regression analysis (i.e., logistic, linear, univariate, multivariate, binomial, hierarchical multi-level and Poisson) followed by ANOVA/ANCOVA analysis and paired sample t-tests were most frequently conducted within the studies.

Figure 2-4 Intervention study designs and presence of a control/comparison groups ($n = 29$)

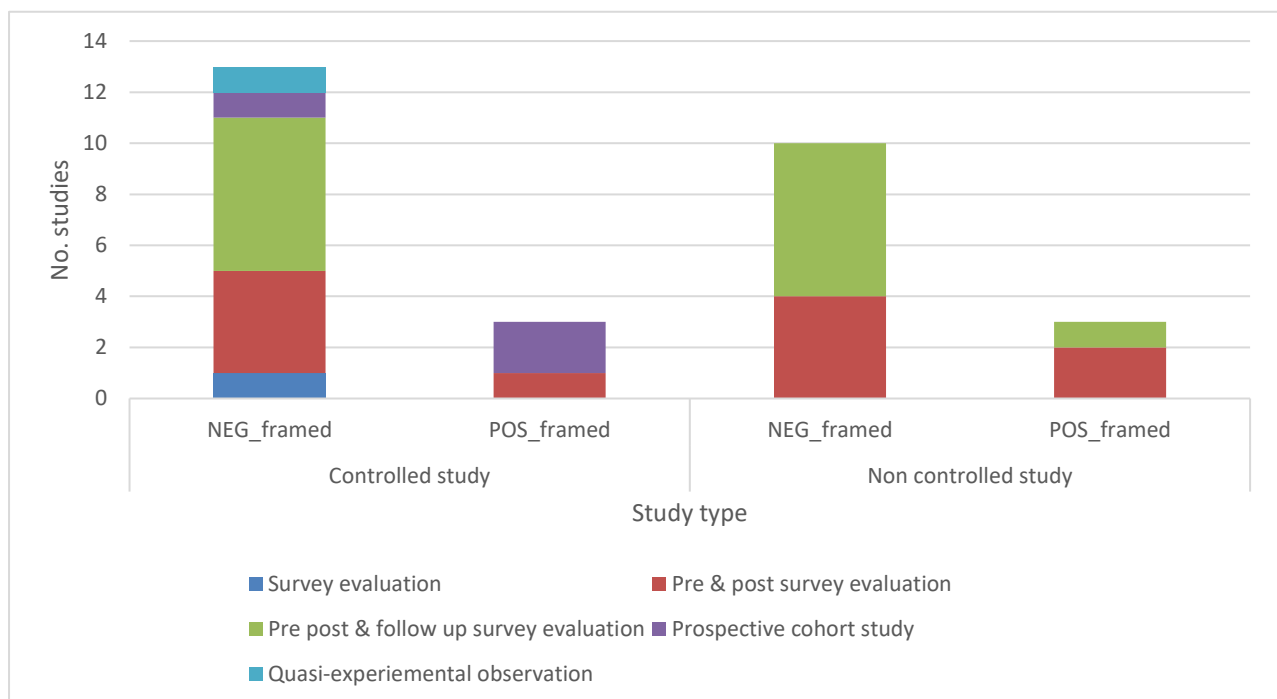
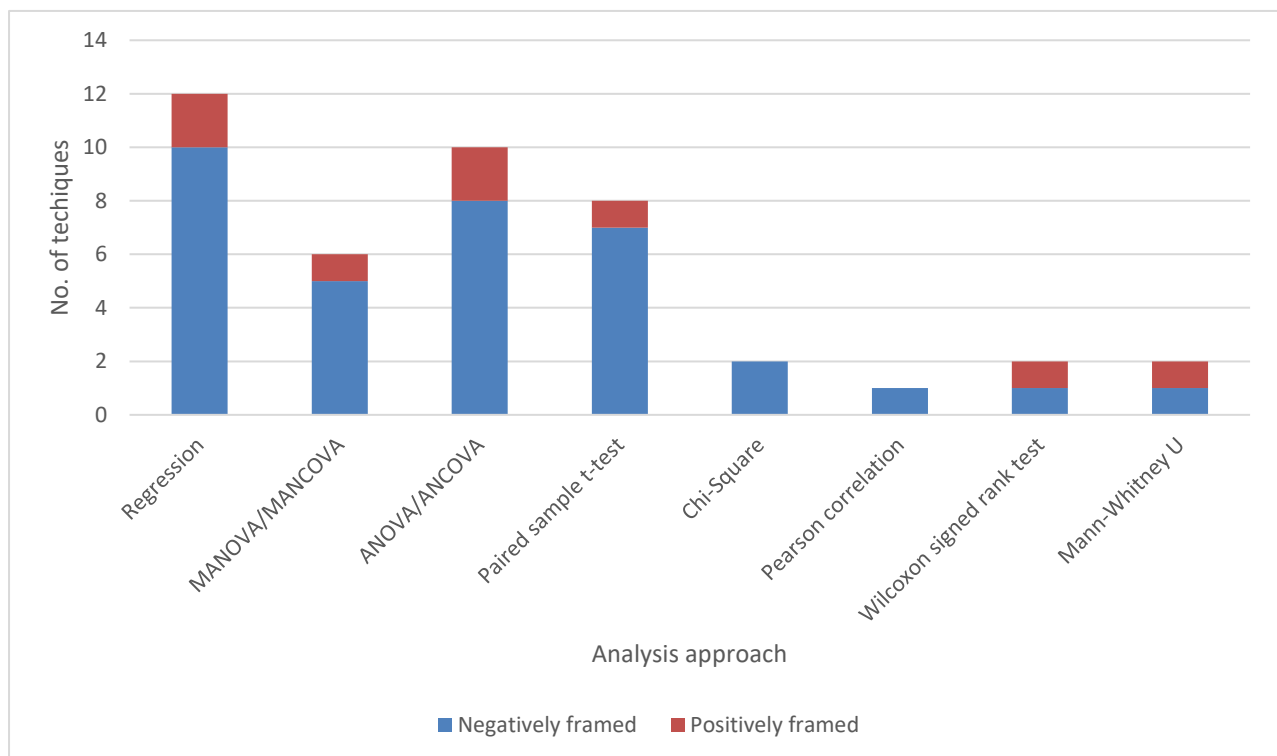
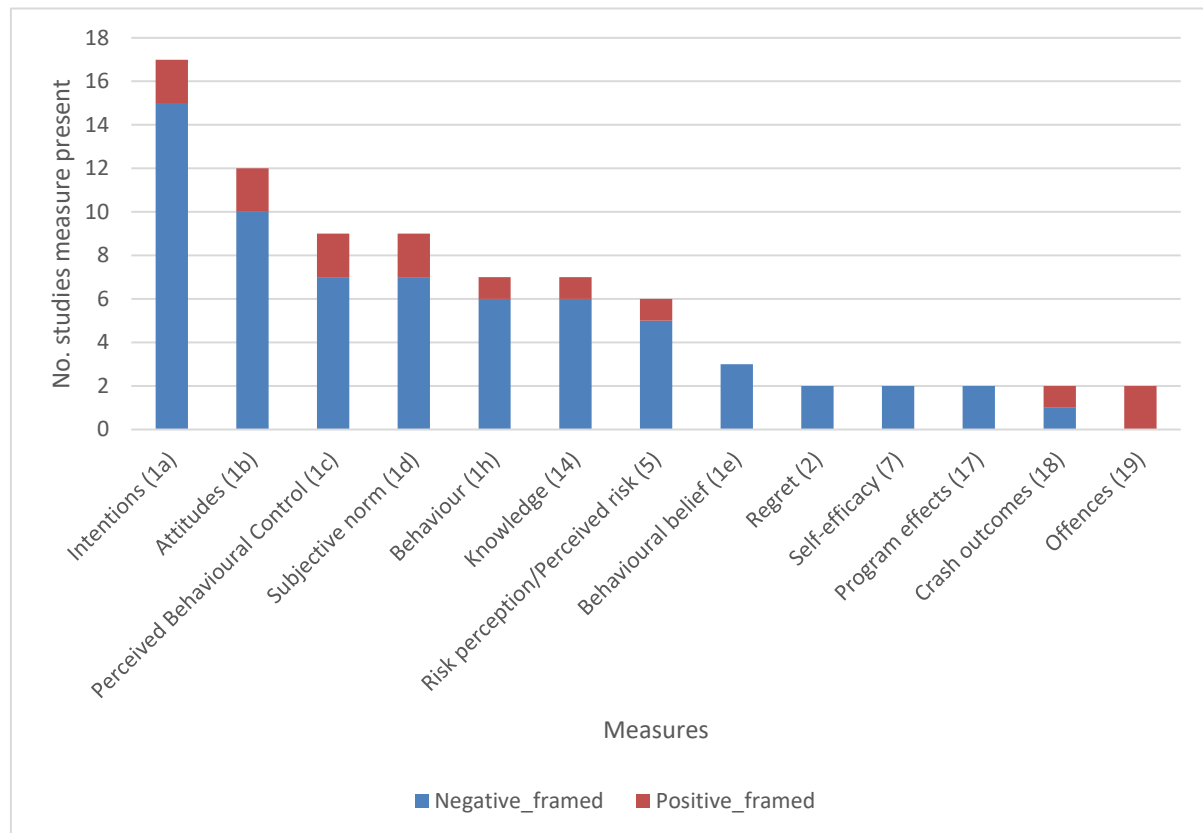


Figure 2-5 Analysis approaches adopted by studies reviewed ($n = 29$)



A total of 97 different outcome measures were applied across the studies evaluated ($n = 29$, $M = 3.4$ per study). The most used outcome measures were intentions (in 17 of 29 studies, 58.6%), attitudes (in 12 of 29 studies, 41.4%) as well as Perceived Behavioural Control and subjective norms (each in 9 out of 29 studies, 31.0%) (See Figure 2-6), all of which are components of the Theory of Planned Behaviour. Behaviours were also recorded in several studies, which were relevant to pre-drivers and those learning to drive (e.g., seatbelt wearing). Full details of the interventions included within this review are provided in Appendix A.2 and A.3.

Figure 2-6 Outcome measures within evaluated studies ($n = 29$)*



*Nb. Numbers and letters in parentheses provide an easy to reference code for the outcome measures recorded by studies, which are used throughout the results section. Other measures with a count of 1 includes: Descriptive norms (1f); Injunctive norms (1g); Accident likelihood (3); Drive ability (4); Outcome expectancies (6); Over confidence (8); Cognitive impact (9); Emotional impact (10); Risk comparison (11); Accident experience (12); Near accidents (13); Influencing friend and family behaviours (15); Extended Parallel Process Model measures (16); Sensation seeking (20); Optimism bias (21); Illusionary invulnerability (22); Differential association (23); and Perceived threat (24).

2.4.2 Study outcomes

Given the diversity of the study designs, analytical approaches and outcome measures employed by the studies in this review, intervention effects have been compared where at least two interventions use the same outcome measure. Table 2-3 provides details of the outcome measures and the corresponding interventions where these have been assessed. As already outlined in the study incidence of outcome measures (See Figure 2-7), intentions followed by attitudes, perceived behavioural control and subjective norms have been assessed in the greatest number of interventions.

Table 2-3 Interventions including most common outcome measures

Outcome measures	Intervention no.*	Total number (% of all interventions, n = 22)
Intention (1a)	1, 3, 5, 7, 8, 9, 10, 12, 13, 14, 16, 17, 19	13 (59.1%)
Attitudes (1b)	2, 3, 8, 9, 10, 11, 13	7 (31.8%)
Perceived Behavioural Control (1c)	3, 8, 9, 10, 12, 17, 19	7 (31.8%)
Subjective norm (1d)	3, 8, 9, 10, 17, 19	6 (27.3%)
Behaviour (1h)	6, 9, 10, 12, 14, 15	6 (27.3%)
Knowledge (14)	2, 4, 13, 14, 15, 18	6 (27.3%)
Risk perception / Perceived risk (5)	5, 8, 9, 11, 22	5 (22.7%)
Behavioural belief (1e)	3, 14	2 (9.1%)
Regret (2)	3, 7	2 (9.1%)
Self-efficacy (7)	8, 10	2 (9.1%)
Programme effects (17)	9, 13	2 (9.1%)
Crash outcomes (18)	2, 20	2 (9.1%)
Offences (19)	20, 21	2 (9.1%)

* See Annex A.1 for intervention details

The overall findings from this study are provided in Table 2-4. The detailed analysis conducted which has informed these overall findings can be found in Annex A.4. Sixty-four per cent (49 out of 77) of the outcome measures reported within the 29 studies and 22 interventions in this review reported beneficial intervention effects. Sixteen studies, measuring twelve separate interventions reported wholly beneficial effects (i.e., all outcome measures reported beneficial effects). This equates to 55% of the interventions (16 out of 22) and 55% of the studies (12 out of 29) reporting beneficial effects. In contrast, 10 studies, reporting on 8 interventions reported beneficial effects for 50% or less of the outcome measures. This equates to 34% of review studies and 36% of interventions reporting beneficial effects on 50% or less of the measured outcome measures.

Table 2-4 Summary of study outcomes

No.	Intervention	Study	Intention (1a)	Attitudes (1b)	Perceived behavioural (1c)	Subjective norm (1d)	Behaviour (1h)	Knowledge (14)	Risk perception/ perceived risk (5)	Behavioural belief (1e)	Regret (2)	Self-efficacy (7)	Programme effects (17)	Crash outcome (18)	Offences (19)	% positive effects (by study)
1	Bstreetsmart	Sharwood et al. (2022)	+													100%
2	RRISK	Senserrick et al. (2021)												+		100%
		Zask et al. (2006)		+				+								100%
3	Learn2Live	Cutello, et al. (2020b)	++	++Δ	++	++				++	++					100%
		Burgess (2011)	+	+	+	+										100%
4	Road Safety Live	Bojesen & Rayce (2020)						/								0%
5	SPIKS Intervention	Rimal et al. (2019)	R						+							100%
6	SAFE	Freund et al. (2019)					+									100%
7	RACQ Docudrama	Kennedy et al. (2018)	R								R					100%
8	Safe Drive Stay Alive	Dale et al. (2017)	0						0			0				0%
		Poulter & McKenna (2010)	+ - *	0	++	/*			0							40%
		Symons et al. (2008)	+	0	+	+										75%
9	Pre-driver DUI program	Markl (2016)	0	0	0	0	0		0				++			14%
10	Traffic Informers	Cuenen et al. (2016)	Δ	Δ	Δ	Δ	Δ									100%
		Feenstra et al. (2014)	0	+		0						0				25%
11	Pre-driver intervention	Glendon et al. (2014)		-					0							0%
12	You Hold the Keys (YHTK)	King et al. (2008)	/		+		+									67%
13	P.A.R.T.Y Programme	Francis et al. (2022)	+					+					+			100%
		Cameron et al. (2022)		++												100%

No.	Intervention	Study	Intention (1a)	Attitudes (1b)	Perceived behavioural (1c)	Subjective norm (1d)	Behaviour (1h)	Knowledge (14)	Risk perception/ perceived risk (5)	Behavioural belief (1e)	Regret (2)	Self-efficacy (7)	Programme effects (17)	Crash outcome (18)	Offences (19)	% positive effects (by study)
13	P.A.R.T.Y Programme cont...	Gunn et al. (2018)		+				+								100%
14	BITZ programme	Unni et al. (2017)	/				/	+		0						25%
15	IMPACT	Stewart et al. (2009)					0	+								50%
16	Loewenstein Hospital Rehabilitation Centre Workshops	Rosenbloom et al. (2009)	Δ													100%
17	Traffic Weeks	Riaz et al. (2019)	Δ		Δ	Δ										67%
18	Interactive presentation on distracted driving	Hurwitz et al. (2016)						+ ^a								100%
19	Road safety programme for high school students	Floreskul et al. (2016)	R		0	0										33%
20	Workshop education - resilience and driving focused	Senserrick et al. (2009)												+	0	50%
21	Life Skills Training	Griffin et al. (2004)													+	100%
22	ACT Road Ready	Bates et al. (2020)							+							100%
Percentage of positive effects (by measure)			71%	64%	67%	56%	50%	86%	33%	50%	100%	0%	100%	100%	50%	

Nb. The colours in the table denote the following: Green, generally positive; Yellow, Mixed; and Red, No or negative effects for the outcome measure. The symbols provide the following qualifications: + Positive effects; - Some negative impacts; / Mixed effects; 0 no effects; * Effects diminished at follow-up; Δ Sub-group impacts; R regression analysis; a 1 out of 14 measures was *ns*

2.5 Discussion and conclusions

This current study reviews the intervention effects of several pre-driver education interventions to provide a synthesis of the evidence on the effectiveness of pre-driver education. Overall, this review finds that for 55% of the interventions (16 out of 22) and 55% of the studies (12 out of 29) reviewed found a beneficial effect for all measured outcomes. However, on closer inspection, ten interventions (83%) and twelve studies (75%) falling within this category were only assessed with one or two outcome measures, which reduces the strength and robustness of this finding.

For three interventions (Learn2Live, Traffic Informers, P.A.R.T.Y), evaluated by four studies, 100% of (more than two) outcome measures demonstrated a positive effect. For Learn2Live, whilst several beneficial intervention effects were demonstrated, the post-intervention improvements noted by Burgess (2011) were evaluated using a quasi-experimental pre-and-post study design, without a control group, which reduces confidence in the findings due to the limitations associated with this study design (e.g., lack of sample randomisation, participant response bias due to repeated testing, no comparison group to compare findings with etc). The subsequent evaluation of Learn2Live by Cutello et al. (2020b) employed a more robust pre-test, post-test and follow-up controlled study design and found similar results to Burgess (2011), although the beneficial effect of the intervention at follow-up waned overtime. A reduction of intervention effects at follow-up has been found in several other studies (Cameron et al., 2022; Gunn et al., 2018; Poulter & McKenna, 2010), which may in part be explained by intervention duration and dosage, especially in relation to other more powerful everyday influences in young people's lives (e.g., friends, family, media, culture etc.) (Cassarino & Murphy, 2018). The beneficial intervention effects noted by Cuenen et al. (2016) for the Traffic Informers intervention related to individual sub-groups (i.e., gender and educational settings) rather than overall intervention effects. In contrast, the Traffic Informers study by Feenstra et al. (2014), which included a control group, only demonstrated beneficial intervention effects for attitudes. Finally, the evaluation of the P.A.R.T.Y intervention by Francis et al.

(2022) found beneficial intervention effects on behavioural intentions, knowledge and intervention effect measures. Other studies evaluating the P.A.R.T.Y intervention found intervention effects for attitudes (Cameron et al., 2022; Gunn et al., 2018) and knowledge (Gunn et al., 2018). Unfortunately, none of these evaluations were controlled and therefore given the evaluation approaches adopted, it is not possible to interpret the study findings more broadly.

Overall, 73% of the interventions and 79% of the studies evaluated intervention outcomes using TPB measures (i.e., Intention (BI), Attitudes (ATT), Behavioural Belief (BB), Perceived Behavioural Control (PBC), Subjective Norm (SN) and Behaviour (BEH)), although not all TPB measures were measured in each intervention. As described in Table 2-3, Behavioural Intentions, followed by Attitudes and Perceived Behavioural Control were the TPB constructs most commonly measured by the studies, with the percentage of positive study effects ranging from 64% (ATT) to 71% (BI) (See Table 2-4). The findings suggest that it is important that studies evaluating the effect of interventions using the TPB, measure all components to understand whether the intervention is having an impact on antecedents to behaviour and intentions. If an intervention does not have an impact on intentions or behaviour, but does have an impact on antecedent components, the intervention may still be beneficial to some extent. For instance, the study by Feenstra et al. (2014) which evaluated Traffic Informers had no effect on intentions, but a beneficial effect on attitudes towards driving violations. Overall, across the interventions and studies reviewed, there was a mix of positive and null effects on TPB components. The exception to this finding was a study by Glendon et al. (2014) where the pre-driver intervention evaluation conducted found negative attitude effects. Of the 24 studies that evaluated the effect of interventions on TPB components, only 50% of the study designs included a control or comparison group, meaning the certainty of effects is more difficult to determine. Several studies, which included measures for all TPB components, used regression analysis to assess the extent to which components explained measured intentions, with some evidence suggesting that there is value in interventions addressing multiple TPB antecedents to intentions and behaviour.

Of the studies in the review that measured knowledge impacts, 86% found beneficial effects. It is important, however, to recognise the limitations associated with knowledge improvement as a vehicle for behavioural change. Michie and Johnston (2012) in their conceptual and methodological review of advancing behaviour change science emphasise the limitations associated with placing too much weight on measurements taken early in the causal chain, such as knowledge and attitudes, which will be reduced as external influences mediate eventual behaviours. It is therefore important to review any intervention knowledge improvements with this limitation in mind.

In this review, only two of the six studies measuring risk perception effects found beneficial intervention impacts. Young drivers' risk perceptions have been found to correlate negatively with driving behaviours that are unsafe (Glendon et al., 2014; Ulleberg & Rundmo, 2003); researchers have therefore argued that influencing risk perception may influence behavioural change. However, a study by Ivers et al. (2009) which sought to establish associations between risky driving behaviours and risk perception, within a cohort of young drivers, found that risky driving behaviour overrode the importance of risk perceptions as a predictor for crash overrepresentation. In addition, risk tolerance is said to be affected by psychological and/or social factors rather than risk familiarity or assessments of risk benefits (Slovic et al., 2004); therefore the extent to which an intervention can influence risk perception is questionable and may in part explain the limited effects demonstrated by the studies in this review.

Self-efficacy (an individual's belief of their ability and resources to change a situation (Ajzen, 2002)) was measured in two studies included in this review, with no intervention effects found. Whilst similar to PBC as a construct, self-efficacy may be an important post-intention factor that may assist in bridging the known 'intention-behaviour gap' (Schwarzer, 2008). If this is the case, it is discouraging that there is currently a lack of studies measuring self-efficacy intervention effects.

Although not conducted by default, two of the studies reviewed, measured and demonstrated positive intervention effects. Intervention effects, in this case and as usually defined, refers to the satisfaction or value ascribed to the intervention by participants. Such measures are valuable as they provide information about the face validity of the intervention, which is important to measure. For instance, if recipients do not like an intervention it may be challenging to secure enough support to secure its ongoing delivery. As seen in the evaluation of a pre-driver education intervention by Markl (2016), whilst the intervention was not found to have any demonstrable effect on TPB or risk perception outcome measures, participants rated the intervention highly. For this reason, it is important to conduct both effectiveness and process evaluations (i.e., evaluations which monitor and assess interventions to establish relationships between programme delivery and measured outcomes), as the results from one cannot infer the other.

In addition to intervention behavioural component effects, several of the studies found a difference in intervention effect by sub-group, particularly for gender and education type (i.e., general, technical or occupational education). In several studies it was found that females had safer views than their male counterparts pre-intervention (i.e., Glendon et al., 2014; Rosenbloom et al., 2009; Symons et al., 2008), with some studies finding no differential effects for gender post-intervention (e.g., Rimal et al., 2019). In contrast, some studies found greater post-intervention effects for females than males (i.e., Cutello et al., 2020b) as well as effects for males post-intervention or for both genders (i.e., Cuenen et al., 2016). Where intervention effects by education type were measured, effects tended to be greater for those in general and occupational rather than technical education (Cuenen et al., 2016), with some interacting effects between gender and educational types reported by Riaz et al. (2019) (e.g., finding that intentions and social norms improved post-intervention for females from general education). Whilst these findings do not provide a consistent picture of intervention effects by sub-group – other than that males typically report less safe views than females at baseline – the results illustrate the importance of measuring intervention sub-group effects to inform the design and delivery of future interventions.

One consistent finding emerging from several studies in this review, was that the effect of interventions waned over a relatively short period of time (Cameron et al., 2022; Gunn et al., 2018; Poulter & McKenna, 2010). Only 52% of the studies within this review included a follow-up evaluation beyond the immediate post-intervention stage. Given that a large proportion of the studies evaluated found a waning of intervention effect at follow-up, it is important that future interventions are designed with multiple engagement points, to reinforce intervention content (i.e., through extending the road safety message, reminding participants about safety promoting content and actions etc.). Studies should also be designed to measure the effects of interventions over a longer period so that the sustainability of any intervention effect can be fully understood.

Despite several articles within the literature recommending that positive emotional appeals are further explored within interventions (Cutello et al., 2020a; Lewis et al., 2007b), the majority of interventions in this review are negatively framed with strong fear appeal elements (i.e., crash reconstruction, personal testimonials etc.). Whilst active learning and personal resilience skills (i.e., a focus on building strengths and competencies) have been incorporated into several of the interventions reviewed, they are in the minority, yet show promise (i.e., Griffin et al., 2004).

Only three interventions, evaluated by three studies (Griffin et al., 2004; Senserrick et al., 2009; Senserrick et al., 2021) measured crash and/or offence outcomes. The largely positive effects reported illustrate the importance of future intervention evaluations adopting outcome measures which go beyond self-report surveys, as this would provide much needed robust evidence upon which to base decisions related to pre-driver education design and delivery. Six studies also included some measure of behaviour, a few of which were objective measures (e.g., observation of seatbelt wearing). The use of objective, behavioural measures would also improve the robustness of future studies as would the adoption of common methodologies to support the ease at which current studies could be compared and meta-analyses conducted.

As has been outlined throughout this discussion, there are several limitations with the studies included in this review. The lack of controlled or longer-term follow-up evaluations of the interventions in this review hinders understanding. The different evaluation metrics and analysis approaches employed also reduces the ease at which study outcomes can be compared, although methods for converting effect sizes for the use in meta-analyses have recently been developed to help address such issues (Poom & Af Wåhlberg, 2022). There is also a reliance on self-report metrics within the studies reviewed which presents issues such as poor reliability (Af Wåhlberg & Dorn, 2015), socially desirable responding and common method variance (Af Wåhlberg et al., 2010). In addition, there is an endemic issue related to the evaluation of survey data which has been collected from several different schools and/or colleges, which is then not treated as clustered data within the analysis approaches adopted. This leads to all data being treated as equal, rather than as data from individuals within a school/college which will be more similar within, than between, educational institutions. To date, only one study by Bojesen and Rayce (2020) has been run as cluster randomised controlled trial, a study design commonly applied within medical research where participants are clustered via delivery (i.e., school, hospital, doctors surgery etc.). If road safety education research is to inform policy and delivery, it is vitally important that the highest quality research designs are used to progress understanding of what does and does not work.

It should also be noted that this review has been conducted as a critical rather than systematic literature review and therefore, despite the purposive sampling approach applied to literature identification, some studies of relevance may not have been identified. The evaluation of intervention effects has also focused on the most popular measured outcomes and therefore some of the less frequently used evaluation metrics have not been considered in this review, which might have informed a different overall conclusion.

Overall, this review finds that pre-driver education interventions can have small scale, short-term beneficial effects on antecedents to behaviour. The road safety community remains wedded to consequence focused and information provision interventions despite the limitations associated with these approaches. The findings from this review will guide the approach taken to subsequent studies within this thesis. The findings point to the importance of future research designing and evaluating interventions to test developing theories about the role of positively framed interventions as well as using robust study designs and outcome metrics which support intervention effect comparisons with previous research.

3 PAPER TWO – EVALUATING THE CONTENT THEMES AND BEHAVIOUR CHANGE TECHNIQUES INCLUDED IN EXISTING PRE-DRIVER TESTIMONIAL EDUCATION INTERVENTIONS

3.1 Abstract

Young drivers are at disproportional risk of death and serious injury in comparison to more experienced drivers (Mayhew & Simpson, 2002). Consequently, improving the safety of young and novice drivers is a key focus for administrations throughout the world, making research into evidence-based preventative interventions an important endeavour. Pre-driver testimonial interventions, which vividly outline the consequences of road traffic collisions using a fear appeal approach, are typically delivered with the aim of improving the road safety attitudes and intentions of attendees (See Paper 1). A limited number of evaluation studies of this type of intervention have found some small, short-term effects on antecedents to behaviour (e.g., Cutello et al., 2020b). There is currently a lack of understanding about both the intervention content and components which make up evaluated interventions, possibly because many evaluations are not published and open to scrutiny, which limits the aggregation and replication of study findings. This study evaluates the content of six pre-driver testimonial interventions in the UK and establishes the presence of Behaviour Change Techniques (BCTs) within the interventions. An indicative thematic analysis of six performances was conducted through transcribing and coding a total of 7.5hrs of audio and video recordings. BCT techniques were coded in accordance with the BCT Taxonomy (v1) 93 hierarchically clustered techniques (Michie et al., 2013). Four themes (biased and (mis)information about risks, Graphic descriptions of trauma, emergency service experiences and promoting self-ownership of safety) and two sub-themes (emergency service personnel as helpers/heroes and professional anguish – sharing the tragedy reduces the burden) arose from the content analysis. Twenty-three of the 93 BCTs were present in the interventions reviewed. The limited range of BCTs used were also largely negatively framed and spanned 12 of the 16 groups in the taxonomy. The findings of this study

provide specific details about the content, themes and BCTs included within a sample of pre-driver testimonial interventions which are discussed with reference to the academic literature. Suggestions are provided for how thematic content and BCT application can be improved in future pre-driver interventions.

3.2 Introduction

Pre-driver testimonial theatre education is a sub-group of interventions delivered to young drivers, which is typically delivered to school and college students by multi-agency partnerships consisting of local administrative agencies and the emergency services. The content and format of performances is usually dependent on local partnership requirements which rarely use a formal design process (Launchbury et al., 2007). Such interventions normally aim to influence pre-driver attitudes and subsequent behaviours on the road in an emotive and hard-hitting way through the delivery of live performances, which often include video and personal testimonials graphically illustrating the impacts and consequences of young driver collisions.

Pre-driver testimonial theatre education has been found to typically deliver small-scale beneficial effects on antecedents to behaviour (e.g., attitudes, perceived behavioural control, subjective norms and intentions), with studies evaluating the longer-term effects of interventions finding that positive intervention effects often wane over time (Cameron et al., 2022; Cutello et al., 2020b; Gunn et al., 2018; Poulter & McKenna, 2010, See Paper 1 for more details). Existing research demonstrates several limitations and concerns when interventions are delivered using fear appeal and are negatively framed. The use of fear appeal in campaigns has previously been described as being based on ‘common sense’, that the more fear a campaign evokes, the greater the chance of recommended behaviours being adopted (Higbee, 1969). Although some empirical research has supported this statement (Insko et al., 1965), findings across studies have been inconsistent (Carey & Sarma, 2016). In a meta-analysis of more than 100 public health fear appeal interventions Witte and Allen (2000) found that an appeal was more persuasive the stronger the fear aroused, which increased perceived severity and susceptibility. However, Witte and Allen (2000) also note in their review that fear

appeal can motivate both message acceptance and defensive avoidance. They described the optimal conditions for a fear appeal message being a high threat message, where the recommended behaviour is likely to be effective and possible for an individual. In conclusion, Witte and Allen (2000) recommend that fear appeals should be used with caution given the potential for them to be ineffective if an audience does not feel able to address the threats presented.

Several studies have reviewed the effectiveness of fear appeal within road safety messaging. One study assessing the impact of threat appeals on young male drivers ($n = 62$) found that when a high threat and high efficacy based message was used, this led to a decrease in speed choice (Carey & Sarma, 2016). The positive effect of the inclusion of specific coping strategies in road safety advertisements on message acceptance was also demonstrated in a study by Tay and Watson (2002), who found that when participants were shown additional coping messages within a fatigue public service announcement, they reported higher levels of response and self-efficacy. As with public health approaches more generally, the provision and development of coping mechanisms alongside fear appeal approaches has been found to be important for message effectiveness, as it is important that the audience is able to prevent and/or avoid harm (Ngondo & Klyueva, 2019) and that viewers believe that they can enact coping strategies to reduce the threats they face (Lewis et al., 2007b; Lewis et al., 2013). Several research studies have also found the importance of adopting varying approaches to the use of fear appeal, depending on the experience of the driver (Hoffman & Rosenbloom, 2016) and also how familiar the subject matter is to them (De Pelsmacker et al., 2011), with greater influence of fear found for inexperienced drivers and more unfamiliar subject matter. Lewis et al. (2007a) have questioned the relevance and effectiveness of targeting strong threatening appeals towards young drivers, with Taubman Ben-Ari et al. (2000) concluding that eliciting fear of personal death is unlikely to be an appropriate way to change personal behaviours in young men.

The way in which road safety messages are presented within media communications and road safety advertisements can also have an impact on the driving intentions of the target audience. Drive theory (Janis, 1967) indicates that the relationship between fear, attitudes and behaviours is characterised by an inverted U-shape curve (i.e., with low fear levels recipients may not take onboard the messages, resulting in a lack of message persuasion, whereas when very high levels of fear are evoked, recipients can employ defensive mechanisms instead of attending to or complying with the threat message presented). Medium message sensation value (MSV) messages have been found to result in intentions to drive more slowly, in comparison to low or high message sensation approaches (Rhodes, 2017). Rhodes (2017) found that as message intensity increases, the production of message related thoughts decreases and emotional thoughts increase. They conclude that the decrease in message processing suggests that there is a limited capacity explanation for the effect of highly intense fear appeals (i.e., that stress or other conditions related to high arousal limit message processing). Fear appeal arousal not carrying over into the cognitive, evaluative and behavioural responses of young adults was also found by King and Reid (1990) when reviewing advertisements and their effects on intentions to drive under the influence. Ngondo and Klyueva (2019) emphasise the importance of practitioners testing messages if they are using a fear appeal approach, to establish whether the messages adequately evoke high levels of vulnerability and efficacy. Lewis et al. (2007a) considers that fear appeal, aside from attracting attention, has been found to be less critical in contributing to behavioural change than other factors, such as perceptions of vulnerability and the provision of effective coping mechanisms.

A criticism of road safety and broader public health evaluation research is that it is often difficult to understand the component composition of interventions and therefore findings are difficult to compare with other intervention outcomes (Abraham & Michie, 2008; Fylan & Stradling, 2014). Abraham and Michie (2008) suggested a standardised definition of techniques is used within behavioural interventions to support the identification and replication of effective components within studies. This began as a 26-item taxonomy which was subsequently

expanded to a 93-item taxonomy following a Delphi-type exercise (Michie et al., 2013). BCTs have been defined as “*Observable, replicable and irreducible component[s] of an intervention designed to alter or redirect causal processes that regulate behaviour*” (Michie et al., 2013, p.82). To date only one other study of a pre-driver testimonial intervention has evaluated the intervention for its BCT content (Dale et al., 2017) using the 93-item taxonomy (Michie et al., 2013), finding seven negatively framed BCTs (10.11 future punishment, 9.1 persuasive source, 5.2 salience of consequences, 5.3 information about social and environmental consequences, 5.1 information about health consequences, 5.4 information about emotional consequences and 6.3 information about others). However, this study has not been replicated and Dale and their colleagues only evaluated one pre-driver testimonial intervention. It is therefore not clear whether different administrations around the UK consistently deliver the same content.

The aim of this study has been to evaluate the content of and the extent to which a larger sample of negatively framed testimonial pre-driver theatre interventions employ Behaviour Change Techniques (BCTs). Content analyses of a wide sample of pre-driver testimonial performances has been undertaken to inform the design of a pre-driver education intervention (See Paper 6).

3.3 Method

3.3.1 Performances

Six pre-driver road safety performances for 16–18 year olds, taking place in nine areas across the UK in Autumn/Winter 2019 took part in the study. Table 3-1 provides details about performance aims, the number of performances delivered, the length of performances and the number of students that attended. The performances ranged from 55–110 minutes in length, with an average length of 82 minutes. Across all six interventions, 87 performances were delivered to 32,867 students ($M = 377$ students per performance). A total 7.5 hours of audio recording was transcribed for analysis, totalling 70,000 words across 117 pages of transcript.

Performance aims included providing messages and advice to support safe road use; increasing awareness of road safety responsibilities; positively influencing attitudes; and reducing the number of crashes, deaths and serious injuries.

Table 3-1 Performances evaluated

No.	Performance	Area	Performance aim	Length (mins)	No. performances	Student (no.)
1	Learn2Live ¹	Cornwall, Dorset, Devon & Somerset	To provide road safety messages to the audience and provide advice to enable the audience to keep themselves safe	90	22	8,900
2	Safe Drive Stay Alive ²	Surrey	To make young people aware of their responsibilities as drivers and passengers whilst travelling and to positively influence their attitudes	110	18	10,000
3	Safe Drive Stay Alive ³	East Sussex	To reduce the number of people killed and seriously injured on the roads of East Sussex and Brighton and Hove	90	6	3,820
4	Safe Drive Stay Alive ⁴	Lancashire	To encourage students to improve their attitudes towards risk taking behaviour on the roads	55	21	6,780
5	No Turning Back	Kent	To reduce the number of crashes, deaths and serious injuries on Kent and Medway's roads	93	2	1,513
6	Learn&Live	Cleveland	To provide road safety messages to the audience and provide advice to enable the audience to keep themselves safe	55	18	1,854
TOTAL					87	32,867

¹ Learn2Live <https://learn-2-live.org.uk/>

² Surrey Safe Drive Stay Alive <https://safedrivesurrey.org/>

³ East Sussex Safe Drive Stay Alive <https://www.esfrs.org/your-safety/safer-roads/safe-drive-stay-alive/>

⁴ Lancashire Safe Drive Stay Alive <https://lancsroadsafety.co.uk/safedrive-stayalive-success/#:~:text=A%20road%20safety%20initiative%2C%20run%20by%20the%20Lancashire,circumstances%20and%20consequences%20of%20a%20road%20traffic%20collision> .

There was some variation in performance delivery across the six performances. Overall, performances were typically delivered by a Fire and Rescue Service host, with guest in-person testimony talks provided by police collision investigators, firefighters, paramedics, nurses, road traffic collision victims and bereaved family members. The performances were also interspersed with recorded film testimony given by road traffic collision victims and family members, as well as road safety advertisements and dramatised collision reconstructions. Appendix B.1 provides an overview of the performances, with Appendices B.2–B.7 providing a more detailed outline of the content and delivery processes for each of the performances.

3.3.2 Content analysis

Audio (.WAV) or video recordings (MOV., MP4) of the six performances were transcribed and checked for accuracy in advance of conducting the content analysis. The performance transcript was then imported into NVIVO release 1.6.1 to allow for transcript coding.

Content analysis has previously been defined as “*A research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns*” (Hsieh & Shannon, 2005, p.1287). It is an unobtrusive method as researchers are able to engage in data collection without direct contact with the subject studied and is also flexible as an inductive or deductive analysis tool, dependent on study requirements (Elo & Kyngäs, 2008).

An inductive approach to analysing the content was taken with codes, categories and themes emerging from the data. Preliminary codes were formulated from the data, the data was coded and codes were revised accordingly, which informed the development of broader categories and themes. Prior themes were not established using a deductive approach as this type of analysis has not previously been conducted and therefore it was considered important to work with an approach which enabled relevant themes to emerge from the data.

The BCT Taxonomy (v1) 93 hierarchically-clustered techniques (Michie et al., 2013) was used to establish BCTs employed within the performance. In advance of coding, the researcher undertook BCT taxonomy training⁵, with Michie et al. (2013) examples used to establish the definitions for content categorisation within the BCT Taxonomy (v1). Data was then coded as part of this deductive approach into the 93 categories in NVIVO, with codes and categories revisited during the process and a comparison of categories across all cases completed at the end of content analysis process. Both the thematic content analysis and the BCT taxonomy coding was conducted by the main researcher and checked and validated by a further researcher. Any discrepancies identified at the validation stage were discussed between the two researchers, with coding revised accordingly. All content analysis findings are then compared to the academic literature.

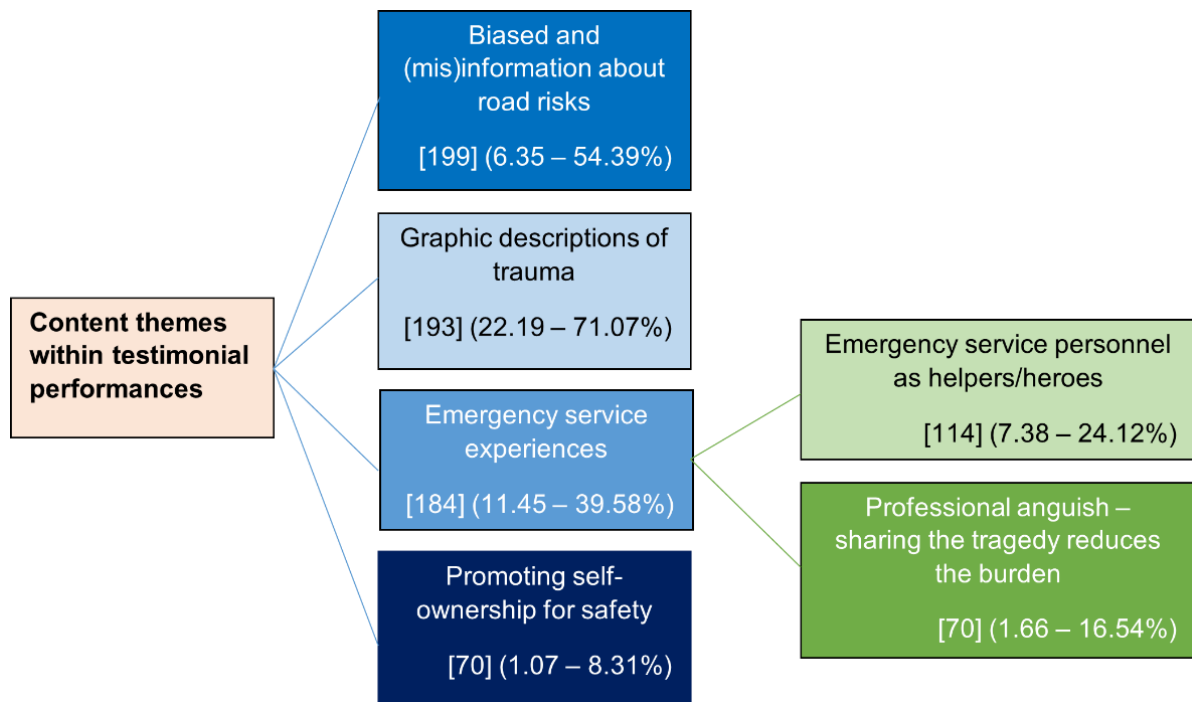
3.4 Results and discussion

3.4.1 Key performance themes

Four themes and two sub-themes have been identified across all six performances, which are outlined in Figure 3-1. The sections that follow provide a detailed account of the main and sub-theme results from the content analyses including the use of quotes to illustrate each theme and sub-theme.

⁵ BCT V1 online training <http://www.bct-taxonomy.com/>

Figure 3-1 Content themes within testimonial performances



Nb. [xxx] indicates number of references for each theme, (x.xx – x.xx%) indicates the range of performance content which fell within each category. Blue boxes indicate themes and green boxes indicate sub-themes.

3.4.1.1 Biased and (mis)information about road risks

Information provision is often assumed to be an important intervention component to achieve behaviour change despite the lack of theoretical (e.g., Michie & Johnston, 2012) or empirical (e.g., Bojesen & Rayce, 2020) evidence to support this assumption. Whilst it is common for interventions to aim to improve attendees' health-related knowledge through the provision of information, young driver crashes and offences have not been found to result from a lack of knowledge about risky driving (Gibbons & Gerrard, 1995). Several studies in the field of driving research have found that interventions which increase knowledge or change attitudes result in relatively few behavioural effects (i.e., drink driving behaviours: Mann et al., 1986; Sheppard & Stoveken, 1993). In an evidence review on the safety value afforded by driver education and training Mayhew and Simpson (2002) conclude that one of the main problems with interventions for this target audience is that interventions do not address the age and experience factors that are most related to young driver crash risk.

Performance content across all six interventions was strongly skewed towards providing information about road risks, which was recognised by some speakers with statements such as, “*You’ve heard a lot of information...you now have an idea of the risks and consequences for you as individuals*” [1] and “*He’s going to tell you how to tap into a lot of information and advice for you young drivers and young passengers*” [2]. The risks covered in the six performances are outlined in Table 3-2. All performances focused strongly on the majority of ‘fatal five’ risk factors (i.e., speeding, failure to wear a seatbelt, drink/drug driving and distraction/inattention) (Salmon et al., 2019), but less so on fatigue.

Table 3-2 Risks covered by performances

Risk	No. of interventions	1	2	3	4	5	6	Total no. of refs	% of content (range)
Speed	6							48	1.46 – 14.17%
Mobile phone use	6							27	1.03 – 16.34%
Seatbelt wearing	6							27	0.67 – 10.84%
Drink driving	6							26	0.51 – 13.51%
Drug driving	6							12	0.07 – 6.31%
Passenger distraction	5							15	0.10 – 4.29%
Driver experience	4							8	0.31 – 1.89%
Impulsivity	3							4	0.52 – 0.82%
Attention management	2							7	1.87 – 4.02%
Emotions	2							6	0.24 – 2.71%
Fatigue	2							6	0.35 – 1.79%
Peer pressure	2							3	0.08 – 6.60%
Over confidence	2							2	0.05 – 0.12%
Weather	2							2	0.04 – 0.16%

The composition of each of the interventions and the extent to which they included information about each of these risk factors is outlined in further detail in Appendices B.2–B.7. The format of the information typically fell into two categories: details about the consequences of taking part in risky behaviours; and illustrated examples of the risk leading to death or injury on the road. All of this information was presented from an emergency service viewpoint. Examples of the way in which this information was provided for the speed risk factor is outlined in Table 3-3.

Table 3-3 Example performance content on risk behaviours: Speed

Performance	Example content
1	<i>“He was travelling too fast. Well in excess of the speed limit”</i>
2	<i>“Now speed is not the cause of a collision, but it is a determining factor as to how severe that collision could be and extent of the injuries”</i>
3	<i>“If you're caught speeding, you're going to get £100 fine and three points on your license”</i>
4	<i>“Around 1 in 3 road deaths are speed related”</i>
5	<i>“The person could have driven slower...”</i>
6	<i>“And I'm finding that, especially on bends, that people are leaving the road at quicker speeds because they're driving too fast, maybe a bit more than their ability and relying more on the car”</i>

Whilst information provision can act as a reminder about good driving habits and the appropriate coping mechanisms and strategies to employ, it is not common for information provision to lead to behavioural change. This point is illustrated in another field of public health by a child drug refusal behaviour study, conducted by Corbin et al. (1993) which found that children in a skills-based intervention (i.e., provided and taught drug knowledge, assertiveness skills, decision making skills and drug refusal skills) showed significant improvements in decision making and behavioural skills in comparison to the children who were delivered the same content via an information only route. Another study by Armitage and Conner (2002), assessing the effectiveness of three separate interventions (TPB, self-efficacy, plain information) for reducing fat intake over a three-month period found that the TPB and self-efficacy conditions had a small effect on fat intake across the whole group, whereas all three conditions had an effect on individuals who had a high level of fat intake. The findings of this study illustrates that whilst the information only condition was the least effective of all the interventions, there were certain groups for which information provision was still instructive, but

effectiveness of information provision should not be assumed by default. For instance, a critical review of parent-based interventions supporting young driver safety by Curry et al. (2015a) concluded that the passive dissemination of hard copy informational materials was ineffective at improving parental and young driver outcomes. Several research studies have identified ways in which information can be used to support positive health behaviours. For example, a pilot study by Eppright et al. (2003) assessing testicular cancer intervention approaches found that when coping response information was provided following a fear appeal message, maladaptive fear appeal responses were reduced and positive behavioural intentions increased. Williamson and Wardle (2002) in their study assessing the effectiveness of an information booklet at increasing bowel screening uptake found that 42.5% of those in the intervention group were 'very likely' to attend screening following the intervention, in comparison to 29.4% of the control condition. The booklet modelled ways of securing social support, provided normative information, acknowledged barriers to attendance, encouraged the rehearsal of screening benefits and suggested possible coping strategies. These studies collectively demonstrate how information provision might best be harnessed to support behavioural change.

As already outlined, performances focused their content on providing information about what is typically termed the 'fatal five' (i.e., speeding, failure to wear a seatbelt, drink/drug driving, distraction/inattention and fatigue). All of these 'sharp end' behaviours (i.e., immediate road-based causal factors, rather than upstream issues) have been found to be contributory within road traffic collisions and each has an extensive literature detailing causation factors, sub-group effects and evidence-based preventative options (See Cassarino & Murphy (2018) for a summary review). Only one of the performances reviewed [1] has been subject to previous evaluations (Burgess, 2011; Cutello et al., 2020b) and none of the performances were designed with reference to behavioural theory or research evidence about collision causation. Performances were instead designed using local road safety professionals' personal knowledge, as is typically the case for road safety interventions (e.g., Weston & Hellier, 2018). Consequently, interventions of this type provide information about individual collisions that have

occurred and relevant contributory factors, with the aim of raising awareness about the importance of maintaining safe driving behaviours. A study by Salmon et al. (2019) reviewed the reasons for drivers engaging in fatal five behaviours, which included an online survey with drivers ($n = 315$) and a subject matter expert workshop ($n = 6$) which consequently mapped, using a systems model, behaviour causation, which assessed different levels of influence (i.e., Level 1 - Parliament and legislatures to Level 5 - Operating process and environment). In reviewing the results of this process, it is clear there are many reasons for poor road behaviours, which are not all best dealt with at the individual level (i.e., job design, media and social media etc.). In future, it is important that interventions are designed in a way to support the optimal operation of the wider road safety system, for instance increasing perceptions that road users are likely to be caught when performing unsafe driving behaviours.

There was some subject matter covered in the performances, which highlighted (most likely) new information to the audience. For instance, in one performance the developmental reason for young people being disproportionately involved in collisions was outlined (i.e., *“Your group are more likely to be killed or seriously injured in a road traffic collision than anybody else. Why is this? A young person's brain is unable to recognise risk and danger in the same way as somebody who is over 25. Unfortunately, the part of the brain that controls the way we react and respond to risk hasn't fully developed until that age. That explains why younger people than this are generally more impulsive. And it may also explain why you have more collisions”* [1]). Whilst this input is helpful, as it enables young people to understand their biological limitations, which is something identified as important by developmental psychologists (Blakemore, 2018), without outlining the coping mechanisms and strategies that young people can use to overcome these shortcomings, the provision of this type of information risks young people feeling less in control of their safety. The inclusion of implementation intentions (also known as if-then plans) in interventions supports individuals to respond to future critical situations in a fast and efficient way without further conscious intent. Future interventions should ensure that concepts and ideas are introduced to an

audience who already have the means (or are provided the means) to process this information in a way that supports safer behaviours.

Given the interventions reviewed by this study were developed without reference to behavioural theory or a broader knowledge base, there were occasions where inaccurate descriptions or information was provided. In the Kent No Turning Back intervention [5] the definitions provided for optical illusions were not scientifically correct and there was a missed opportunity to discuss hazard perception (Crundall, 2016), change blindness (Galpin et al., 2009) and roadway attention (Underwood et al., 2003), which are more relevant concepts for the target audience. The definition of impulsivity provided also did not explain impulsive negative road behaviours in relation to the driving task. In addition, some of the content was more geared to females than males (i.e., *“something that may affect you in later life that you will not be [able] to have children because you didn't wear a seat belt properly”* [5]), which as well as the relevance and appropriateness of the content provided, appeared to be a missed opportunity to target as much content as possible towards the most at-risk group in the audience, young males. These limitations with one specific intervention illustrate the importance of interventions being both theoretically and evidentially grounded.

Some performance narratives also undermined enforcement deterrents by explaining how the system did not work in their case study example, *“I got caught again and was made to do a mobile phone awareness course. I did that, sat the course, didn't really pay attention and as soon as I finished the course I was straight back on my phone, on the way home...So in total over 10 years of driving, I was caught six times. I got 12 points on my licence and I was made to do two courses. My last offence I was back in court and by that time I should have lost my license. It was my 12th point that day, so by the letter of the law I should have been banned. But I wrote a letter to the judge, played the sob story, I needed my license to do my job, to pick my son up and unfortunately, the judge took pity on me and let me keep my license that day. So, I walked out, still driving.”* [3] The concept of deterrence is used within criminology to describe, through the use of, or by threat of legal sanctions, the prevention of criminal behaviour (Meier &

Johnson, 1977). In the field of economics, the key focus of deterrence theory is to increase an individual's perceived expected cost of taking part in activities which are illegal (Becker, 1974a) and consequently it is important that interventions support and reinforce, rather than weaken, the perceived legitimacy and impact of legal sanctions.

3.4.1.2 Graphic descriptions of trauma

All performances evaluated were structurally reliant on collisions to illustrate various safety learning issues. On average 40% of the performance content included graphic depictions of trauma (with a range from 22% to 71%), delivered via in-person testimony or through fictional collision reconstruction.

Fear and threat appeal was used liberally across all six performances, with some performances asking attendees to consider what it would be like to be in a collision, *"Now I just want you to think for a moment. Imagine being the passenger or the driver in that vehicle...the next minute you're in this nightmare situation. Possibly, just entwined in that vehicle"* [6] or for loved ones to receive news about their involvement in a collision, *"Then I want you to imagine, tomorrow night, you're not there. Somebody's had to come and knock on your door and tell your parents, your family, you're not coming back. I want you to imagine them in that house wandering around, picking up things that you've touched before just so they can have a little bit more contact."* [4]

Some performances also encouraged attendees to consider the regret they might feel if they were responsible in some way for a collision (i.e., *"Can you imagine how you'd feel if your text or your phone call distracted them enough to cause an accident"* [3], *"what if you were responsible for the death of one of those individuals, by thinking you could drive a bit faster, because you're a really good driver...You'll never forget it. It'll be with you forever."* [4])

The effect of anticipated regret (AR) on health behaviour has been the subject of much study over the past couple of decades. AR is described as *"experienced when people realize or imagine that their present situation would have been better had they decided differently in the past"* (Zeelenberg & Pieters, 2006,

p.214). A meta-analysis of the broader public health literature by Brewer et al. (2016) which combined effect sizes from 81 studies ($n = 45,618$) using a random effects meta-analysis found that AR was associated with intentions ($r_+ = .50, p < .001$) as well as health related behaviours ($r_+ = .29, p < .001$). These findings are in line with a previous meta-analysis by Sandberg and Conner (2008) which also found that AR had an additive effect to existing TPB variables (AR-intention relationship $r_+ = .47, k = 25, N = 11,254$, AR-behaviour relationship $r_+ = .28, k = 8, N = 2,035$). However, Brewer et al. (2016) reported that inaction regret predicted stronger intentions and behaviour than action regret and that when considering less severe and less immediate hazards anticipated action regret was found to be less associated with behavioural intentions. Overall, Brewer et al. (2016) concluded that anticipated inaction regret had a stronger association with health behaviour than is often considered and that greater attention should be given to the use of anticipated regret in health behaviour interventions. An earlier literature review on the role of AR for health and safety decisions by Koch (2014) also concluded that AR generally predicts behavioural intentions in line with the extended Theory of Planned Behaviour, in which the inclusion of AR has received much support (Abraham & Sheeran, 2003, 2004; Conner et al., 2006; Sandberg & Conner, 2008). Looking specifically at the subject of road safety, Koch (2014) noted that anticipated regret has negatively predicted intentions to speed in several studies (Chorlton et al., 2012; Conner et al., 2007; Elliott & Thomson, 2010; Elliott et al., 2013; Newnam et al., 2004) and that focusing on the regret that might be experienced following the consequences of poor driving behaviours may reduce intentions to drive carelessly. Based on the published evidence, accepting that experimental road safety studies on the impact of AR on intentions and behaviours remain sparse, the use of inaction AR messages focused on severe outcomes may have some value.

Graphic descriptions and images of crashes were also used throughout the six performances evaluated, to varying degrees. Most of the performances started with a disclaimer such as *"In terms of the content, there are some images that you may find distressing. There may be some of the stories that we're going to talk about make you feel a little bit uncomfortable. If at any time you feel as though*

you need to leave, you can do. But just make sure you share your concerns and speak to your mates or our members of staff.” [6] In some of the performances, presenters acknowledged that the intention was to support safe mobility, “None of us want to stop you from driving. We just want you to be safe...We want you to drive. We want you to enjoy driving. Yeah. It brings great opportunities. It brings great freedom, but it also comes with a lot of responsibility. Okay.” [2] It was also stated that the intention was not to frighten attendees, “Now just before you go I want to say, we don't, we're not trying to frighten you or saying that driving is bad, driving is fantastic, it gives you independence, it frees us parents and carers up to not be taxis anymore” [3], which may, in part, be a recognition that the information being provided during the performance could put some of the audience off driving.

In one performance [6] thirty-six images of crash scenes in the aftermath of collisions were presented on screen, equating to one new image every six seconds. Some photographs also contained graphic details of collision including a burst air bag with blood, skin and teeth from an injured driver and video footage of a car stuck under the wheel of a HGV, with firefighters moving the car to get passengers out. In many of the pictures, emergency service workers can be seen tending to the injured, although no specific graphic details can be seen. Table 3-4 provides some examples of the graphic descriptions provided during the performances.

Table 3-4 Examples of graphic description content included within the performances included in this analysis

Performance	Example content
1	<p><i>"One of them had a laceration from the top of his ear, down to his jaw. Clean enough for me to be able to get my hand in."</i></p> <p><i>"Her body was absolutely broken, distorted in every way... and as I searched her body, I could feel the broken bones through her clothes and her arms were twisted and her legs were buckled."</i></p>
2	<p><i>"In the back was her 18 month year old who had a concave face completely smashed in, smashed on the back of her own mother's head bleeding, barely crying, needed a lot of help, needed surgery."</i></p>
3	<p><i>"We've got a clip coming up in a second, um it's from a mother who lost her 38 year old son in a motorcycle accident. Now David had been a rider for 22 years and he was a good rider. But a couple of factors led to his death. Now his mum was really keen for this footage to be shown so that she could raise awareness. Now, David was wearing a GoPro camera on his helmet which captured his last journey. You won't see any bloods or anything like that, but if anyone is distressed, it's quite a shocking clip, if anyone does get distressed then please do head out to the back of the foyer, we have some volunteers there."</i></p> <p><i>"He's braked, he's braked so hard he's gone through the windscreen and got squashed between the two cars. Hence why we couldn't find him. We then had to move the bodies, put the bodies into a body bag. As I grabbed hold of the young lad, I grabbed hold of his arm and his arm came away from his body, a bit like a chicken wing that's overcooked."</i></p> <p><i>"The front seat passenger broke a femur, the strongest bone in the body. Sounds like a pencil snapping. A sound you don't forget."</i></p>
4	<p>[Video begins with two young females, one giving mouth to mouth resuscitation to the other. The second female has a bloody head wound and is lying unconscious on the side of the road].</p> <p><i>"The nine year old boy in the back of the car had sustained severe facial injuries from hitting the back of the driver's seat. He had a five inch laceration across his forehead. The skull was visible. And it looked like the skin was falling off his face. He also had a long laceration down the right side of his nose, to his top lip, which was barely intact and he'd lost several of his front teeth. His nose was flopping about on his face and every time he spoke, blood sprayed everywhere. But he was crying, in absolute agony."</i></p>
5	<p><i>"The girl in the back had not been wearing her seatbelt. She hit the driver's seat so hard, it snapped in half, forcing his head down onto the steering wheel. She continued travelling over the top of his head and hit the windscreen, it didn't shatter, she didn't go through it. It threw her back into the rear of the car and my mates had found her, curled up in a ball underneath the driver's seat."</i></p>
6	<p><i>"The airbag then deflated, which it's designed to do and then his head was buried into the boss of the steering wheel. You could just pick out some of his teeth and flesh from hitting that steering wheel."</i> [sounds of groaning and disgust from the audience]</p>

The use of graphic imagery in health promotion appeals is not uncommon. One of the most well-known examples is that of graphic imagery on tobacco products to discourage smoking. Leshner et al. (2010) compared the effect of two types of anti-tobacco advertisements, one which focused purely on a threat appeal related to tobacco use and the other containing disgust related imagery. Their study found that both content types had a significant effect on the degree to which cognitive resources were available to process the message. They concluded that disgust conditions (e.g., diseased lung) engaged processing resources well when there was no accompanying information about health threat, but when a disgust image and threat appeal were used in combination this reduced the audio recognition of the message provided. This finding encourages intervention designers to carefully consider how messages are developed to secure optimal message engagement and processing. Further evidence on preparing messages with the target audience in mind comes from a study on the effectiveness of graphic threats used in both familiar and unfamiliar fear appeals. De Pelsmacker et al. (2011) found that strong graphic threat messages had greater effects for unfamiliar (i.e., muscle disorder) than familiar (i.e., drink driving) issues and for the familiar drink driving issue adding information to a weak (but not a strong) threat appeal increased perceived severity. De Pelsmacker et al. (2011) concluded that it is important to use different message tactics for health threats depending on the target audience's familiarity with the issue. These findings have important implications for road safety intervention design, as road traffic collisions are a familiar risk to many people. Weaker threat appeals accompanied with information might well provide a better outcome than the more severe threats presented in the performances evaluated here.

In the field of road safety, threat appeals have been found to attract attention (Lewis et al., 2007a), but this has not been found to reliably translate into behaviour change (Carey et al., 2013). Whilst threat appeals have been found to have an impact, if certain conditions are met (i.e., efficacy statement use, high susceptibility and high severity subject matter requiring one-time only – as opposed to repeated – behaviours and a predominantly female audience) there have been circumstances where threat appeals have been found to provoke

increases in risky behaviours (Carey et al., 2013). Fear appeals are frequently found to be counter-productive for males (Goldenbeld et al., 2008), leading to defensive reactions, avoidance of threatening information and message rejection, which has also been evidenced in other areas of public health (Brown & Locker, 2009; Hastings, 2002). Males are also less likely to find the material applicable to themselves (Lewis et al., 2007a), which is of relevance given the prevalence of young male drivers within road safety casualty statistics. There is evidence that fear appeals can generate a beneficial cognitive response and attitude change when participants feel vulnerable to the threat presented (Das et al., 2003) or if they are sensation avoiders (Rosenbloom, 2003). Young pre-driver audiences are also more likely to experience optimism bias (White et al., 2011), which also impacts on their reaction to mortality salient content.

Despite evidence finding that threat appeals — when applied in a road safety context — have many shortcomings, when asked, audiences often rate the value of threat appeals highly. Lennon and Rentfro (2010) in their focus group evaluation of fear appeal effectiveness amongst young adults found that more severe, graphic public service announcements related to distracted driving were rated as more effective than funnier, less graphic public service announcements, even though both appeals influenced individual perceptions of threat susceptibility. Similarly, a more recent study by Beck et al. (2018) which assessed the motivational factors associated with driving tired amongst college-aged students, found that participants preferred messages including graphic and emotional content related to crashes and their consequences, with preventative message strategies delivered either by social media or through another audio visual medium. The value offered by big budget public service announcement advertisements including graphic crash scenes has also been subject to evaluation in a study by Donovan et al. (1999), which found lower cost, shorter duration options such as talking head style approaches to be just as effective as the bigger budget productions. The accumulated evidence on the role and impact of graphic threat appeals in road safety suggests that their use can lead to unintended consequences related to message processing and engagement with safety promoting information, particularly amongst young males. Consequently,

the intervention described in Paper 6 will not include graphic portrayals of collisions.

The consequences of road traffic collisions (health, emotional and social), *“Ultimately, there are consequences”* [6] were heavily emphasised within the performances reviewed (See Table 3-5). The physical consequences for surviving victims of road traffic collisions were highlighted by family members and victims. In addition, the emotional consequences of collisions for victims, bereaved family members, emergency service staff and perpetrators were also emphasised largely through the recounting of personal experiences. The performances are grounded in the concept of *“the ripple effect”* [5], where the negative emotional consequences of a collision spread through family, friends and work colleagues due to *“that one moment, that one choice, affect[ing] everybody”* [5]. The tonal presentation of the emergency service content is outlined and reviewed in Section 3.4.1.3.2. The social and economic consequences of road traffic collisions were also discussed in the interventions, which covered the implications of road collision involvement for life plans and employment prospects. In addition, legal consequences were role-played in several of the performances, with the penalty points and fines awarded for different risk behaviours emphasised.

Table 3-5 Health, emotional, social and economic road collision consequences

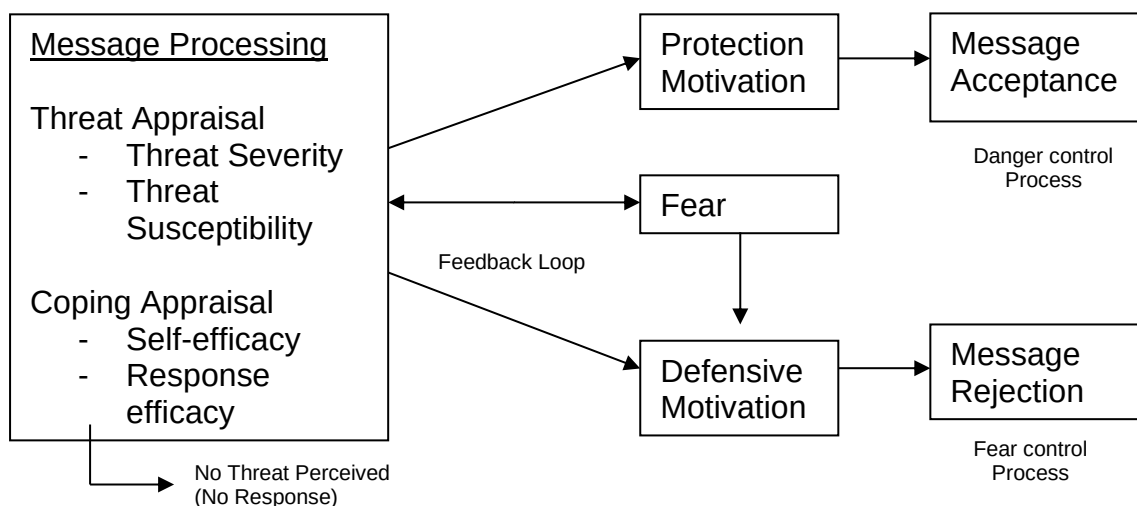
Performance	Example
Health	
[2]	<i>“He had a, had to have a peg inserted so he could be fed and there were many a time I could have ended up crying and breaking down. He often asked us that he wanted to die. He was finding it difficult to, to live. He couldn't communicate. Everything was by some sort of hand sign. He'd lost all his dignity...for the rest of the family it's been very traumatic.”</i>
[5]	<i>“As well as my physical injuries, my dignity had been shredded. I struggled with everyday things. Washing, brushing my teeth, going to the toilet. The memory of me, in the bathroom with my mother washing me and treating my bed sores is still so vivid.”</i>
Emotional	
[1]	<i>“A few seconds later I heard a few more screams because that was her young brother and sister being woken by her mother's screams, running into her bedroom and being told that big sister was never gonna come home again.”</i>

Performance	Example
[3]	<i>"that split second all the things go through your mind, that you're not gonna get to see your child do again...Our lives are never going to be the same again...There's a piece missing" [1] and in the longer term "Every time I see on social media another one of his friends getting engaged, getting married, having their babies, just makes me so incredibly sad."</i>
[2]	<i>"Because it's called survivor's guilt and that's something I can never see myself getting over because I survived, but so many people were emotionally hurt or a lot worse."</i>
[3]	<i>"The real punishment will stay with me forever. There's not one single day goes by where I do not feel so sorry, with immense guilt and remorse of what I've done. I'm very, very aware that I've destroyed someone's family."</i>
[4]	<i>"I could see the pain in the mum's face and utter shock and disbelief in his dad's. They had lost their boy. And nothing was going to change that."</i>
Social and economic	
[6]	<i>"All of a sudden you get caught by the cops. Within two years of passing your test, your license will be taken from you cause you can't have six points on your license. So, moment of madness, daftness, you didn't even think. You get the phone, just a quick call, or you received that call, your license is taken away, you're banned from driving."</i>
[5]	<i>"I'm arresting you on suspicion of causing death by dangerous driving. You do not have to say anything, but it may harm your defence if you do not mention, when questioned, something you may later rely on in court."</i>
[3]	<i>"If you're convicted of drink or drunk driving the minimum, you're going to receive is a 12-month ban. You could possibly get six months in prison, a £5,000 fine, as well as a criminal record. Your driving licence will show that you've been convicted for drug or drink driving and this stays on your licence for 11 years."</i>

Road safety messages which highlight the negative consequences resulting from unsafe driving behaviours is a common approach (Carey & Sarma, 2016; Lewis et al., 2007b). There are several behavioural models which have been applied to threat appeal research which theorise the role of consequence identification within fear and threat appeals (e.g., Parallel Response Model (PRM) (Leventhal, 1970); Health Belief Model (HBM) (Becker, 1974b); Terror Management Theory (TMT) (Greenberg et al., 1986); Theory of Planned Behaviour (TPB) (Ajzen, 1991); Protection Motivation Theory (PMT) (Rogers, 1975); and Extended Parallel Process Model (EPPM) (Witte, 1992)). Taking the Extended Parallel Process Model (EPPM) (Witte, 1992) — a framework for understanding responses triggered by a threatening message — as a worked example (See Figure 3-2), it is suggested, in the first instance, that a message recipient will appraise the message received for its severity (i.e., consequences from collision) and their personal susceptibility to the threat presented (i.e., their belief that their own risk of being involved in a road traffic collision is high). If the threat presented is not thought to be high to the individual receiving the message, Witte (1992)

suggests that there will be no further response. However, if the message is considered both severe and relevant, the model suggests that an individual will then appraise the efficacy of a recommended response in two separate parts. Firstly, whether the recommended action (i.e., reducing speed) will be an effective way of avoiding getting injured in a collision (the response efficacy) followed by their belief about whether they are able to carry out the recommended response (self-efficacy). The resulting response will then be either danger control or fear control. If threat and coping appraisal is high, danger control will result, with uptake of the recommended actions presented in the message. If threat appraisal is high, but coping appraisal is low, focus is likely to be on fear rather than reducing the threat presented which can lead to maladaptive processes such as denial and avoidance. Consequently high threat and high efficacy messages have been described as having the greatest potential to secure behavioural change (Carey & Sarma, 2016). In thinking about the application of the EPPM to the performances evaluated in this study, it is likely that the performances are creating a degree of defensive motivation in the audience, particularly amongst young males.

Figure 3-2 Extended Parallel Processing Model (EPPM)



Source: Witte (1992)

The use of fear appeal in campaigns and interventions has previously been described as being based on 'common sense' that the more fear a campaign or intervention evokes, the greater the chance of recommended behaviours being adopted (Higbee, 1969). Although some empirical research has supported this statement (Insko et al., 1965) findings across studies have been inconsistent (Carey & Sarma, 2016). Whilst a meta-analysis of fear appeal interventions from across the public health field by Witte and Allen (2000) found overall support for strong fear appeals being more persuasive than low or weak fear appeals, the review also recognised that fear appeal can motivate both message acceptance and defensive avoidance. Overall, Witte and Allen (2000) found that, when accompanied with high-efficacy messages, fear appeals had a weak, but reliable effect on attitudes, intentions and behaviours. They also caution that fear appeals can backfire if an audience does not feel like they can address the threats presented (in line with EPPM in Figure 3-2). A further meta-analysis of 127 public health fear appeal studies by Tannenbaum et al. (2015) also concluded that the studies reviewed had a positive effect on attitudes, intentions and behaviours (random-effects, $d = 0.29$), with effectiveness increasing in certain circumstances (i.e., when efficacy statements were included, where high susceptibility and severity circumstances are presented, when desired behaviours are one-time only (rather than repeated behaviours) and when the audience includes a higher percentage of females). In a study on the effects of threat appeals on young male drivers ($n = 62$), Carey and Sarma (2016) found that a high threat alongside a high perceived efficacy message led to a decrease in speed choice. A second study ($n = 81$) found that increased levels of state anger may counteract the potential value of combining fear-arousing threats and self-efficacy messages. The authors concluded that threat-based road safety communications that target affective (fear) and cognitive (perceived efficacy) mechanisms can positively affect driving behaviours, but state emotions such as anger may negatively impact the effect of the message. Overall, the study supports the use of efficacy-building messages in threat communications but highlights the complexity of and the need to understand more clearly the array of affective influences on driving and how they influence message acceptance and uptake. Given the heavy focus

of the performances analysed in this review on collision consequences, with performance delivered to a mixed gender audience, with no efficacy statements applied and ongoing behaviours requested, there does not appear to be the active ingredients within these interventions that the literature suggests is needed to achieve positive outcomes.

3.4.1.3 Emergency service experiences

All performances used emergency service experiences as a core component of the performances. Two distinct sub-themes emerged, as outlined in section 3.4.1. The sections that follow provide example content within these sub-themes and relates these findings to the broader literature.

3.4.1.3.1 Emergency service personnel as helpers/heroes

Emergency service presenters shared substantial information recounting what is involved as part of the emergency services role post-collision, *“I arrive, I get out. I put my breathing apparatus on. I grab the hose from the fire truck and go to put the fire out”* [3] and commonly sought to bring to life the real-life carnage experienced in the aftermath of a road traffic collision, *“You have video games and they're quite gory, aren't they? They're quite scary. But I've got to tell you, nothing is like what really happens at a road traffic collision. It's quite horrendous. It is traumatising. And even for us who're there helping out and getting on with stuff and we're trained to do that, which is brilliant, but it really sticks with us and we feel and get every feeling sight, sound and smell. And the gore, yes, I can, I can tell you all sorts of stuff.”* [2] In recounting the realities associated with responding to road traffic collisions, many speakers in the performances used this as a springboard to provide a rationale for their involvement in the intervention, *“You know what, I have painted quite a bleak picture. That's my world, unfortunately. That's why I'm here talking to you.”* [3]

Speakers made statements in their testimonials such as *“we just want to share our experiences with you”*. [2] Typically, emergency service speakers recounted their length of service and described their consequent experience as being lifesaving information for attendees, *“please take this gift of life that we are offering you by listening carefully to what they have to share...today you've been*

given the gift of life”, “We’re all here to make sure you reach that potential. To make sure that you fulfil your lives and you enjoy them. That’s what we’re here for.” [4] As part of their contribution to the interventions, emergency service workers clearly convey their motivation to save life. Their contribution to the performances was thought to be important for “stopping you appearing on that board in our office” [4] and consequently “up and down the country emergency services, local authorities, employees, employers, are all pulling together to try and get some safety messages out to keep people as safe as possible on the roads.” [6] It is presumed that these types of statements are made to dissuade the audience from taking part in risk taking behaviours that lead to serious outcomes (i.e., “This is why we’re here. No other reason of being here, just to let you know of the experiences and hopefully next time you’re in a car you can sort of remember back to what you’ve seen and heard of all the people here today and take something from it and think, ‘Ah, no, actually.’” [2]).

Several of the performances describe the intervention as having reduced casualties, without having sufficient empirical information available to prove this to be the case (i.e., “Why have we seen that reduction? Well, we like to think that the Safe Drive Stay Alive message is getting out there. I spoke to a lot of you outside who said, yeah, you know, ‘My siblings have been’, you know, ‘I came when I was younger’ so hopefully the word is getting out there. It’s cascading down. Okay” [2]). The belief in the effectiveness of such interventions is common (i.e., Beck et al., 2018; Lennon & Rentfro, 2010), but the research evidence does not support that performances of this nature would improve pre- or young driver safety (See Paper 1). There is a potential danger that performance attendees are provided with the message that attendance alone will makes them safer, which would not be an expected outcome from this type of intervention.

The obvious nature of the messages being presented was alluded to within at least two of the performances (i.e., “Some of the messages you’re going to hear about are going to be fairly obvious, but we want to challenge the way you think about them. We want you to think about where you are now and obviously, where you will be once this production is finished in – after two o’clock this afternoon.

And then in the future” [5], “It’s not rocket science. I think everybody will know the fatal four. But I’m going to go through them again with you” and “It’s a no-brainer for me” [6]), which may have potentially undermined the importance of the messages presented and may also have reduced audience attention.

3.4.1.3.2 Professional anguish – sharing the tragedy reduces the burden

The emotional anguish experienced by emergency service workers in the aftermath of a road traffic collisions was emphasised in the following ways:

“To have to knock on someone’s door at any time of a day or night and explain the reasons why we’re there and that their loved one will no longer be coming home is absolutely soul destroying. Not only does this information that we have to tell people impact on the friends and families, but it also impacts on us too.” [2]

“The hard part of my job, or what I find the hardest, is dealing with the emotions and dealing with relatives of people that have died, dealing with people that have got serious life changing injuries. It’s funny because I have a memory full of people’s worst few hours.” [2]

Further examples of this professional anguish are provided in Table 3-6 below.

Table 3-6 Example performance content covering professional anguish

Performance	Example content
1	<i>“But I looked at John. And tears were rolling down his face, looked to my left, right, my colleagues Andy, who had called me, tears are rolling down their face. There’s no dignity in death.”</i>
2	<i>“And that’s just one incident. I’ve got too many.”</i>
3	<i>“It was my second night. I can see it. I can smell it as though it happened yesterday.”</i>
4	<i>“The screams and cries from this young lad were one of the things I will never forget.”</i>
5	<i>“But I want to talk about one person today and that person is James. I met him once, but he’ll stay with me forever.”</i>

The ongoing mental and emotional effects for emergency service workers pervades the performance content, *“I can tell you all about those [collisions]. Where they all happened, what sort of injuries people suffered. Because we don’t forget them. They don’t go away” [4], “As I say, these things stick with us. We might take it out on our families at home. Sometimes we get home and we’re very, very quiet. My wife and daughter just know to leave me alone if I’m quiet.”*

[3] One of the performances stressed the importance of friendship and support within the emergency services to help those involved cope with their experiences, *"We need to work together and look out for each other and work as a team to keep each other safe when we're at incidents."* [1] It is not clear why the emotional consequences for emergency service workers were laboured to such a great extent within the performances. All speakers sharing their emotional experience appeared to be doing so, at least in part, as a cathartic release.

The relationship between emotion and behaviour is not clear and is poorly understood by the threat appeal literature (Carey et al., 2013). Influential theory implies that emotion does not have a direct effect on behaviour and therefore making a causal link between fear and behaviour has been described as over simplistic (Carey et al., 2013). Baumeister et al. (2007) and Baumeister and Lobbestael (2011) argue that long-held emotions directly cause behaviour, (applying the direct causation model), although Carey et al. (2013) concludes, as others have done, that the evidence base is not clear. Schwarz and Clore (1996) state that direct effects of fear appeal are more mental than behavioural and the onset of fear itself does not predict a wide range of behaviours (e.g., a desire to avoid harm or loss leading directly to actions such as selling stocks). Although fear is an emotion often elicited by threat appeals (Ordoñana et al., 2009) it is not the only emotion as fear appeals can also elicit guilt, shame and regret. It is therefore not clear what kinds of emotional effects speaker anguish and appeals to drive safely have on future driving behaviour.

Consedine and Moskowitz (2007) argue that it is important to understand the interplay between these different elicited emotions, to determine the effectiveness of threat appeals. Maladaptive responses to fear appeal approaches have been previously identified, where individuals ignore the threat or take no action due to being fearful (Leventhal & Niles, 1964). These defence mechanisms have been found to be deployed by those most susceptible to health threats (Ruiter et al., 2014) and for those who the health threat is relevant (Kessels et al., 2014). Given that maladaptive responses to fear appeal can lead to chronic heightened anxiety and complacency amongst those not directly

targeted (Hastings et al., 2004), the continued use of fear appeal approaches, in light of the available evidence, raises significant ethical concerns. de Hoog et al. (2007) conclude that for fear-arousing communications to be effective, it is not necessary to make communication as gruesome as possible, given that plain written information about consequences has been found to work just as well. They state that the key to fear arousing communication is to ensure that people feel vulnerable to the portrayed risk. It is not known the extent to which young people attending these performances felt vulnerable to the risks presented and felt able to act in the face of the information presented.

In the performances evaluated within this study, the importance of the speakers being 'real' (i.e., not actors) was mentioned on several occasions by speakers when covering content about road risks (i.e., *"the people you're about to see today on this stage, they are not actors, okay? They are serving people in the emergency services. They are real life people with real life stories. Okay? They're going to be sharing some real bad times and some real bad experiences"* [2], *"I am reality. This is real. This could happen to your mum, your sister, your aunty, your uncle, whatever"* [3]). Road collisions were also described as not being, in real life, as portrayed in films (i.e., *"And that's something you don't see on the internet or in films, Too Fast, Too Furious. They do all sorts of things there, don't they? And stop and swerve and airbags go off and everyone's okay. That's not real life. That is not real life. This is real life. This is what I'm telling you about what happens"* [2]). Presumably this narrative was included due to the belief that young people would be more persuaded by real life stories and are influenced in their driving by what they see in films. Storytelling has long been recognised as an important tool for engaging curiosity, emotions and imagination in an appealing and memorable way (The Health Foundation, 2015) and has been used as both a research tool and teaching technique (Coulter et al., 2007). In several professions, such as nursing and teaching, reflective practice is an important part of training and personal development. Edwards (2014) in their review of reflective practice in nursing concluded that storytelling adds significantly to reflective practice, particularly for clinical situations where reflection cannot always be expressed. The public retelling of highly emotional

professional stories in the interventions within this review, whilst likely to be memorable for attendees, are more likely to be beneficial as part of the reflective practice of the individuals speaking. Such approaches are less likely to have a persuasive impact on the attitudes, intentions or behaviours of the attendees (Perloff, 1993). It has been suggested that real-life scenarios explored by simulation, discussion and debate can create authentic and relevant learning experiences in learning environments (Errington, 2008). However, Moon and Fowler (2008) in their conceptualisation of a framework for the use of story within higher education and professional development state that it is important not to dismiss the role of fiction, describing fiction *“as a relatively untapped, but valuable resource in education”* because *“Fiction is free, it can go anywhere, it can be used to make any point”* (p.236). Given the potential value offered by both real-life and fictional accounts it does not seem necessary, in terms of persuasive influence, for speakers to stress the ‘authentic’ nature of the intervention content.

The messages provided by speakers, particularly those from the emergency services, were delivered with a sense of urgency and a pleading tone (i.e., *“Please don’t let your family be next...Please don’t think you can drive dangerously without suffering the consequences”* [2], *“Your life is so fragile. And the older you get, the more you will come to realise this. So, I hope that next time you consider using your phone or doing something stupid whilst driving, think of me”* [3], *“The road, the car, the people, the injuries, the way I felt. And no matter how many times I stand here and how many times I plead with young people to drive safely, I can still see the image of that young person laying in that car.”* [5])

It is assumed that this overall narrative and tone was adopted to emphasise the devastating consequences of actions so that fewer ‘bad’ road behaviours occur. One speaker said, *“I was your age once so I know exactly how you guys think, you think that you’re invincible and that bad things won’t happen to you and you do stupid things not thinking of the consequences because you’ve been lucky enough not to experience them yet, but take it from me, if you continue to make bad decisions, eventually and unfortunately your luck will run out and they will catch up with you.”* [3]

3.4.1.4 Promoting self-ownership for safety

Alongside highlighting the risks associated with and consequences of road traffic collisions, all performances included the promotion of actions to support safety, to a greater [1] and lesser [3] extent. Despite the recognised role of the safe system components (Larsson et al., 2010) as being central to the safe road use, only one of the performances contextualised the performance content using this concept (i.e., *“as human beings, [that] we have a part to play in ensuring that everything links up. Safe roads, safe vehicles, safe people and safe spaces”* [6] and *“Even with those safety features [in vehicles], it will only provide and afford so much protection”* [6]).

Several of the performances emphasised that *“everybody has the opportunity to keep themselves and others safe in the choices that they make.”* [1] Participants were reminded that *“ultimately you have the control of what happens to you and your friends and that there are many things you can do to keep yourselves and others safe”* [1] and that they are responsible for their actions *“when you're driving a car, if you've got your mates with you, you've also got that responsibility of other people's lives.”* [6]

Being in control of actions taken and being responsible for self and others are recurring themes within several of the performances, *“remember there will always be situations that arise that you're not expecting and had not planned for. Impulsivity can come into play at any time. But remember you can still take control. It's important to manage and learn to recognise situations where you may be susceptible to not making your best decisions. For instance, when you're tired or being pressured by your friends”* [1], *“your actions change lives”* [4]. Whilst some of the performances provided worked examples for how young people could remain responsible and in control, this was not the case for all performances where more general persuasive, non-specific examples were given (i.e., *“there is no turning back from some of the decisions you make”* [5], *“today is your opportunity to go away from here and change and make a difference”* [5]).

Control as a concept, features as a component within many behavioural models (i.e., Perceived Behavioural Control (PBC) within TPB (Ajzen, 1991), self-efficacy within EPPM (Witte, 1992) and efficacy within PRM (Leventhal, 1970) as well as a broader concept within PMT (Rogers, 1975)). As has already been discussed, an individual having the ability to produce a desired result is central to the success of achieving a change in behaviour. The well-known 'intention-behaviour' gap is theorised within the TPB to be in part reduced by increased PBC. Therefore, whilst the interventions evaluated emphasised the importance of control, the success of the interventions will have been dependent on whether feelings of control and self-efficacy were bolstered in a way that enabled intentions to effect behaviours.

The importance of developing skills and plans to ensure safety was included in several of the performances. During Learn2Live [1] students were asked to *"please start to develop your skills in managing risk and prevent tragedy happening to you, your friends and your family by creating your own safe plan."*

[1] The development of plans, to support an individual to translate goals into action, has been found to be important for supporting behavioural change (Gollwitzer, 1999). Implementation intentions, or if-then plans, have been identified as a technique that can support the effectiveness of interventions as they *"link anticipated critical situations to goal-directed responses"* (Gollwitzer, 1999, p.493). This technique has been applied within road safety previously (e.g., Brewster et al., 2015; Elliott & Armitage, 2009 See Chapter 1) suggesting that supporting the development of actionable plans offers promise. Future interventions should look to structure this type of support through providing tools such as volitional help sheets, as recommended by Brewster et al. (2015).

Safe plans were not discussed in depth as part of the Learn2Live performance, although illustrative examples of what a safe plan might look like were provided, *"Remember this is simply what you can do now to keep yourself safe in the future. This can be a simple action that takes seconds and don't actually cost anything. This could be as simple as telling somebody where you are and when you're coming back. Have local taxi phones programmed into your phone. In carrying*

some emergency cash and importantly, rehearsing what you could say to somebody to get yourself out of a potentially risky situation.” [1] Whilst this focus is to be applauded, sometimes this was quite misdirected, with considerable time spent on highlighting apps such as ‘What Three Words’ [1], which helps people to simplify their location details. Whilst this is helpful for emergency response purposes, this time within the intervention could have been better spent focusing on more effective prevention messages which could relate directly to the development of safe driving plans. In SDSA Surrey [2], whilst there was mention of taking action to avoid risks, only one or two examples were provided throughout the performance. The East Sussex SDSA [3] provided some general tips, which could be used to form the basis of a plan (i.e., *“So, tips, put your phone away when you're driving. Turn it off. Turn it on to silence so you're not tempted to look at it. And if you can't trust yourself, with it sat next to you, on the seat next to you, pop it into the boot, put it away, put it so that you can't get to it. Whatever's going on with your phone can wait until you've got a safe place to have a look at it. And also, don't text or call someone when you know they're driving”* [3]). Beyond general tips provided in the performance, no follow-up activities were promoted by the facilitator in this performance.

No safe drive plans were mentioned within the Safe Drive Stay Alive Lancashire [4] intervention and whilst the No Turning Back Kent Intervention [5] discussed potential risk situations, no mention was made of how to develop strategies to avoid risks or whether this would be covered in classroom follow-up sessions. Similarly, despite the suggestion that the Learn&Live [6] performance would help to show young people how to stay safe on the roads, *“We want you to make informed choices”* [6], few concrete examples were given (i.e., *“So if you are driving, or if you're go out, embarking on a journey as a group, think about planning ahead so you give yourself enough time”* [6]).

Throughout several of the performances [1, 2 & 5] follow-up materials were promoted by the speakers (i.e., *“And instructors, teachers, guides, if you haven't got it already, your follow-up resource, please ask a member of the Safe Drive staff and you can carry on giving the message long after we leave here”* [2],

“Please start to develop your skills in managing risk and prevent tragedy happening to you, your friends and your family by creating your own safe plan” [1]). These follow-up materials have not been reviewed in-depth in the present paper, but typically include further information about road related risks, signposts to other relevant resources and for Safe Drive Stay Alive Surrey [2] individual student worksheets and classroom follow-up group based activities covering the topics of impulsivity, peer pressure, mobile phones, drugs and alcohol⁶ are provided. Discussions with intervention deliverers suggest that the take up of the follow-up material is very ad hoc and dependent on teacher and school interest, time and resources. There is currently limited evidence available on the effectiveness of follow-up materials/sessions within pre-driver interventions, as the majority of existing evaluation studies have not been designed in a way to specifically measure the effect of any follow-up content. Cutello et al. (2020b) did however evaluate the effect of a peer-led and an expert-led follow-up road safety event, both of which were found to be effective at improving attitudes related to risky driving, with the peer-led follow-up being the favoured by participants. Intervention dosage (i.e., frequency of delivery) is recognised as an important component of intervention effectiveness (e.g., Kinnear et al., 2017), with follow-up materials having the potential to extend the initial influence of interventions. Further studies are required in the field of pre-driver education to establish the optimal type and duration of follow-up materials and their relative impacts on outcomes of interest (e.g., attitudes, intentions and behaviours).

Learn2Live [1] had a running theme in their performance about the importance of being a good friend and what it means for road safety, *“You probably already know that you’re here today to talk about road safety. What you may be surprised to hear, is that you’re also here to talk about the importance of being a good friend, valuing your friendships...keep yourselves and your friends safe by having your own personal safe plans.”* [1] Some worked examples, using three video

⁶ Safe Drive Stay Alive Surrey follow-up materials
<https://safedrivesurrey.files.wordpress.com/2018/10/sdsa-resource-a4-booklet-2018-update1.pdf>

clips, were provided to the audience about how a passenger might seek to dissuade a driver from speeding and reading or writing a text message whilst driving.

Video 1: Passenger dissuading driver from reading a text whilst driving [1]

Female: *“Mate, there’s a service station in less than a mile.*

Male: *Yeah?*

Female: *Yeah. So, let's pull up and you can check your text there.*

Male: *No, I'm fine.*

Female: *I'm not comfortable. Come on, we can get some food while we're there.*

Male: *Whatever [Sighs].”*

Research by Guggenheim and Taubman-Ben-Ari (2015) exploring whether friendship can support safe driving amongst young drivers found that certain elements of friendship were connected with safety regardless of gender or age (i.e., mutual interests as well as practical and positive interactions). Where friendship was based on responsibility, concern for others and equality, this was associated with safe driving for females and older younger males (i.e., 21–24 year olds), whereas, in contrast, friendships primarily focused on spending leisure time together on common interests were related to more risky driving, particularly amongst younger male drivers (aged 17–19). Guggenheim and Taubman-Ben-Ari (2015) conclude that research-based interventions could be used to promote safer driving behaviours amongst young drivers by fostering the positive aspects of peer relationships. Whilst the video example outlined above from the Learn2Live intervention [1] is not research-based, components within it (i.e., demonstration of coping mechanisms, development of plans and support from friends), are supported by the literature.

Speaking out and taking action, whether as a driver or a passenger, was also touched on in some of the performances (i.e., *“Even if you're a passenger, you have the right to say, 'Please slow down'”* [2], *“If you are in any doubt, if you get into a car and realise the driver is behaving erratically or you think they are under the influence, ask them to stop. If they don't stop tell them you're going to be sick. That's a sure way for them to get you out of that car. If in doubt, get out. And in my world a mate doesn't let a mate drink or drug drive”* [3], *“So don't be that victim. Be that safe driver. Be the person in your group that your friends can rely on. Do things differently. Be the positive influence. Be the voice of reason”* [5], *“it's back to that contract. Having that understanding, that trust between you as passengers and the driver”* [6]). The specific risk posed to passengers was also emphasised, *“we often find that it's passengers in vehicles that are the ones that are seriously injured or tragically lose their lives.”* [6]

Peer passengers increase the risk of fatal crashes within young and novice drivers due to the increased distraction and peer pressure (Chen et al., 2000; Ehsani et al., 2015; Ouimet et al., 2015; Simons-Morton et al., 2005) and consequently a developing body of research has sought to understand whether peer passengers can be harnessed to improve young driver safety (Buckley & Watling, 2018). Kennedy et al. (2018) evaluated the effectiveness of a school-based road safety education intervention at encouraging young drivers to speak up when a driver was talking on a mobile phone whilst driving, through strategy development exercises (See Appendix A.1 for further details of the RACQ Docudrama Program). The evaluation found that intervention participants were more likely to speak up than participants within the control condition with AR and PBC identified as important predictors of speaking up, with females more positively influenced by the intervention than males. Kennedy et al. (2018) suggested that future interventions could focus on social threats, such as social disapproval towards risky driving behaviours to secure greater persuasiveness of the intervention for young males. This gender difference in likelihood to speak up has also been found in other intervention evaluations (Hover et al., 2000). There may be potential for future interventions to support and encourage peer passengers to speak up and promote safer road user behaviours, providing the

intervention is evidence-based and protective strategies are thought to outweigh the proven negative consequences of having peer passengers within vehicles, especially during early licensure. Given the weight of evidence supporting the value offered by Graduated Driver Licensing (e.g., Williams, 2017), which typically includes some level of passenger and night-time driving restrictions depending on local permutations, reducing peer passengers, rather than encouraging safe passengers would appear the best evidence-based passenger strategy to promote to young people.

The promotion of evidence-based road safety actions was not generally forthcoming in the performances evaluated. The Learn&Live [6] performance included several references to some of the evidence-based actions that novice drivers can take to improve their safety, namely, getting enough driving experience, purchasing as safe a vehicle as can be afforded as well as telematics insurance (See Table 3-7).

Table 3-7 Actions promoted to improve safety [6]

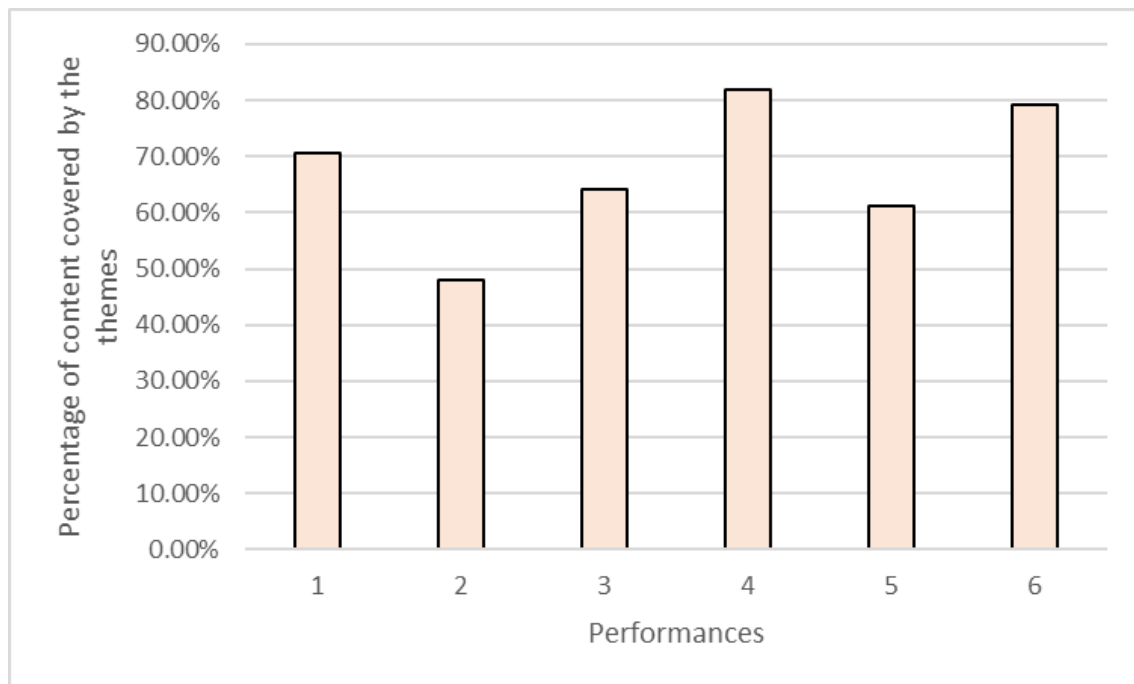
Action promoted	Example
Driving experience	<i>"If you do decide to learn to drive, it's an expensive process. Could be £20/£22 a lesson, the driving standards agency suggests you should take 47 lessons and have 20 hours of additional experience. That's a lot of money. That's a big investment. Some people might take a lot less than that. They'll bang in for their test quite early. The problem there is they may not be fully equipped once they pass that test to be as safe as we would like them to be."</i>
Purchasing safer vehicle	<i>"Because you'll go out, you'll buy a car, your friends'll buy a car, or family'll buy you a car and they'll try and get the safest car for you. And there's a lot of investment in car manufacturer now to make a vehicle safe. They'll put in anti-skids, they'll give you stability control, they have your side impact bars, everything is there to make you safe."</i>
Telematics insurance	<i>"a positive thing for young drivers." "It does make you safer." "They have helped a lot more people than they've hindered."</i>

However, two of these positive, safety promoting messages were somewhat lost in their presentation. Where encouraging adequate driving experience is concerned, the emphasis is placed on learning to drive costs and repeating the Driver and Vehicle Standards Agency (DVSA) suggestions for on-road hours, which are not in line with international best practice (e.g., Over 100 hours of supervised practice (Cavallo & Oh, 2008)) and this may have dissuaded the audience from getting sufficient practice. In addition, the message about purchasing safe vehicles with up-to-date technology was nullified when followed with the statement, *“ultimately, I want you to sort of remember that a car is nothing more than a tin box on wheels. That’s all it is. Even with those safety features, it will only provide and afford so much protection [6].”* Whilst this comment is presumably made to encourage young drivers not to rely solely on vehicle technology, such a statement could also potentially undermine the important message provided to this age group about purchasing the safest vehicles within their available budget. In future, pre-driver educational interventions should seek to promote the actions that research evidence has found will support young driver safety, such as a 12-month minimum learning period (Mayhew et al., 2014b; Senserrick & Williams, 2015) and hazard prediction training (Crundall, 2016) (See paper 3).

3.4.1.5 Theme variation by performance

On average the themes identified within the content analyses accounted for 67.54% of the content in the performances (ranging from 61.11% - 79.19%). As shown in Figure 3-3, the themes covered the most content in performance 4 and the least in performance 2 (i.e., for performance 2, more than 50% of the content was outside of the themes identified in this study).

Figure 3-3 Performance content covered by themes by performance



The extent to which the identified themes and sub-themes were covered in each of the six performances varied (Figures 3-4 and 3-5). Graphic descriptions of trauma formed the greatest amount of performance content for performances 1-4 (with 1-3 being most similar in terms of the performance content). Performance 4 had the greatest percentage of 'Graphic descriptions of trauma' and 'Emergency services experiences' content, whereas performances 5 and 6 had 'Biased and (mis)information about road risks' as the largest amount of performance content. For the sub-themes, performance 4 had the greatest amount of content that fell within these codes. All performances had more content about emergency service personnel as helpers/heroes than on professional anguish. The greatest disparity between the two can be seen for performance 6 (See Figure 3-5).

Figure 3-4 Percentage of performance content addressing themes

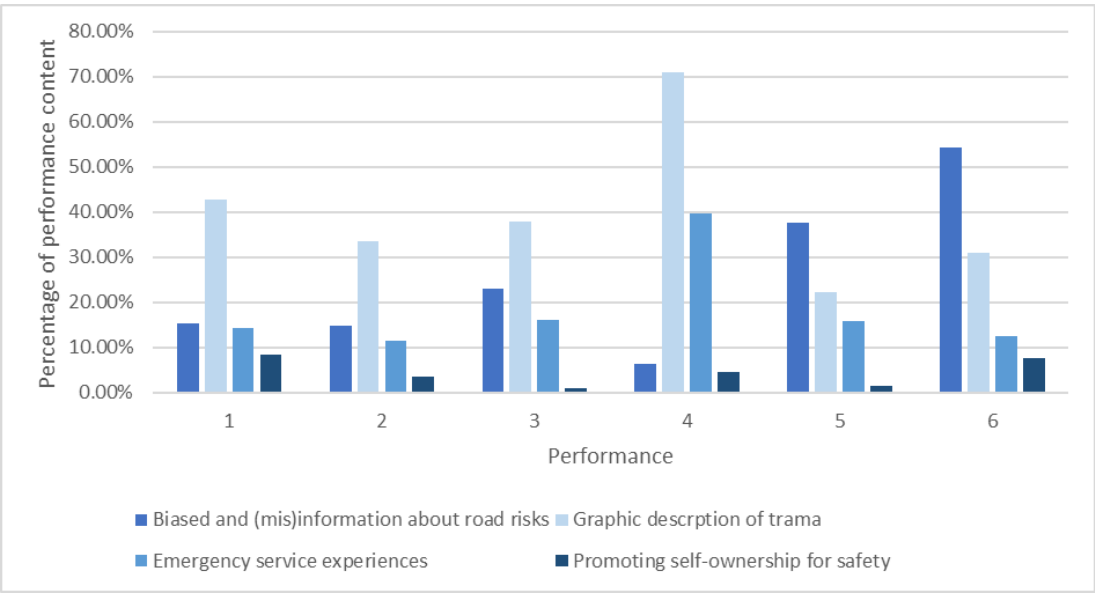
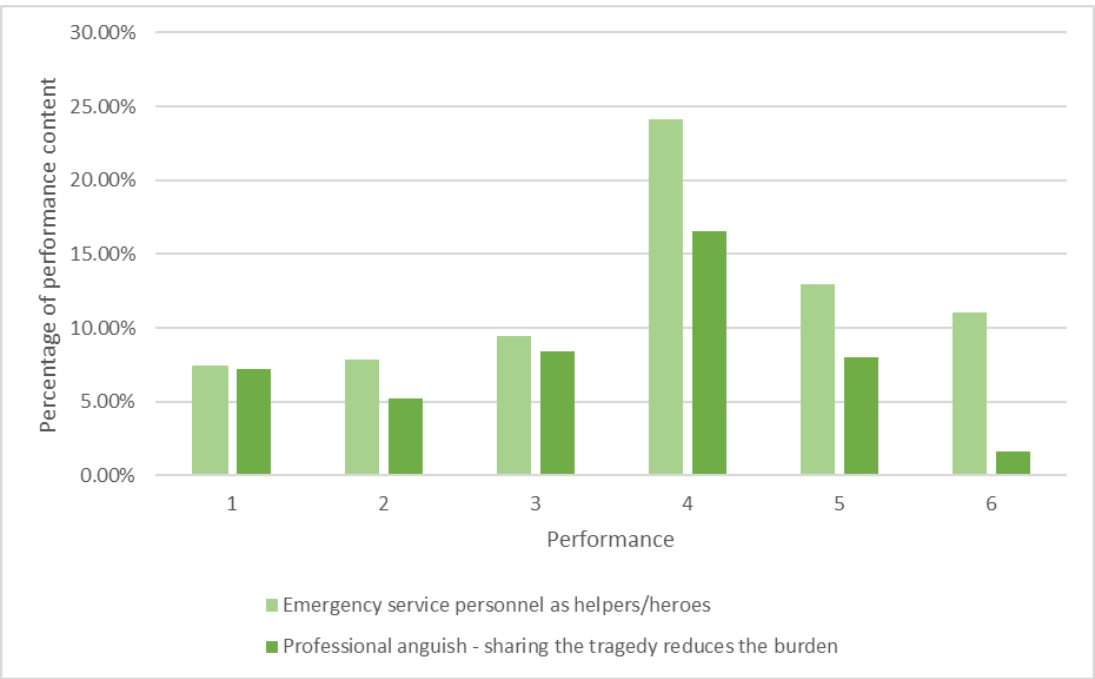


Figure 3-5 Percentage of performance content addressing sub-themes



3.4.2 BCTs employed within the performances

Table 3-8 shows the results of the BCT content analysis conducted. A total of 23 (25%) of the 93 BCTs were found to be present, to varying degrees, in the performances, spanning 12 out of a total of 16 groups.

Table 3-8 BCT groupings and BCTs across six performances

BCT grouping	BCT	Presence in Performance(s) Certainty (+ or ++) **						TOTAL no. certainty ++ (%)	TOTAL no. certainty + (%)	GRAND TOTAL certainty per BCT (%)
		1	2	3	4	5	6			
1. Goals & planning	1.1 Goal setting (behaviour) *	++	+	+		+		1	3	4
	1.2 Problem solving *	+	+			+	+	0	4	4
	1.4 Action planning *	++	+	++		+	++	3	2	5
3. Social support	3.1 Social support (unspecified) *	++						1	0	1
	3.2 Social support (practical) *	+					+	0	2	2
4. Shaping knowledge	4.1 Instruction on how to perform a behaviour *	++						1	0	1
	4.2 Information about antecedents *	++	++	++	++	++	++	6	0	6
5. Natural consequences	5.1 Information about health consequences *	++	++	++	++	++	++	6	0	6
	5.2 Salience of consequences	++	++	++	++	++	++	6	0	6
	5.3 Information about social and environmental consequences	++	++	++	++	++	++	6	0	6
	5.5 Anticipated regret *	+	+	+	++		+	1	4	5
	5.6 Information about emotional consequences	++	++	++	++	++	++	6	0	6
6. Comparison of behaviour	6.1 Demonstration of the behaviour	++	+	+	+			1	3	4
	6.2 Social comparison	+				+		0	2	2
7. Associations	7.1 Prompts/cues *		+		+			0	2	2
	7.5 Remove adverse stimulus						+	0	1	1
8. Repetition & substitution	8.1 Behavioural practice/rehearsal *		+					0	1	1
9. Comparison of outcomes	9.1 Credible source	++	++	++	++	++	++	6	0	6
10. Reward & threat	10.11 Future punishment			++	+	+	++	2	2	4
13. Identity	13.1 Identification of self as role model	+				+		0	2	2
15. Self-belief	15.1 Verbal persuasion about capability	++	+	+	+	+	+	1	5	6
16. Covert learning	16.1 Imaginary punishment	+		+	++	+	++	2	3	5
	16.3 Vicarious consequences	++	++	++	++	++	++	6	0	6
TOTAL no. certainty ++ (%)		13 (68%)	7 (47%)	9 (64%)	9 (69%)	7 (47%)	10 (67%)			
TOTAL no. certainty + (%)		6 (32%)	8 (53%)	5 (36%)	4 (31%)	8 (53%)	5 (33%)			
GRAND TOTAL per performance (%)		19 (100%)	15 (100%)	14 (100%)	13 (100%)	15 (100%)	15 (100%)			

* High potential BCTs, as assessed by Fylan (2017), which have been assessed by the researcher as applicable to workshop and education performances. 11 out of 22 are present in the performances.

** Level of confidence for the identification of BCT, as recommended by the online training: + BCT present in all probability; ++ BCT present beyond all reasonable doubt.

Seven BCTs, from four groups were present in the performances beyond reasonable doubt (Certainty ++). This is outlined in Table 3-9, with coded content examples.

Table 3-9 BCTs present in all performances beyond all reasonable doubt (Certainty coding ++)

Grouping /BCT	Example text coded to this Group/BCT
4. Shaping knowledge	
4.2 Information about antecedents	<i>"What we eventually found out was, Dan had gone out for some beers with his friends in Chorley, that's fine, no blow against that and, please, enjoy yourselves. But what Dan did was decide to get in his car and drive home. Dan was three times over the drink drive limit. He bounced off that curb that night. He killed his self and changed his family's lives forever."</i> [4]
5. Natural consequences	
5.1 Information about health consequences	<i>"Now, had he been wearing his seatbelt, he would have almost certainly, a bit shaken and bruised and bumped, but he would probably have opened the driver's door and got out of his car. But he wasn't wearing his seatbelt. And the result of that was, that he was then ejected through his own vehicle at nearly 90 miles an hour. And the only thing that stopped him coming out of his vehicle was meeting the rear wheel, the spare wheel on the back of this four by four, coming into his car. The last thing he'll have ever seen. The only saving grace is we think he was probably killed instantly, which means he was probably dead before his car stopped moving."</i> [1]
5.2 Salience of consequences	<i>"I'm just going to show you a series of images. It's a short clip. It lasts about three minutes. And these are locations where people have got it wrong. [Maroon 5 'Memories' plays with photographs of various local collision sites, some with floral tributes]." [6]</i>
5.3 Information about social and environmental consequences	<i>"So, if you're caught not wearing your seat belt, that's again £100 pound fine and three points on your license."</i> [3]
5.6 Information about emotional consequences	<i>"And when they actually told us, it didn't sink in. It was, it's too, too big. How? How could--? How could a young man, that vitality, be no more? He had hit the crash barrier and went straight into the pillar in the middle of the bridge. The impact of which ignited the car. [Father sounding emotional and tearful] His ability to be able to, I think, include everybody within the room, within his, he was in his sphere, he had an ability to be able to look out for everybody else and still have a fantastic time himself [Pause]. I would give everything away. To have him back. [Crying]." [2]</i>
9. Comparison of outcomes grouping	
9.1 Credible source	<i>"Good morning. My name's Gordon Mitchel [Reading from a pre-prepared script]. I've been a firefighter now for over 25 years. 20 of which have been in my hometown of Blackburn. Like the other emergency services workers here today, unfortunately, I've seen my fair share of fatalities and serious injuries. Just because you're in your job longer, doesn't mean you get used to seeing upsetting scenes."</i> [4]

Grouping /BCT	Example text coded to this Group/BCT
16. Covert learning grouping	
16.3 Vicarious consequences	<i>"James was a young guy living here in Kent. It was that time between Christmas and New Year where you don't really get a lot of stuff done at work. He was in his first job and after work he finished early and went to the pub with his mates for a beer. He had one drink and then he got in his car, which was a little red Mazda, he loves his little sports car, that was his pride and joy and he drove home from Maidstone to Medway, where he lived. On his way home, he lost control of his car. His car skidded across the road and it was hit side on by a vehicle travelling in the opposite direction. That vehicle caught fire and the driver of that vehicle had to be pulled out from her car. James died at the scene. A post-mortem on James found that the alcohol level in his body was just below the legal limit. That's the facts as to what happened with James."</i> [5]

There were also a further three BCTs (1.4 Action Planning, 5.5 Anticipated regret and 16.1 imaginary punishment) that were present in five of the six performances, either classed as being present beyond all reasonable doubt, or beyond all probability, dependent on the performance. Examples of these BCTs within the performances are provided in Table 3-10.

Table 3-10 BCTs present in five out of six performances

Grouping /BCT	Example text coded to this Group/BCT
1. Goals and planning	
1.4 Action planning	<i>"So if you are driving, or if you're go out, embarking on a journey as a group, think about planning ahead so you give yourself enough time."</i> [3]
5. Natural consequences	
5.5 Anticipated regret	<i>"How would you cope if that happened to you? How would you cope if you inflicted it on somebody else?"</i> [4]
16. Covert learning	
16.1 Imaginary punishment	<i>"Now I just want you to think for a moment. Imagine being the passenger or the driver in that vehicle. One minute you're in a warm environment, the next minute you're in this nightmare situation. Possibly, just entwined in that vehicle."</i> [6]

Four further BCTS were present in four of the six performances, whether classed as being present beyond all reasonable doubt, or beyond all probability. Examples of these BCTs within the performances are provided in Table 3-11.

Table 3-11 BCTs present in four out of six performances

Grouping /BCT	Example text coded to this Group/BCT
1. Goals and planning	
1.1 Goal setting (behaviour)	<i>"Do not exceed the speed limit under any circumstances. Do not drive if you're tired. And as a driver or passenger, please make sure you wear a seat belt for every journey regardless of how short it is."</i> [1]
1.2 Problem solving	<i>"As a passenger, always think about who's driving the car and what condition they're in. If you have any doubt, don't get in the car."</i> [2]

Grouping /BCT	Example text coded to this Group/BCT
6. Comparison of behaviour	
6.1 Demonstration of behaviour	<p><i>"Here's an example of friends using positive peer pressure to reduce everybody's risk on the road.</i></p> <p><i>[Video starts 01:26:56]</i></p> <p><i>[Music playing on the radio and sounds of driving]</i></p> <p><i>Female: Mate, there's a service station in less than a mile.</i></p> <p><i>Male: Yeah?</i></p> <p><i>Female: Yeah. So, let's pull up and you can check your text there.</i></p> <p><i>Male: No, I'm fine.</i></p> <p><i>Female: I'm not comfortable. Come on, we can get some food while we're there.</i></p> <p><i>Male: Whatever [Sighs]."</i> [1]</p>
10. Reward and threat	
10.11 Future punishment	<p><i>"You are working hard at the moment, you're at college and at some point, you'll do exams, or you pass your courses and you move on to a job or something up to another point of education. I've still got investigations on the book waiting to go to court from 2017. Now, that's people in limbo for nearly two years where they don't know where they're going. Where, they've applied for a job, that could be working through apprenticeships, it could be working through different things and all of a sudden that's just taken away from them because of, sometimes, a silly mistake."</i></p> <p>[6]</p>

An analysis of the high potential BCTs (as defined by Fylan, 2017) for application in both theatre and workshop formats for pre-driver education has been conducted (See Appendix B.8). This analysis concluded that 54 of the 93 BCTs were suitable for application within a theatre format, with a further 27 BCT possibly appropriate for use. Of the BCTs that were suitable or possibly suitable for application in theatre performances, 22 were described by Fylan (2017) as high potential BCTs. 50% of these were identified within the 6 performances analysed (See Table 3-12). Whilst many BCTs have been identified as appropriate for use within this type of intervention, intervention effectiveness is not simply related to the number of BCTs applied. Moreover, there may be a diminished effect of the BCTs applied if too many are used. Fylan and Stradling (2014) conclude, in their analysis of BCTs used in road safety interventions for young people, that whilst it is important to increase the range of BCTs employed, interventions should be based on theoretical models of behaviour and apply the BCTs which are compatible with the aims and objectives of the intervention.

Table 3-12 High potential BCTs and presence in performances evaluated

Grouping	BCT	No. performances applied in
1. Goals and planning	1.1 Goal setting (behaviour) *	4
	1.2 Problem solving *	4
	1.3 Goal setting (outcome) *	0
	1.4 Action planning*	5
	1.5 Review behaviour (goals) ^a *	0
	1.7 Review outcome goal(s)*	0
2. Feedback and monitoring	2.2 Feedback on behaviour ^a *	0
	2.3 Self-monitoring of behaviour*	0
	2.4 Self-monitoring of outcome(s) of behaviour*	0
3. Social support	3.1 Social support (unspecified)*	1
	3.2 Social support (practical)*	2
4. Shaping knowledge	4.1 Instruction on how to perform a behaviour*	1
	4.2 Information about antecedents*	6
5. Natural consequences	5.1 Information about health consequences*	6
	5.5 Anticipated regret*	5
7. Associations	7.1 Prompts/cues*	2
8. Repetition and substitution	8.1 Behavioural practice/ rehearsal*	1
	8.3 Habit formation*	0
9. Comparison of outcomes	9.3 Comparative imagining of future outcomes*	0
12. Antecedents	12.1 Restructuring the physical environment*	0
	12.2 Restructuring the social environment*	0
13. Identity	13.3 Incompatible beliefs*	0

^a application within theatre provision a possibility

This analysis illustrates that there is potential for the performances to include more high potential BCTs, particularly those that have been identified as successful for this target audience (i.e., self-monitoring of behaviour and outcomes of behaviour (2.3 & 2.4), Feedback on behaviour (2.2), Instruction on how to perform a behaviour (4.1), Goal setting (behaviour & outcomes) (1.1 & 1.3), Review behaviour goals (1.5) and Social support (unspecified & practical) (3.1 & 3.2)) (Sullman, 2017). The performances reviewed for this study have largely focused on BCTs within the ‘shaping knowledge’ and ‘natural consequences’ grouping. Although some of these BCTs have been frequently found in successful interventions for 13–18 year olds (i.e., Information about health consequences (5.5), Sullman, 2017), future interventions should aim to diversify BCT use to a broader range of high potential BCTs.

3.5 Conclusions

This present analysis of six different pre-driver testimonial interventions, has found several common themes in content and use of BCTs included. This study makes several recommendations for the design and delivery of road safety interventions which will be considered in the development of a pre-driver intervention (See Paper 6).

Information provision featured highly within all interventions reviewed. However, there are limitations associated with information provision as a mechanism for behavioural change (Gibbons & Gerrard, 1995) and future intervention designers should carefully consider how information provision is used, so that it can best support beneficial outcomes for young drivers. This might include providing content to support individuals to develop self-efficacy and/or perceived behavioural control through the use of tools such as implementation intentions, using effective BCTs for this target audience, addressing factors that are most associated with crash risk (i.e., age and experience, Mayhew & Simpson, 2002) as well as being mindful of how such content can support delivering safety improvements, which support the broader road safety system (e.g. increasing risk of enforcement perceptions). Ultimately, it is vital that interventions are theoretically and evidentially grounded to ensure that the content is both accurate, as well as most likely to secure beneficial improvements in road safety attitudes and intentions.

All the interventions assessed in this study relied on graphic descriptions of trauma to increase the persuasive power of the messages presented. Whilst the research evidence finds learning benefits associated with both real-life and fictional accounts (Moon & Fowler, 2008), future intervention delivery should consider the nature and tone of the message delivered. In the interventions reviewed, the emergency service worker voice dominates, labouring job roles, experiences and the emotional anguish experienced when attending collision scenes (both immediate and ongoing). Whilst a clear motivation to save life is conveyed, it is likely that presenters are benefiting from a form of a cathartic release through sharing their professional anguish. Descriptions of collisions and

injuries dominated the performances and whilst research indicates that there may be some value in using anticipated regret to improve road safety outcomes (Koch, 2014), there is a risk that the extent of the graphic descriptions could discourage some of the audience from driving. With traffic collisions being a familiar traffic risk to many, it has been suggested by De Pelsmacker et al. (2011) that weak threat appeals alongside information provision might deliver better outcomes than severe threat information as included in the interventions reviewed. Research points to the potential for maladaptive responses resulting from fear appeal (e.g., to ignore or take no action due to being fearful, mortality salience etc.), with defence mechanisms deployed by those most susceptible to the health threat (Ruiter et al., 2014). The effectiveness of the interventions reviewed will be dependent on the risk vulnerability experienced by participants and their belief in their ability to act, which is currently unknown for the present interventions. Despite the abundant evidence available on the unintended negative consequences of threat appeals, it is interesting to note that interventions, such as those evaluated in this study, are often rated highly by attendees (Beck et al., 2018; Lennon & Rentfro, 2010).

Whilst Behaviour Change Techniques (BCT) were present in the performances evaluated, the analysis of how these mapped across to high potential BCTs demonstrates that there is significant potential for interventions of this nature to employ a broader range of evidence based BCTs. Currently there is a heavy focus of the performances on natural consequences, as found by Dale et al. (2017) and Fylan and Stradling (2014) in their broader study of interventions for young people. With the testimonial performances evaluated in this study only having a marginal focus on goal and action planning activities, which are the components that have the greatest potential to narrow the intention-behaviour gap, future interventions should include these high potential BCTs. Overall, BCTs provide a practical framework for considering and applying important intervention components and should be considered in the design and delivery of future interventions. However, as outlined earlier in this paper, the utility (as opposed to the number) of BCTs applied, should guide BCT incorporation.

Given the interventions evaluated in this study are heavily focused on collision consequences, require ongoing behavioural changes from a mixed gender audience, without efficacy statements applied, the interventions do not appear to have the active ingredients necessary to achieve positive behavioural outcomes. Previous effectiveness studies of the Learn2Live intervention by Burgess (2011) and Cutello et al. (2020b) collectively conclude that the intervention had immediate effects on several TPB components, with effects that diminished over time, particularly for males. This type and magnitude of effect is typical of evaluations of this nature (e.g., Poulter & McKenna, 2010). It is important that future interventions are designed using a theoretical and evidential background, as this will help to avoid circumstances where speakers inadvertently present negative messages (e.g., around enforcement deterrents), as was seen in some of the interventions reviewed. The use of peer-age presenters as well as employing active learning approaches should also be considered, alongside the application of more positively framed approaches which have demonstrated promise (Lewis et al., 2007b). It is encouraging that some of the performances in this review address important safety promoting actions, such as speaking out, taking control in on-road situations, engaging with social networks and developing safe driving plans. However, some of these messages were either lost in their presentation, or did not contain demonstrations of tools such as implementation intentions (Gollwitzer, 1999) which may help attendees to action the concepts presented. In future it is vitally important that interventions promote actions that are supported by the research evidence, such as a 12-month minimum learning period (Mayhew et al., 2014b; Senserrick & Williams, 2015) and hazard prediction training (Crundall, 2016) (See Paper 3).

It is interesting to note that despite traditional classroom learning typically being delivered in small classes of around 30 students, large audiences appear to be considered both the norm and acceptable practice for the delivery of road safety interventions. Optimal class size to secure best student outcomes, particularly related to academic achievement, is an active area of pedagogical research. Ehrenberg et al. (2001) in their review on the impact of school class sizes on student learning posited that there are several ways in which class size may

impact this metric (e.g., student social interaction, levels of distraction, the focussed attention a teacher can provide to individual students and the types of learning experiences offered etc.). The authors conclude that it is important to consider class size within the broader context of policy levers (i.e., teacher quality) and that more high-quality robust randomised controlled studies are required to inform policy in this area. A more recent study by Bosworth (2014), using publicly collated data from the North Carolina Education Research Data Centre (US) related to fourth and fifth grade students, found that smaller classes typically experienced smaller achievement gaps on average, although the effect size was small. Given class size is considered a metric of relevance in pedagogy, further thought should be given in future to suitable class sizes for road safety interventions. Whilst it may be pragmatic to deliver to larger groups, this may create learning challenges and ethical issues, particularly when challenging emotional content is delivered at scale, meaning that attendees who are negatively affected may feel less able to excuse themselves from the room.

This study is subject to several limitations, which should be considered in the interpretation of the results. The themes were generated using an inductive content analysis of the data. Consequently, the content analysis did not test any specific theory and had a different method been applied, slightly different themes may have presented. It is possible that themes have been missed, or BCT items coded incorrectly (or completely missed from the categorisation). The likelihood of these errors has been minimised through the main researcher training in BCT taxonomy coding and the coding being reviewed by two researchers. This study extends the work of Dale et al. (2017) with a larger sample of performances and confirms their overall conclusion that performances of this type predominantly use negatively framed BCTs with a focus on consequences and information provision.

4 PAPER THREE – A LITERATURE REVIEW OF YOUNG DRIVER RISK TAKING

4.1 Abstract

Young driver risk taking contributes to death and serious injury amongst young people and the other road users with which they interact. Significant research has been conducted over the past decade to identify the causal mechanisms related to the risks experienced by this group to assist in the development of effective intervention approaches. Despite the wealth of evidence available on young driver risks, this is rarely applied in the development of interventions, which are typically developed by road safety practitioners based on personal experiences and intuition, without a formal design process (See Papers 1 and 2).

This study evaluates young driver safety risk factors reported within recently published reviews to identify the broad themes for a new pre-driver safety intervention to address (See Paper 6), focusing on the topics that the evidence indicates will have a positive influence on young driver safety outcomes. Given the breadth of risk factors associated with young and novice driver safety, an examination of meta-analyses, recent systematic and general literature reviews ($n = 21$) since 2010 was conducted to provide a synthesis of the evidence.

Five main areas of risk were identified, which were summarised into the following areas of preventative focus: Maximising the learning to drive process (i.e., getting sufficient driving experience and gaining necessary cognitive skills); Making decisions that support safety (i.e., vehicle choice and feedback on driving behaviours); Maintaining focus - Reducing in-vehicle distractions (i.e., mobile phone use and passengers); Fitness to drive (i.e., managing fatigue, avoiding drink and drug impairment); and Controlling the journey (i.e., managing speed). In addition to identifying areas of content for inclusion for a new pre-driver safety intervention, this study highlights how intervention content might be designed to increase the likelihood of beneficial road safety outcomes for the target audience.

4.2 Introduction

Young driver risk taking is a well-known, chronic public health issue. Jurisdictions throughout the world have sought to address this area of risk through a combination of licensing, training and education initiatives. Despite significant attention, road traffic injuries remain the leading of cause of death amongst 5-29 year olds worldwide (World Health Organisation, 2018).

Over the last twenty years a significant body of research has been conducted to understand why young novice drivers are at a disproportional risk of injury. Driver age and experience have been found to be key contributors to greater risk taking and collision risk amongst young novice drivers (Curry et al., 2015b; McCartt et al., 2009; O'Brien et al., 2016; Roman et al., 2015). This is particularly true amongst male drivers (Amarasingha & Dissanayake, 2014; Rowe et al., 2015) who are almost four times more likely to be involved in a killed or seriously injured (KSI) casualty than young females (RAC Foundation, 2016).

Developmental maturity (Johnson & Jones, 2011; Keating, 2007; Keating & Halpern-Felsher, 2008) and consequent problems with impulse control (Hatfield et al., 2017; Steinberg, 2011; Steinberg et al., 2017) are also contributory factors in risk taking behaviours amongst young novice drivers, which leaves young people vulnerable to distraction from peer passengers (Bingham et al., 2016; Buckley et al., 2014; Heck & Carlos, 2008; Steinberg, 2011; Williams, 2003; Williams et al., 2007) and other distractions due to technology in the vehicle (Buckley et al., 2014). Young drivers are also more susceptible than older age groups to impaired driving caused by alcohol consumption (Keall et al., 2004) and sleep deprivation or tiredness (Carskadon, 2011). Studies have also found young drivers, particularly young males, to exhibit more risky and fewer cautious driving behaviours, such as speeding when compared to more experienced drivers (Sarma et al., 2013). The wealth of research conducted on the road safety risks experienced by young and novice drivers provides vital background to the broader situations and individual behaviours that increase the risks experienced by this group, which is formative for the development of preventative initiatives.

In addition to understanding the specific risk behaviours experienced by young and novice drivers, several theories of risk taking further support an understanding of the pattern of risk taking observed within this group. The role of risk-propensity (i.e., a positive attitude towards risk taking activities) in young drivers was explored in an experimental study ($n = 89$, Age = 16-25 years, $n = 110$, Age = Over 35 years) conducted by Hatfield and Fernandes (2009) who found that, in comparison to older drivers, younger drivers had a greater tendency to take collision risks, due to a lower-level of risk aversion and a greater motivation for taking driving risks (i.e., seeking experiences, excitement, prestige as well as opportunities to 'blow off steam'). Younger drivers were also more likely to be sensation seeking, influenced by peers and to underestimate risk or consider risks irrelevant. Hatfield and Fernandes (2009) concluded that there was particular value in addressing motives for drink driving and speeding amongst young drivers given their significant relationship to the variables (as outlined above) when compared with older drivers.

Several studies have also evaluated the impact of sensation seeking on young driver behaviour. Sensation seeking has been described as a need to experience excitement, novelty and danger (Zuckerman, 1979) and as a personality trait, refers to individual differences in optimal levels of arousal and stimulation (Zuckerman, 1994). Cassarino and Murphy (2018) in their critical literature review on reducing young driver crash risk found that it is difficult to prove whether sensation seeking is a stronger indicator of risk behaviours within different age groups. However, given the increased engagement in risk taking within young drivers as a result of developmental factors, Cassarino and Murphy (2018) conclude that promoting safe attitudes towards different driving behaviours might help moderate the detrimental impact of personality traits, which are less amenable to change.

Finally, Risk Allostasis Theory (RAT) is also commonly applied to assist in explaining driver behaviours. The concept, originally developed by Fuller (2011), is based on a task-capability model, which outlines how task demand relates to environmental, vehicle and personal characteristics. In this framework there is a

range of acceptable task difficulties (i.e., gap between demand and capabilities), which a driver will seek to maintain. Consequently, if a driver exceeds their capability, a collision may occur. For young drivers who lack experience and the ability to anticipate hazards, there is a risk that many over-estimate their driving skills, which can lead to a reduced safety margin, as understood by RAT.

These theories of risk taking provide important background to this review of the risk behaviours most commonly experienced by young and novice drivers. Paper 1 in this thesis, which reports on the findings of a critical review evaluating the effectiveness of pre-driver education interventions, found that, of the interventions reviewed, none were designed with reference to behavioural theory or research evidence about collision causation. Instead interventions were typically designed using the personal knowledge of local road safety practitioners, as has been found previously found by other studies (e.g., Weston & Hellier, 2018). This study evaluates young driver safety risk factors reported within recently published reviews to identify the broad themes for a new pre-driver safety intervention (See Paper 6), focusing on the topics that the evidence indicates will have a positive influence on young driver safety outcomes.

4.3 Method

An examination of recent (since 2010) meta-analyses, systematic and critical literature reviews on young driver safety was conducted to identify key risk factors to be addressed by a newly designed intervention (See Paper 6). A 'review of reviews' was conducted because the vast literature available on the topic⁷ of young driver risk was not in scope for this study.

⁷ A search on SCOPUS using the search terms TITLE_ABS_KEY ("young" AND "driver*") returned 12,865 results.

A search for relevant meta-analyses, systematic and critical literature reviews was conducted on SCOPUS using the following search criteria:

TITLE-ABS

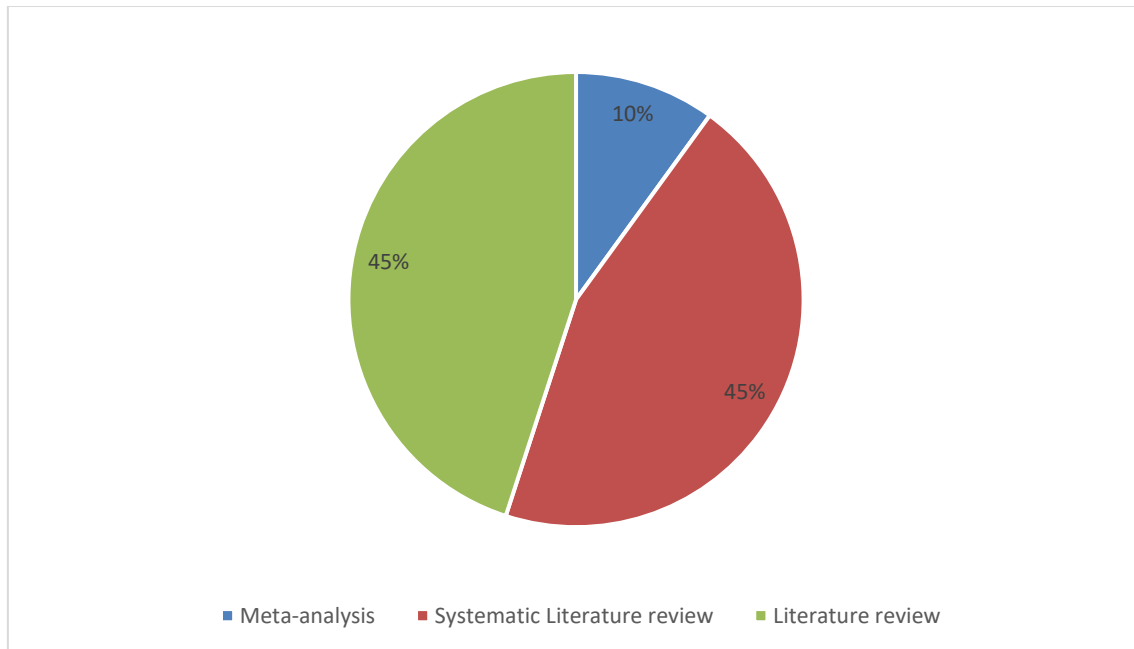
```
KEY ( ( ( "pre" OR "young" OR "teen*" ) AND "driver*" AND ( "systematic review" OR "critical review" OR "meta-analysis" OR "literature review" ) ) ) AND ( LIMIT-TO ( PUBYEAR , 2021 ) OR LIMIT-TO ( PUBYEAR , 2020 ) OR LIMIT-TO ( PUBYEAR , 2019 ) OR LIMIT-TO ( PUBYEAR , 2018 ) OR LIMIT-TO ( PUBYEAR , 2017 ) OR LIMIT-TO ( PUBYEAR , 2016 ) OR LIMIT-TO ( PUBYEAR , 2015 ) OR LIMIT-TO ( PUBYEAR , 2014 ) OR LIMIT-TO ( PUBYEAR , 2013 ) OR LIMIT-TO ( PUBYEAR , 2012 ) OR LIMIT-TO ( PUBYEAR , 2011 ) OR LIMIT-TO ( PUBYEAR , 2010 ) )
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References within the systematic and critical literature reviews, as well as the meta-analyses identified, were also examined and downloaded where research was identified as having a particular relevance for the design of the intervention. The initial database search was conducted in January 2021 and updated in December 2022. Initial keyword searches using the Boolean search string above resulted in 335 publications, which were refined with title screening and abstract evaluation against inclusion criteria ($n = 46$). Following reading the full text of articles, 14 articles were identified for inclusion based on the criteria set (i.e., article in English, published since 2010 and reported on a systematic, meta-analysis, systematic or critical literature review addressing young driver safety risk factors). A further 6 articles from the researcher's personal library (accumulated over the course of study) were also identified as meeting these criteria and were included in the review. A total of 20 papers were reviewed to inform this paper. For a list of the articles included in this review, please see Appendix C.1.

The largest number of articles included were either systematic or general literature reviews, with only two articles being meta-analyses (See Figure 4-1). Collectively the articles reported on the findings of 1,001 studies.

On average 50 articles (range: 8 – 196) were included within each of reviews referred to in this analysis (See: Appendix C.1 for further details).

Figure 4-1 Research design format of selected articles ($n = 20$)



The themes and sub-themes emerging from this review were developed using an inductive approach. Preliminary codes were formulated and revised accordingly, which informed the development of broader categories and themes (See Appendix C.1 where key young driver risks addressed by studies are identified). To address any study selection bias or selected outcome reporting limitations presented by the study method adopted, all papers which are referred to in detail in this review were reviewed at source before findings were presented.

4.4 Results and discussion

Five key themes and nine sub-themes emerged from the literature as topics that pre-driver interventions could address to support improved safety amongst this at-risk group. The findings are discussed under the identified themes and sub-themes in the sections that follow. The themes, split between a focus on pre-licensure and post-licensure, are outlined in Figure 4-2.

Throughout this results and discussion section, cited research is provided in brackets [], which refers to research reports cited in Appendix C.1.

Figure 4-2 Key themes for intervention focus

PRE-LICENSURE	Maximising the learning to drive process	Getting sufficient driving experience [6, 10]
		Gaining necessary cognitive skills [4, 5, 6, 9, 16]
POST-LICENSURE	Making decisions that support safety	Vehicle choice [6]
		Feedback on driving behaviours [6]
	Maintaining focus: Reducing in-vehicle distractions	Mobile phones [3, 6, 7, 15, 18, 19]
		Passengers [6, 8, 10, 11, 13, 17]
	Fitness to drive	Managing fatigue [12, 20]
		Avoiding drink and drug impaired driving [1, 2, 6, 13, 14]
	Controlling the journey	Managing Speed [6, 11, 13]

Nb. See Appendix C.1 for research referred to in [].

The sections that follow outline the research findings under these themes in more detail and conclude with a summary of countermeasure approaches relevant to the development of pre-driver interventions.

4.4.1 Maximising the learning to drive process

Driving experience is an important contributor to reducing crash risk amongst young and novice drivers [6]. Consequently, the learning to drive phase is a critical time for interventions to improve road safety outcomes for young drivers.

The sections that follow outline two protective actions that can be taken to support the learning to drive stage, which have emerged from this present review.

4.4.1.1 Getting sufficient driving experience

Driving inexperience has a negative impact on the driving performance of young drivers and is a key risk factor, associated with unsafe driving behaviours and collisions amongst this at risk group [6]. Age is a confounding risk factor because parts of the brain important for safe driving can take until the mid-twenties to fully develop, which can limit a young driver's ability to manage complicated driving environments and circumstances [6]. The first six months of solo driving post-licensure has been identified as the riskiest period of time for newly qualified novice drivers [6] and consequently it is commonly recommended that young and novice drivers get as much experience as possible pre-licensure in different road environments and situations.

Throughout the world many jurisdictions have in place Graduated Driver Licensing (GDL) systems to support young driver safety [6]. This licensing approach often includes a minimum learning period and/or driving hours requirement during the learner driver phase to increase driver experience, in addition to other components to address other aspects of risk (e.g., post-licensing restrictions for 6–12 months including night-time driving and/or passenger restrictions). GDL improves driving safety through increasing driving experience under safe conditions [6], with conclusive evidence from the US showing that GDL reduces collisions for the youngest age group, with fatal crash rate reductions of 17–63% possible when the most stringent form of GDL is applied [10].

The amount and nature of the experience needed to reduce risk has also been the subject of numerous studies and remains an active area of investigation. A positive association between mileage and hazard perception abilities amongst young drivers has been evidenced [6i] with significant improvements noted in eye glance behaviours at six and twelve months post-licensure.

Evidence suggests that parental involvement is crucial during the learning to drive and early independent driving stage of a young person's driving career. Parental participation and conduct within the early months of driving practice is closely related to how, particularly young male drivers, continue to operate on the roads [6ii]. Little is currently known about the nature and spread of parental supported practice that learner drivers are engaging in with additional support and guidance for parents recommended [6]. The cumulative body of research pertaining to the value of driving experience for young driver safety highlights the importance of securing both a sufficient quality and quantity of on-road experience, supported by parents and driving instructors ideally within a GDL system.

4.4.1.2 Gaining necessary cognitive skills

Cognitive skills which relate to safe driving include the employment of effective visual search strategies, honed hazard perception capabilities and the inhibition of distractions [6]. The ability to anticipate or detect potential hazards has an impact on crash involvement with both on-road experience and hazard perception training having been found to increase the development of necessary cognitive skills in young and novice drivers [16]. The findings of an experimental study [6iii] found that after 6-months of driving experience eye glance behaviour in novice drivers ($n = 36$) improved, with some of the initial differences between adults and newly-qualified drivers no longer significant, indicating that substantial learning had taken place over time within the novice driver group. The study also found that at 6-months post-licensure novice drivers made a greater number of mirror glances when undertaking secondary tasks although adult drivers made significantly more glances in these circumstances, indicating that some differences between newly-qualified and experienced driver eye scanning was still present 6-months post-licensure. A further experimental study [6i] measured skin conductance responses to assess learner, novice and experienced drivers' ($n = 50$) psycho-physiological responses to the presentation of driving hazards. It found that drivers with less than 1000 miles of driving experience had anticipatory responses like those of learner drivers.

In contrast, novice drivers with more than 1000 miles of experience had anticipatory responses similar to those of more experienced drivers. Taken together, both studies point to the importance of on-road driving experience in the development of hazard identification skills.

In addition to the natural development (i.e., over time and with increased exposure) of important higher-order cognitive skills, cognitive training has been recognised as an important approach for improving young driver safety [6]. In this context, there are several different types of driving cognitive skills training including hazard perception, hazard prediction and commentary training. Hazard perception relates to a driver's ability to both anticipate and detect potential hazards in the driving environment [6], with training interventions described by several studies [6iv, 6v, 6vi] as an effective approach for increasing the awareness of hazards and visual scanning behaviour in inexperienced drivers and bringing hazard perception skills in line with those of experienced drivers over a relatively short period of time (i.e., a few weeks to four months) [6]. Hazard perception tests typically involve watching a film clip and indicating when a hazard arises. Despite the apparent reported success of hazard perception training interventions, several limitations have been noted within the literature, such as follow-up effects being short-term and the fact that some drivers still experience difficulties with negotiating complex road environments (e.g., junctions) [16].

More recently, research has focused on the effectiveness of a variant of hazard perception training: hazard *prediction* training [6]. Whilst hazard perception training has its roots in the theoretical framework of situational awareness (SA), it has been argued [6vii] that few studies have used situational awareness as the basis for the study of hazard perception. Consequently, hazard prediction has been found to effectively distinguish between novice and more experienced drivers, whilst being less impacted by the risk appraisal experienced by response time hazard perception alternatives [6vii].

The importance of developing cognitive skills (i.e., hazard perception, visual search and distraction inhibition) for supporting the safety of young and novice drivers was identified by five of the studies reviewed (See Figure 4-2).

The incomplete development of cognitive skills has been found to be a key determinant of young novice and experienced driver performance differences. Studies have found novice drivers to have more narrow road scanning and less well developed abilities to detect, anticipate and respond to road hazards compared with more experienced drivers [6]. Whilst the development of hazard perception skills can be supported with training [6], attention management approaches have been identified as particularly important for preventing distracted driving [5]. Whilst training has generally been found to support skill development in the short-term, questions remain about the extent to which these effects last over time [4, 16] and differ with experience and age group [16]. With latent hazard anticipating training in particular, the extent to which improvements lead to real world latent hazard anticipation has also been queried, with individual level impacts being found to be influenced by individual training views (i.e., egocentric and exocentric) and age [9]. Overall, the accumulated body of research on the impact of cognitive skills training for improving the safety of young and novice drivers is positive, indicating that an intervention which supports and encourages young people to complete cognitive training would be beneficial. Taken together, the available evidence in this field indicates that necessary cognitive skills related to safe driving are in deficit within young drivers and that a combination of on-road experience and cognitive skills training are potentially important for improving road safety outcomes for young novice drivers.

4.4.2 Making decisions that support safety

Traditionally research into young and novice driver safety has focused on the individual level factors (e.g., emotional states, cognitive processes, personality traits, socio-economic status etc.) that relate to risk-taking in adolescence. An increasing number of studies within the field of road safety are being conducted through applying a broader systems approach, which focuses on shared responsibility across the road safety system. To date only a handful of studies have explicitly taken a systems approach to young driver safety [viii, ix], which recognises that action is needed by different actors throughout different levels of the road safety system [6]. In the sections that follow, two system safety issues

have been identified from the literature in this review as being particularly important for supporting young and novice driver safety: vehicle choice; and telematics insurance [6].

4.4.2.1 Vehicle choice

The age and condition of a vehicle that young novice drivers have access to in their first year of driving post-licensure has been described as an important road safety consideration [6]. This is not, however, a commonly addressed component for intervention treatment, despite the known impacts that vehicle purchasing decisions have on the safety of this of this at-risk group.

A prospective cohort study of newly licensed car drivers in New Zealand [6x] questioned parents ($n = 1200$) of newly licensed 15–17 year olds about vehicles accessible for use by the newly-qualified driver. The results showed that the vehicles driven by this group were more likely to be small, older (87% 10-years plus) with less comprehensive insurance cover. A similar telephone study with parents of teenagers ($n = 500$) conducted in the US [6xi] found that whilst the majority of teenagers were driving either mid-to-large vehicles, possibly as a result of the larger average size of vehicles in the US, a large proportion of the teenagers were reported by their parents to be driving older than ideal vehicles, which would not have key safety features (e.g., Electronic Stability Control). A comparable, earlier study [6xii] came to similar conclusions and found that whilst parents reported understanding important safety criteria for choosing safe vehicles, the vehicles actually selected provided inferior crash protection. Finally, a study [6xiii] reporting crash data from Australia and New Zealand found that those under the age of 25 had a statistically significant 69% (95% CI 30-123%) elevated injury crash involvement when driving high performance vehicles. However, the study concluded that given high performance vehicles only made up between 0.4-2.5% of vehicles in the jurisdictions evaluated, that the costs of implementing vehicle restrictions for high powered vehicles (e.g., ongoing enforcement) was likely to outweigh the safety benefits.

These studies suggest that there may be value in providing teenage drivers and particularly their parents [6xiv] with better consumer information about vehicle

choice options and beneficial safety effects offered by improved crash protection and other active safety technologies. However, no evaluation studies of intervention strategies of this type have been found. The financial costs associated with ensuring young and novice drivers have access to newer and safer vehicles may present a greater challenge than addressing other behavioural and social factors associated with young driver risk [6]. Whilst the financial barriers to entry related to vehicle access are an important consideration for raising awareness about car conditions on safety, ensuring young people are travelling in the safest vehicles that can be accessed within available budget thresholds is an important one-time only purchasing decision. Once made, such a decision will deliver ongoing benefits, unlike safe behaviours which require ongoing maintenance and management. Seeking to address the vehicles that young people are driving in is also in line with systems thinking which recognises that there are other actors and components within the road safety system (e.g., business, legislation etc.) which supports the safety of young drivers. For this reason, addressing vehicle purchasing decisions has been identified as a relevant area of focus within future young driver interventions.

4.4.2.2 Feedback on driving behaviours

Feedback on young and novice driver behaviours, recorded using in-vehicle data recorders (IVDRs), is typically delivered with the aim of supporting drivers to become aware of and consequently reduce their risky driving behaviours. This can be provided as feedback only or feedback linked to incentive-based, often telematics-based insurance schemes.

The feedback provided, which monitors aspects of driving related to unsafe driving behaviours such as harsh braking, sharp turns and fast acceleration, has been shown by numerous studies to reduce young driver risk, particularly where feedback is combined with rewards. An evaluation of an insurance-based intervention on the speeding behaviours of young and novice drivers in the Netherlands, found that applying fees for speeding behaviours reduced speeding violations significantly [6xv]. There were however limitations with the evaluation which should be noted (i.e., self-selected sample, strong participant attrition and

a small intervention effect which disappeared after the intervention was removed). A simulator study [6xvi] which investigated the outcomes for young males of different feedback and reward mechanisms found that when drivers received feedback and reward tokens combined, they spent the least amount of time above the speed limit. Drivers who received rewards only, showed similar reductions in speed and participants receiving feedback only displayed behaviours much closer to those of the control group. These findings led the authors to conclude that there was a higher value of token rewards, over and above the feedback only conditions tested. The limitations of extrinsic rewards have been noted in other studies [6xvii], such as behaviours changing when rewards are no longer available.

Previous research [6] has highlighted the potentially important role of parents in supporting feedback and monitoring processes related to young driver safety. Programmes with active parental involvement components, which also support feedback and monitoring of driving behaviours, have been found to reduce risky driving behaviours [6xviii]. Particular value was reported from a study [6xix] assessing the impact of IVDR feedback on young male driving behaviours, whilst employing a parental vigilant care approach⁸, which found that delivering feedback in this way significantly improved the driving behaviours of the young male drivers in the experiment.

Overall, evidence on the impact of feedback, incentives and rewards provided to young novice drivers through IVDRs indicates that such technology has the potential to support safe road user behaviours, with effects differing depending on the type and format of feedback provided. The value that promoting telematics could have on uptake has been previously highlighted [6] and consequently, there appears to be value in exploring how young driver interventions could promote the use of in-vehicle feedback.

⁸ an authoritative parenting approach which highlights the importance of increasing parental involvement and presence in potential areas of risk, which includes training on how to monitor behaviours and take appropriate action if necessary.

4.4.3 Maintaining focus: Reducing in-vehicle distractions

4.4.3.1 Mobile Phones

Distracted driving has been found to be a particularly common cause of road collisions in young adulthood [19], with 16–19 year olds most likely to die in distraction-related crashes [15]. For young drivers, mobile phone use whilst driving is a strong environmental predictor of road collisions [6], with texting whilst driving common amongst this at-risk group [15]. Young, inexperienced drivers are typically more affected by conducting secondary tasks in a vehicle than drivers with more experience [18].

Mobile phone use whilst driving is distracting because it draws resources from four domains: visual; cognitive; manual; and aural. This effects an individual's ability to manage tasks, consequently effecting safety [7]. One study [18] which assessed the effect of secondary tasks on young driver performance found that the act of looking away from the road had the greatest effect on driver risk. Whilst young drivers have reported being aware of the dangers associated with mobile phone use whilst driving, many are continuing to use mobile phones behind the wheel [3]. The social context (e.g., peer relations [7] and social norms [15]) has been found to play an important role in the decisions young people make about whether to use their mobile phone whilst driving. Researchers have, for instance, found that parental mobile use whilst driving and social norms for quick responses to text messages were associated with increased mobile phone use in this context [15]. Personality traits may also be important predictors of distracted driving behaviours. A questionnaire study ($n = 120$) [7xx] measuring the 45-item Big Five personality factors found that when teenagers reported higher levels of openness and conscientiousness, this was predictive of texting and more general mobile phone use and interaction whilst driving. Lower levels of agreeableness were predictive of fewer mobile phone interactions, indicating that the need and interest in communicating with others, a common need within teenagers, may be a key factor within in-vehicle mobile phone use behaviours.

Several studies make recommendations about employing interventions to address mobile phone use amongst young drivers. Suggestions range from

continued educational and legislative efforts to ensure that distracted driving is considered as unsafe and socially unacceptable as drink driving [19] to providing financial incentives to support safer behaviours [15]. Promoting knowledge about driver's flawed illusion of control and perceived ability to concentrate on distractions whilst using a mobile phone has not been recommended as an effective long-term prevention approach for mobile phone use whilst driving [19]. Consequently, there appears to be value in interventions avoiding focusing on the risk associated with mobile phone use and texting whilst driving, which is already known to drivers. It has been suggested that interventions instead focus on countering the other factors that influence drivers to use mobile phones when behind the wheel (i.e., social norms and expectations for quick message responses). It has been suggested that *“Educational interventions aimed at reducing texting whilst driving and distracted driving in general should focus on targeting the mechanism by which distraction causes crashes – by getting drivers to keep their eyes on the forward roadway”* [15] (p.85). Whilst having eyes on the road is undoubtedly a vital pre-requisite of safe road use, drivers also need to have their mind on the road (as outlined in section 4.4.1.2) to ensure they are sufficiently aware of and able to react to their changing surroundings. The importance of engaging the target audience's wider social networks, such as parents, within intervention approaches has also been highlighted by previous research [15].

Researchers [7] have highlighted that young people still engage in distracted driving behaviours despite recognising the dangers. One study [7xxi] suggests that the delayed gratification involved in managing mobile phone use is challenging for teenagers and therefore strategies which can bolster positive road safety mobile phone use attitudes and increase the ease by which drivers refrain from using the mobile phone (e.g., decreased social pressure) may be effective. It has also been suggested that a willingness to discuss alternative behaviours can lead to teachable moments and behavioural change, with interventions which incorporate connectivity and context for young drivers as being more likely to be successful [7xxi]. The available evidence on the prevalence and effect of mobile

phone use within young drivers indicates that addressing this topic within young driver intervention material should be a high priority.

4.4.3.2 Passengers

The distracting effect of passengers on young driver safety, has been well noted in existing research [6], with young drivers being more likely than older drivers to take part in risky driving behaviours when travelling with passengers. This effect is particularly strong in the presence of peer age passengers who are risk accepting or actively or passively exerting pressure to inspire risky driving behaviour [6]. One study [17] found that fatal crash risk was higher for young drivers carrying passengers, which increased in line with the number of passengers in the vehicle. A meta-analysis [8] has also assessed the impact of in-vehicle passenger communication on road safety outcomes across all age-groups and found that passenger distraction was a key risk factor with negative consequences for driving behaviours, which impacted on a measurable proportion (3.55%) of collisions.

In addition to the in-vehicle distraction posed by peer passengers, young driver reward sensitivity has been found to increase in the presence of peers [13]. Young drivers who are more reward sensitive have been found to take more risks (i.e., speeding, drink driving), with consequent impacts on road traffic collisions and violations (ibid.). Young drivers have also been found to travel at higher speeds when travelling with peers than when travelling alone, which provides a further illustrative example of the important role that the driving environment plays in directing and/or mediating the impact of emotions on young driver behaviours [11].

Research has started to explore whether passengers can be harnessed as a positive resource within the vehicle (i.e., for providing directions, supporting hazard detection etc.) [6]. To date, only a handful of studies have been conducted, some of which [6xxii] have demonstrated promise in such approaches influencing outcomes in the short-term through promoting peer communication and co-operative safe driving [6]. It has also been recognised that interventions which engage with important actors from across the road safety system, such as

parents, are needed [6]. It has been suggested that as young drivers are building their experience and getting used to the driving task immediately post-licensure, limiting the number of peer passengers (i.e., via GDL) is a public policy option which allows young people to gain vital experience in safe circumstances (i.e., without passengers). In an assessment of the impact of GDL in the US [10], the author reports on a disagreement around the effectiveness of different permutations of passenger restrictions (i.e., none or one passenger) and references research [10xxiii] which reports that having three or more passengers under the age of 21 is associated with a fourfold fatal crash risk, in comparison to having no passengers. Whilst research assessing the role of passengers to support safety is in its infancy, the current weight of evidence suggests that it is vital for policies and licensing approaches to reduce the number and presence of young passengers travelling with young drivers.

4.4.4 Fitness to drive

4.4.4.1 Managing fatigue

Young drivers are at significant risk of fatigue related collisions due to disrupted sleep schedules and their reduced ability to function optimally with a sleep deficit [12]. The link between daytime fatigue and road traffic collisions is well recognised within the research literature, with young male drivers more fatigue collision involved than young female drivers [20]. Young drivers commonly recognise that they experience fatigue whilst driving, with collisions resulting from fatigue most likely to occur at night-time, in comparison to older adults who are more likely to experience fatigue related collisions mid-afternoon [20]. All collisions of this type, regardless of age, have been found to most likely occur when the driver is travelling alone [20]. A systematic review on the effect of sleep deficit on young driver function [12] concluded that whilst higher-quality experimental approaches (i.e., randomised controlled trials) are needed to improve the quality and reliability of experimental research, the available evidence indicates that a loss of sleep amongst young drivers leads to an increased variation in lateral lane positioning and an increased frequency of centre white line crossings. They also tentatively report (given the quality of

research evidence) that crashes and outcomes related to speeding increase where there is a persistent sleep deficit.

Several actions to reduce fatigue related collisions amongst this at-risk group (i.e., avoiding travelling whilst fatigued, not drinking, driving and planned napping etc.) have been suggested [20]. However, it has also been acknowledged that the current sleep deficit epidemic is a result of societal norms around electronic device and caffeine use as well as structural issues such as early education start times [20]. To support young and novice drivers to reduce fatigue related risks, the evidence suggests that both personal behavioural changes, supported by complementary changes throughout the broader road system are required.

4.4.4.2 Avoiding drink and drug impaired driving

Drink driving is a causal factor in collisions involving young drivers [6]. Drink driving propensity has been found to relate to both individual personality types and reward seeking tendencies. For instance individuals who exhibit low sensation seeking and high risk perceptions have been found to have lower rates of drink driving [6]. A review of the extent to which sensitivity to rewards influences risky driving [13], reported on the findings of a young driver questionnaire study [13xxiv], which found that 70% of the variance in intentions to drink drive were explained by perceived rewards associated with drink driving. Another study [6xxv] found that stronger reward sensitivity and weaker sensitivity to punishment was related to greater self-reported drinking. In addition, there is a greater risk that young drivers will drink and drive if their parents also engage in this behaviour [6].

Driving impaired by cannabis has also been found to be a contributory factor in road collisions involving young drivers [1]. One review [1] concluded, with a low to medium level of confidence, that cannabis has a particular road safety related impact on young and novice drivers (i.e., reduced speeds, increased tailgating, increased reaction times and increased lane keeping and steering variability), although further studies to evaluate the specific effects on young drivers are recommended. Cannabis usage is not the only drug related impairment of interest in relation to young and novice driver safety. However, the impairing impacts of

other drugs are not discussed here, as they were not identified within the literature that this analysis draws upon.

With the substantial risks posed by impaired driving, whether by alcohol or drugs, the deployment of effective interventions is vitally important. The value of combining awareness campaigns with enforcement initiatives has previously been noted [6], with some evidence [6xxvi, 6xxvii] that brief behavioural interventions (i.e., discussing alcohol effects, legal consequences and options for reducing incidence) can reduce self-reported drink driving. Despite designated driver approaches being commonly promoted, one study [2] reports on the limited effect of this intervention approach and outlines the importance of considering system based options (e.g., night-time transportation) which can support safer individual decisions. It has been recommended [13] that gain-framed messaging, which emphasises the benefits of safe driving and decision making, is used instead of more traditional approaches which emphasise the negative consequences arising from impaired driving behaviour. It has been suggested this is a particularly important approach to take given the heightened reward sensitivity experienced by this group, especially when in the presence of peers. In an investigation of the likelihood that an individual will intervene to prevent driving whilst intoxicated [14], a social psychological theory (Latane & Darley, 1970) was used which describes three stages of 1) noticing the event and interpreting it as dangerous; 2) perceived responsibility to intervene; and 3) having the skills and ability to intervene. It was subsequently recommended [14] that frameworks such as this are used to support targeted campaigns to reduce driving under the influence.

4.4.5 Controlling the journey

4.4.5.1 Managing speed

Speeding has also been identified as a common cause of collisions amongst young drivers [6], with social norms and peer influence having a particular impact on speeding behaviours amongst this at-risk group. An summary of evidence on young driver safety [6] reports that both active and indirect peer pressure has a strong negative impact on young driver speed. When a driver has peers with

positive attitudes towards risky driving or is travelling with a friend who has higher levels of risk acceptance, greater levels of speeding and unsafe driving behaviours are observed. However, in contrast, when a young driver's friends disapprove of risky driving, safe driving is more likely. There are several ways in which peer communication can have an impact on driving behaviours. Peers who have a normative influence (i.e., encouraging drivers to adapt their driving speed) have the greatest negative impact on risky driving, whereas passengers who wield informational influence, have a more beneficial impact [6]. The way in which cars are used amongst young people (i.e., young male leisure driving) [6xxviii] has also been found to influence speeding behaviours.

In addition to peers and social norms having an impact, young drivers who exhibit greater reward sensitivity have been found to engage in more risky driving behaviours such as speeding [13]. Rewards influencing this group [6xxix] may be external (e.g., gaining social status from behaviours) or internal (e.g., enjoying travelling on a certain road at speed), with greater reward sensitivity in males being predictive of more self-reported speeding [13]. In contrast, greater risk assessment was found to be predictive of fewer self-reported speeding behaviours amongst males [13]. Personal attitudes were also found to explain a significant proportion of the variance in speeding, particularly amongst women [13]. When young drivers experience strong emotions they are more likely to take part in risky driving behaviour and less likely to participate in behaviours which are protective [11]. Anger has been noted as a strong predictor of speeding behaviours amongst young drivers [11].

There is a developing body of evidence addressing the interventions and approaches available to reduce speeding behaviours amongst this at-risk group. Providing drivers with feedback on their driving behaviours, supported with incentives and rewards has been found to be more effective than feedback alone at reducing the incidence of speeding [6] (See Section 4.4.2.2 for a further discussion). The important role of the parents/guardians within the learning to drive process as coaches (i.e., providing suggestions on how to drive safely) has also been found to reduce speeding [6xxx], with lasting beneficial effects

transferred to solo driving [6]. The best way in which to present materials to this audience to have a positive impact on attitudes, intentions and behaviours has been investigated by several studies. A review of the literature related to emotions and behaviour [11] found that whilst approaches which evoke fear have reduced driving speeds in some limited circumstances (i.e., following an incident) the overall evidence does not support the hypothesis that fear influences behaviour in other instances. The use of efficacy messages (i.e., prompt questions for audience consideration), in conjunction with speeding messages can maximise intervention outcomes [6xxxix]. These findings collectively suggest the importance of careful consideration around the emotional framing of speed related intervention content and the importance of applying efficacy messages. Given the impact of social norms and peer pressure and the evidenced effect of attitudes on speeding behaviours, interventions would be well placed, particularly when delivered in education settings, to seek to influence these outcomes.

4.5 Conclusions

The literature summarised and presented in this paper has identified areas of content for inclusion in the design of pre-driver interventions (See Paper 6) and highlights, based on this accumulated evidence base, how intervention content might be best designed to increase the likelihood of beneficial outcomes. Five themes and nine major sub-themes have been identified, which will be discussed in brief followed by a review of the strengths and limitations of this paper and how the findings of this paper relate to Papers 5 and 6 in this thesis.

Ensuring that pre-drivers secure a sufficient quantity (and quality) of driving experience, in various on-road environments and circumstances ahead of solo licensure, emerged from the literature as important area of action to support the ongoing safety of this at-risk group. Whilst it appears no ideal number of hours of practice for learning to drive have been identified, research indicates that driving skills amongst new drivers improves when measured at 6-months and 12-months post-licensure at around 1,000 miles [6ix] and at 73 hours of independent driving [6xxxix]. The supportive value of coaching behaviours employed by parents and guardians, cognitive skills training (e.g., hazard perception and hazard prediction)

as well as securing independent driving experience under safe conditions (i.e., without peer age passengers and at night) also emerged as important approaches to promote. The value of vehicle and insurance choices, which can support positive outcomes for this at-risk group, also emerged as a potentially valuable area for intervention focus.

In reviewing the literature which evaluated commonly presented risks for young drivers (i.e., mobile phone use, speeding, drink and drug driving, passengers and fatigue) some ways in which intervention approaches might best support beneficial behavioural outcomes in these areas were identified. For instance, it has been identified by the literature, with a good level of confidence, that young people understand the risks posed by mobile phone use whilst driving, but nonetheless continue to take part in this behaviour. Consequently, some researchers [19] have warned against providing information about risks that are already known, with some instead counselling that interventions should focus on addressing the social context driving mobile phone use (i.e., texts from friends or parents), emphasising the importance of 'keeping eyes looking forward' [15] and supporting the development of strategies which foster positive mobile phone use attitudes, which are mindful of the importance of social connectivity for this at-risk group [7xxi].

Where jurisdictions do not have a legislative remit for restricting peer age passengers during early licensure (i.e., GDL), ensuring young people and importantly their parents, are aware of the risks presented by these circumstances appears to be a valuable area for intervention focus. The use of positive messages, which focus on the benefits of safe driving are a potentially fruitful way to address drink and drug impaired driving, as opposed to traditional consequence focused messaging [13]. The potential value of supporting ways in which young people can intervene to support the safety of their friends has also been covered by the literature reviewed in this paper. Similarly, the importance of careful, positive framing of speed related intervention content [6xxxii], supported by efficacy messages has also been identified [6]. Likewise, it is also recommended that promoted actions for reducing fatigue (e.g., avoiding travel,

planned naps etc.), are sensitively addressed given the systemic societal issues (e.g., school start times, caffeine consumption etc.), which exacerbate fatigue problems for young people given that circadian rhythms for teenagers are frequently at odds with how society has been structured [20].

A major strength of this research is that in reviewing the findings of recent systematic reviews, general literature reviews and meta-analyses assessing young driver risk factors, the headline findings of a substantial number of studies, covering a breadth of risks, have been taken account in this study. However, taking this approach has meant relying on the selection of reference studies in the articles reviewed, which means other relevant studies may have been missed. Despite these potential limitations, reviewing the findings of high-quality aggregated studies, which represent the findings of over 1,000 individual papers, ensures that a significant amount of evidence from studies conducted in the field have been drawn on to inform the themes recommended for future intervention design.

Whilst this study highlights content themes and some evidenced suggestions for ways in which the content might be addressed, the results presented in this paper do not, on their own, amount to sufficient evidence to inform intervention design. To design an evidenced intervention a full logic model should be developed (Glanz et al., 2008) with reference to a relevant behavioural theory, which draws on content themes (such as those outlined in this paper) as well as qualitative work with the target audience (Swist et al., 2022). Papers 4, 5 and 6 in this thesis outline the other steps that have been taken in the design of the intervention that was tested as part of this research, the results of which are presented in Paper 7. It is also important to recognise that the relevance of intervention content and its effect on a pre-driver target audience is uncertain. As already outlined in Paper 1, there is evidence that pre-driver attitudes effect later post-licence behaviours (Helman et al., 2013) and that interventions with a short-term effect on this target group can have an enhanced effect if they are delivered at the right time (i.e., at the point of transition from learner to licensed driver). However not all studies have found evidence to support the beneficial impacts of intervening at the pre-

driver stage, with a study by Rowe et al. (2013) finding that the baseline attitudes of pre-drivers did not predict violations in fully qualified drivers, which led the authors to caution against the delivery of attitudinal interventions to non-drivers. Given the evidence, both for and against the value of intervening at the pre-licensure stage, it is important that further studies are conducted to help establish the extent and nature of different intervention approaches with this at-risk group, a debate which Paper 7 in this thesis contributes to. Overall, this paper contributes to knowledge in this field by summarising key risk factors for young drivers and in particular making use of and extending the critical literature review, conducted by Cassarino and Murphy (2018), through considering how young driver risks identified might inform pre-driver intervention themes and approaches.

5 PAPER FOUR – DELIVERERS’ PERCEPTION OF TESTIMONIAL PERFORMANCE AS AN INTERVENTION

5.1 Abstract

Pre-driver education interventions are commonly delivered in the UK and further afield. Despite this, limited previous research has sought to understand deliverer rationales around intervention design and delivery, with few published results of studies of this type available (e.g., Launchbury et al., 2007). Delivery partner perspectives are important to consider when designing interventions as this group can highlight important delivery considerations (e.g., school timetable limitations) which are important to understand at the early stages of intervention design.

A qualitative research study with delivery bodies was conducted to inform the design of a new pre-driver intervention (See Paper 6). Three consensus workshops were held with practitioners ($n = 33$) between November and December 2019, representing organisations from across 25 different administrative areas in England and Wales. The aim of these workshops was to establish what practical and content elements of existing testimonial performance interventions were considered important by this group for improving young driver road safety. Workshop participants were also invited to complete a pre-workshop survey (completed by 67%, $n = 22$ of workshop attendees) to provide background information about the format of and delivery mechanisms employed within their current pre-driver education interventions.

The five-stage consensus workshop method (ICA-UK, 2014) was employed for this research. Twenty-four major themes were identified by workshop participants from the three workshops in response to the focus question posed, which were summarised by the researcher into three main content themes (content relevance; delivery communication approaches; and consequences and practical tools), and three main practical themes (logistics, resources and capacity; relationship building; and ongoing engagement). The pre-workshop survey found pre-driver education to be delivered across all secondary school age groups, with

testimonial performances dominating in comparison to other intervention types for 16–18 year old students. Multi-agency partnership working was described as common and funding limitations were reported as affecting the way in which programmes were delivered and resourced. Overall, the findings from this study provide practical insights for consideration in the development of new pre-driver interventions (See Paper 6) and highlight areas where deliverers may not be aware of the research evidence.

5.2 Introduction

Pre-driver education interventions are frequently delivered both in the UK and further afield. Limited research exists on the effects of these interventions (See Paper 1 for a summary) and it is rare to find published research on intervention components and the perceptions of intervention deliverers about the value of the content delivered (e.g., Launchbury et al., 2007). Co-production is increasingly recommended as a way in which the diverse needs of stakeholders can be considered in the design of interventions. Ponsford et al. (2021) reports that whilst co-production implies a power balance between researchers and co-producers, the term can describe a range of stakeholder participation approaches, ranging from information provision through to stakeholders having a degree of control in intervention design decisions. Whilst the value of intervention co-production — in its various forms — for delivery providers, recipients and content creators has increasingly been recognised within the development of public health interventions (e.g., Brunn et al., 2021; Ponsford et al., 2021; Swist et al., 2022), there is little evidence of this approach being commonly employed in the design of road safety education programmes. Scott-Parker et al. (2019) report on the work of a multi-agency working group which has sought to identify high-risk young drivers to support targeted preventative interventions, which is illustrative of the safety improvements which can result from multi-agency collaborative research endeavours.

This paper reports on the findings of research with pre-driver education deliverers to inform the design of a new pre-driver intervention (See Paper 6). There are two aims for this study. The first is to understand the extent and nature of current

interventions. Secondly, the study aims to establish deliverer perspectives on the practical and content elements of existing testimonial performances that they consider important for improving young driver safety. The study is expected to inform a broader understanding of deliverer perspectives and how this has influenced the structure and content of interventions to date. The findings will also be used to inform the design and delivery of a new pre-driver education intervention (See Paper 6).

5.3 Method

5.3.1 Pre-workshop practitioner survey

A pre-workshop practitioner survey was conducted in November and December 2019 to establish the format of and delivery mechanisms for pre-driver education that were currently provided by the respondents. The Qualtrics online survey platform was used to distribute the survey to Fire and Rescue Services who had signed up to the workshop after being invited by the National Fire Chiefs Council. All Fire and Rescue Services and their pre-driver intervention delivery partners were contacted and invited to take part in the workshops. Questions were asked about the types of interventions delivered (i.e., testimonial, other theatre, lesson resources, workshops and guest lessons); the age groups which they were delivered to; the number of schools/colleges and students participating in current interventions; the types of organisations and the number of staff involved in the design and delivery of existing programmes; as well as the topics covered by existing interventions. Several questions were also asked about the budget available for pre-driver education in 2019–2020 and how this compared to the previous year's budget. In addition, views were sought on the importance of different approaches to pre-driver education design and evaluation as well as the frequency of existing evaluation approaches. Survey questions on aspirational topics for inclusion in future provisions and the perceived value of pre-driver educational objectives were also included. Full details of the survey and the informed consent statement included can be found in Appendix D.1. Survey responses were analysed using SPSS Version 28.

5.3.2 Practitioner workshop

Three consensus building workshops were held between November and December 2019 attended by intervention deliverers in the UK to establish what practical and content elements of existing testimonial performance interventions are considered important for improving young driver road safety (See Appendix D.2 for consent form). The workshops supported the collection of qualitative data, which augmented the quantitative data already collected from workshop participants in the pre-workshop survey. The consensus workshop is a group facilitation method described by the ICA-UK as *“a way to reach consensus where all participants feel their ideas, insights, perspectives and wisdom have been honoured”* (ICA-UK, 2014, p.37). It is a particularly useful tool for developing consensus from individuals who might have different or opposing views. The purpose of the approach is not to change perceptions, but to instead secure a working understanding of the topic being discussed amongst participants. At the end of the process all attendees should be able to describe the consensus reached as representing their worldview (i.e., attendees might not agree with all points raised, but they will, at the very least, be able to ‘live with’ the consensus reached).

Consensus workshops start with a focus question for the participants to answer, which for this study was two-fold: to identify the practical and content elements of existing testimonial theatre performance interventions that participants think are important for improving young driver road safety; and to identify what practical and content changes should be made to pre-driver theatre and workshop interventions. Both rational (i.e., the practical product of the workshop) and experiential (i.e., the mood and tone of the workshop) aims are set at the beginning of the session to ensure that the scope, purpose and tone for the discussion is clear, which may be explicitly or implicitly shared with the attendees, as appropriate. The rational aim for the consensus workshops run for this study was to understand the consensus of the group to the questions posed. Experientially, the session aimed to acknowledge the views and opinions of practitioners about existing interventions and to enable active engagement from practitioners in the planned research. Building constructive rapport was also an

important objective for the session. The experiential aim of the workshop was achieved through letting attendees know at the start of the session that there were 'no wrong answers' and efforts were made to ensure all attendees were included in the discussions. This was supported by the consensus workshop method which, through the activities involved (i.e., individual brainstorming and turn taking in presenting ideas), supported the inclusion of both extroverted and introverted participants. The workshop involved a five stage process: setting the context for the workshop (i.e., facilitator stating the aim, purpose, focus question and process for the workshop); brainstorming answers to the focus question set (i.e., individual brainstorming using pen and paper, which were then transferred to post-it notes); clustering the responses (i.e., post-it notes being provided to the facilitator and common post-its clustered); naming the clustered consensus (i.e., giving a name to the clustered post-it notes); and then confirming the resolve of the exercise (i.e., discussing the significance of the consensus). The full workshop plan for the consensus workshop is outlined in Appendix D.3 with the full method outlined in Appendix D.4. Once the three workshops were complete, the themes identified during the 'naming the clustered consensus' stage of the workshop were used to develop broader categories and summary themes. Data was collected from the workshops by photographing the post-it note responses and clustered consensus developed by the three workshops as well as transcribing the recordings of the general discussions. It should be noted that the consensus workshop method is not suited for transcription in the same way as focus group or interview methods, so all workshop results draw on the data created through the post-it note clustering process conducted by the participants and other brief notes taken from the session recordings. Whilst some richness of data is lost as a result, a strength of the method is that the responses presented are a true representation of the consensus reached by the participants within the workshop.

5.3.3 Participants

The workshop participants were typically senior organisational employees who had been nominated to represent their organisation. Participant details are provided in Table 5-1 below. This shows that one of the workshops (workshop 3) had more attendees and that overall, approximately the same number of males and females were engaged in the research.

Table 5-1 Workshop participant details

Workshop	No. attendees	No. males (%)
1	6	2 (33%)
2	7	5 (71%)
3	20	11 (55%)
TOTAL	33	18 (55%)

As outlined in Figure 5-1, most attendees were from Fire and Rescue Services ($n = 26$), which was in part due to the project being funded by the National Fire Chiefs Council, who were encouraging support for the project from Fire and Rescue Services nationally. Participants represented organisations from across 25 different administrative areas from across England and Wales (See Figure 5-2).

Figure 5-1 Workshop attendance by organisation type ($n = 33$)

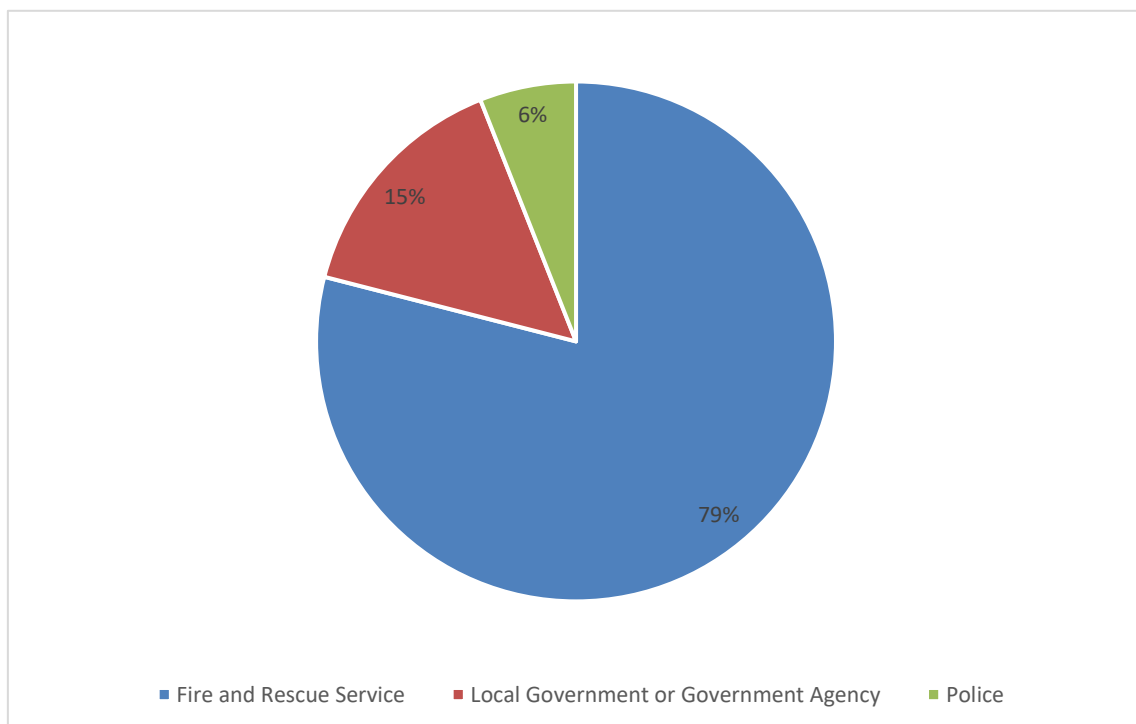


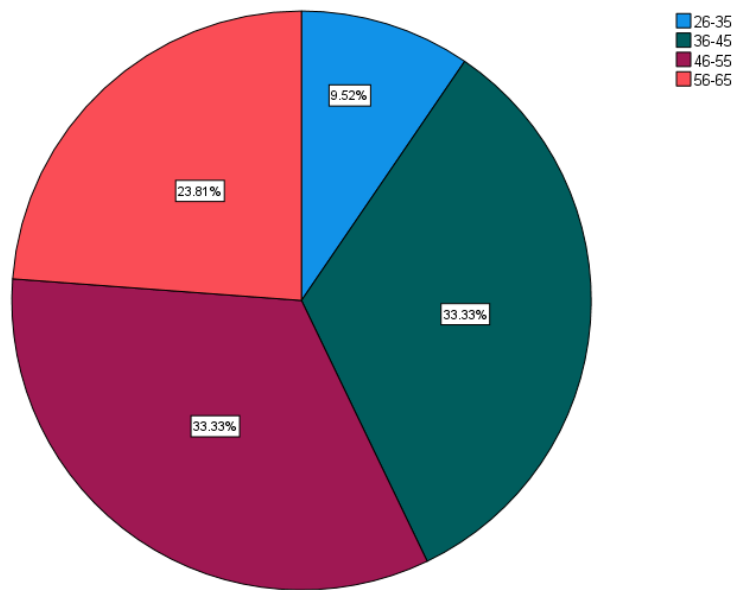
Figure 5-2 Organisational locations represented at the workshop



*Developed using MS Excel Maps function
powered by Bing © GeoNames, Microsoft,
TomTom*

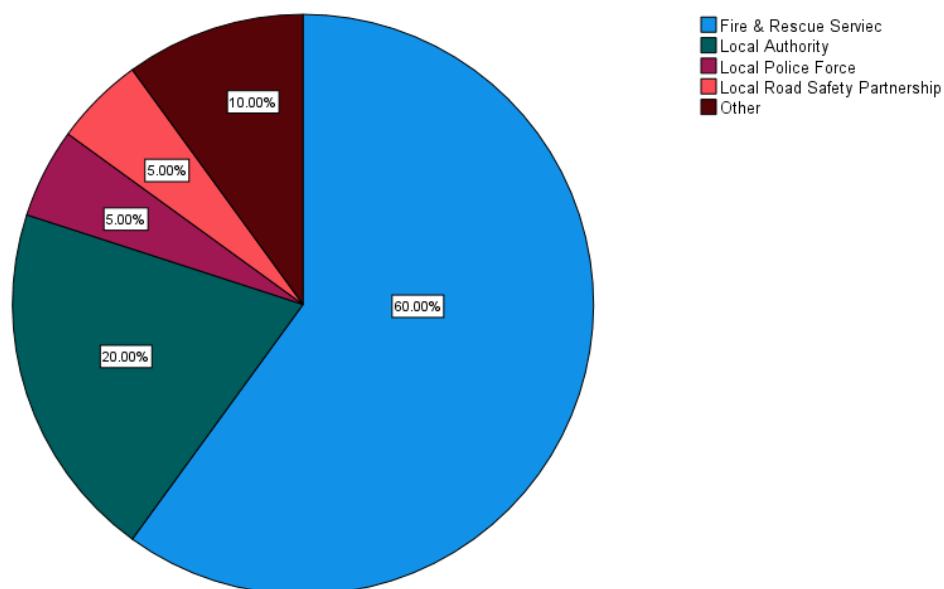
Of the 33 workshop attendees, 22 (67%) filled out the pre-workshop survey, therefore the following data presented from the survey is not representative of all workshop attendees. The attendees of the workshop provided good representation of Fire and Rescue Services throughout England and Wales; however, it should be noted that the survey responses represent individual, rather than organisation viewpoints and consequently, the organisational questions included within the survey (i.e., staffing and budget information) include responses from more than one member of an organisation who responded to the survey. 59% respondents were male and 36% female (5% did not provide a response about gender). In comparison to the number of males and females attending the workshop (See Table 5-1), comparatively more males than females filled out the survey. The respondents were between 26 – 65 years old, with the greatest number of responses from those between 36 – 55 years old (See Figure 5-3).

Figure 5-3 Survey respondent age ($n = 21$)



Fire and Rescue Service respondents made up over half (60%) of the survey response sample, which given the organisations represented at the workshop (See Figure 5-1), is as expected. The second most frequent respondent types were from local authorities (See Figure 5-4). The two respondents that noted 'Other' were from organisations that were closely associated with Fire and Rescue Services.

Figure 5-4 Survey respondent by organisation type ($n = 20$)



Respondents reported that their organisations had a mean of 12.25 years' experience with delivering road safety education ($n = 16$, $SD = 5.64$, MIN: 4, MAX: 30). Respondents also reported a mean of 15.67 years spent working for their current employer ($n = 21$, $SD = 10.08$, MIN: 0, MAX: 40), with a mean of 11.11 years spent working in a road safety education role ($n = 19$, $SD = 10.38$, MIN: 0, MAX: 39).

5.4 Results

5.4.1 Survey results

Respondents reported delivering pre-driver education across all secondary school age groups. Proportionally more education was provided to students who were 16–18 years old (school/college years 12 and 13), who were more likely to receive testimonial interventions than other age groups. The responses indicate that the provision of guest lessons reduce as the age of students increases, whereas the delivery of other types of theatre education peaked for 14–16 year olds (school/college years 10 and 11) (See Figure D.5-1, Appendix D.5). On average, respondents reported delivering testimonial education to an average of 28.64 schools per year ($SD = 26.70$), which was delivered to significantly more students than other education types (See: Table D.5-1 and D.5-2 Appendix D.5). Respondents also reported multi-agency partner involvement in the design and delivery of all intervention types delivered, with the greatest amount of multi-agency partnership working seen within testimonial theatre provision (See Figure D.5-2 Appendix D.5).

A range of road safety risk factors were reported as being included within interventions delivered, with the most covered topics for testimonial theatre being mobile phones and seatbelts, followed by drink driving (See: Figure D.5-3 Appendix D.5). Coping strategies in comparison were covered to a lesser extent. Other topics covered by existing interventions included organ donation, risk assessment, brain development, fatigue, broader influences on young drivers, vehicle checks, use of virtual reality and scooter safety.

Topics which respondents said that they would like to include in future pre-driver interventions, followed a similar pattern to that of current provision (See Figures D.5-3 and D.5-4, Appendix D.5). Overall respondents reported a strong focus on what has traditionally been known as ‘the fatal five’ (See Paper 2, Section 3.4.1.1) and consequently the key action points that are more likely to impact on the safety of this at-risk group (as described in Paper 3), feature at or near the bottom of the table (e.g., vehicle crash worthiness, recommended hours of supervised practice etc.). Respondents were also asked to ascribe the value they would give to delivering several research-based intervention objectives (e.g., providing information on consequences, planning for social support/social change etc., See Table D.5-3, Appendix D.5). All objectives were rated as having a ‘medium level’ value, with encouraging self-monitoring behaviour followed by prompting goal setting and providing feedback on behaviours as the highest rated objectives.

The mean 2019-2020 budget for organisational activity in this area was reported to be £44,407.58 ($SD = £50,506.88$, $MIN = £2,115.00$, $MAX = £148,338.00$, $n = 11$) (See Figure D.5-5, Appendix D.5). On average, respondents reported having almost four times the number of staff within the organisation delivering pre-driver education, in comparison to those dedicated to its design (See Table D.5-4, Appendix D.5). The importance of and frequency at which pre-driver interventions are evaluated was also reported. Of the evaluation statements provided, respondents thought that developing, trialling and testing a different approach to pre-driver education in the UK was the most important (See: Table D.5-5, Appendix D.5). All other statements received strong positive support apart from the statement related to the importance of ‘the use of operational experience as the primary means for developing the content of pre-driver education’ which was rated on average as ‘moderately important’ (See Table D.5-5, Appendix D.5), illustrating that those that responded may understand the limitations associated with using operational experience as the primary means for designing interventions. The frequency with which respondents reported conducting pre-driver education evaluation is currently low (average response of ‘sometimes’) and the evaluation conducted was reported as being more likely to be conducted in-house than commissioned externally (See: Table D.5-6, Appendix D.5).

Table 5-2 Practitioner responses to pre-driver education design and evaluation questions

Statement	Scale	Response	<i>n</i>	Mean (<i>SD</i>)
To evaluate the impact of pre-driver education	1:5	[Not at all important – Extremely important]	16	4.50 (1.02)
To develop, trial and test a different approach to pre-driver education in the UK	1:5	[Not at all important – Extremely important]	16	4.27 (0.59)
To use both academic insight and operational experienced for developing the content of pre-driver education	1:5	[Not at all important – Extremely important]	16	4.19 (1.05)
To use academic insights as the primary means for developing the content for pre-driver education	1:5	[Not at all important – Extremely important]	16	4.13 (0.72)
To use operational experience as the primary means for developing the content of pre-driver education	1:5	[Not at all important – Extremely important]	16	3.63 (1.03)
Complete in-house evaluation of pre-driver education	1:5	[Never – Always]	16	2.88 (1.31)
Evaluate the impact of pre-driver education	1:5	[Never – Always]	16	2.81 (1.38)
Budget for the evaluation of pre-driver education	1:5	[Never – Always]	15	2.27 (1.39)
Commission external evaluation of pre-driver education	1:5	[Never – Always]	16	2.19 (1.38)

Respondents also noted their support of different elements of the planned research (See Table D.5-7). The reasons given for why the respondents would like to be involved in the research included supporting the development of good practice, having support on the development of road safety education and to ensure effective good practice is identified and delivered to help save lives. When questioned about what funds would be necessary to support their involvement with the research the majority said it would depend on the nature of support required and that some external funding may be helpful, as current resources were already committed.

5.4.2 Workshop results

Twenty-four major content themes were identified by the participants (i.e., through post-it note clustering and naming) within the three workshops in response to the focus question “*What content and practical elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?*” The sections that follow outline

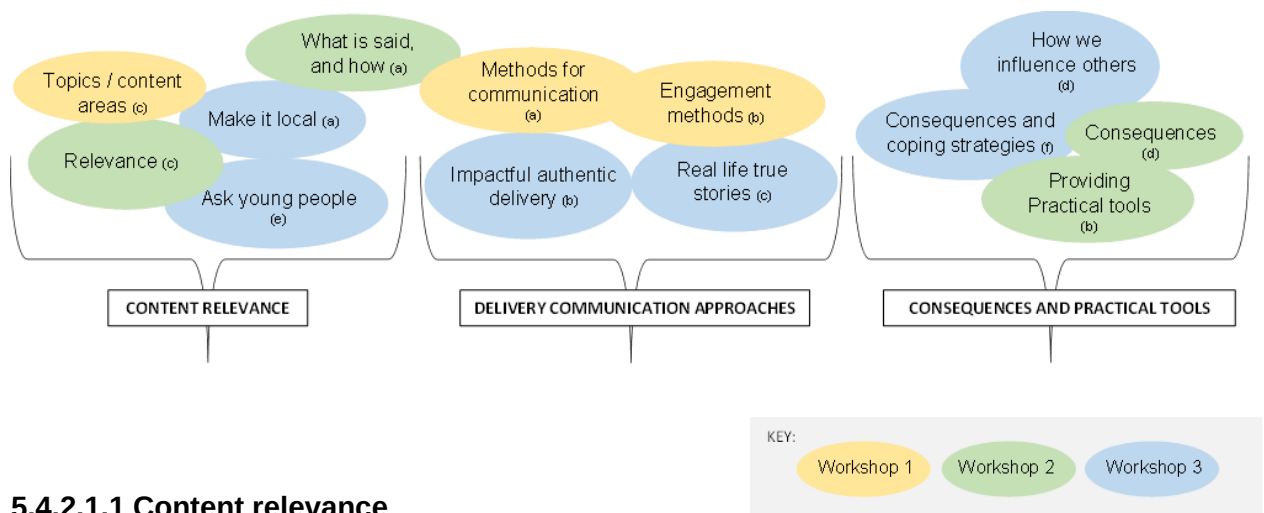
the major content themes identified, described within six overarching themes (three content and three practical). Brackets used throughout the workshop results section denote the workshop number and where relevant the major content theme topic that the description refers to (e.g., [3] or [1a]), which is described in thematic maps (See Figures 5-5 and 5-6).

5.4.2.1 Content themes

Thirteen themes from the twenty-four themes, which emerged from the consensus workshops, were clustered by the researcher into three major themes using the same approach applied for the practitioner workshops (i.e., taking named clustered from workshops, clustering them and naming them). The three overarching themes were: content relevance; delivery communication approaches; and consequences and practical tools (See Figure 5-5).

Figure 5-5 Content consensus themes

Focus Question: What content elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?



5.4.2.1.1 Content relevance

In all three workshops, the importance of including relevant content within testimonial performance interventions was discussed. The case for setting aims and objectives clearly from the outset to ensure well specified and scoped interventions as well as ensuring ongoing evaluation of programmes was recognised by participants [1c, 2] and considered to be particularly important

given the lack of robust evaluations to date [2]. In this context, trialling new approaches to counter criticisms raised about the effectiveness of current programmes was seen as important [1].

Including content which is relatable for both the age and driving stage of the target audience (i.e., driver or passenger) was also recognised as an important design consideration [2c]. Passenger safety and the effects of impulsive decisions were two topics raised as potentially relevant to include within testimonial performances for this age group [1c]. It was also suggested that, in future, interventions should be targeted at and tailored to the specific needs and socio-demographics of the target audience and designed with reference to educational theory [3]. Suitable and optimum timing for interventions (i.e., pre-driver versus earlier) was also discussed [2]. The fact that each audience member is likely to resonate with something different, was also raised [2] with suggestions made for content to be reflective of the audience and the local community/context [2a, 3a]. Co-production with young people to support the development of relatable content [3e] – given that the views of young people would differ significantly from those involved in the design and delivery of an intervention [2] – was suggested as a way in which to maximise the relevance and resonance of interventions. The localisation of messages and inclusion of relevant content for the target audience was, however, described as a strength of current provisions [3].

The way in which testimonial intervention presenters resonate and relate to the target audience was also discussed [2], with concerns expressed about the negative impact that a presenter can have on audience response if they are seen to be ‘preaching’. Message resonance effects were described as dependent on the different responses of individuals [3], which may be informed by previous experiences (i.e., with parents, social networks etc.) [2]. It was also noted that it can take quite a lot of time and effort to grow speakers that can deliver effectively [2] (e.g., ‘staying on theme’ with the core messages discussed [2a]). Current testimonial performances were described as securing high levels of engagement, particularly when showing the impact of collisions on parents and emergency service workers, which was considered to have cumulative impact [2]. It was also

recognised by some participants that respectful listening and attention from the audience on its own does not equate to intervention effectiveness [2]. Some participants argued that it is how the interventions are delivered (e.g., not preaching) and the content included, not necessarily who delivers them, that makes the difference [2]. Overall, the respondents reported recognising the value of testing and evaluating interventions and that developing relatable content was contingent on several factors (e.g., intervention timing, local relevance, co-production with young people etc.). Resonance with the message presented in testimonial performances was recognised to be dependent on how individuals responded to the content provided and the skills of individual speakers. However, there was some disagreement on what could be gleaned about intervention effectiveness, from attention levels and emotional response alone.

5.4.2.1.2 Delivery communication approaches

The importance of impactful, authentic delivery emerged from the discussions [3b], with good speaker quality highlighted as an important ingredient for success. Getting the right speakers and taking time to get their contributions right was also seen as a crucial [2]. It was argued that there is value in using live speakers and video content [3b] with high-production quality necessary for ensuring intervention credibility amongst the target audience. Using filming techniques that increase the longevity and relevance of the content was provided as an example of how providers can achieve desired outcomes whilst keeping costs low [2].

The value offered by real-life stories and experiences [3c], which are emotive in their nature [3b] and linked through to broader statistics to highlight risk issues [3c] was recognised. Conveying the impact of collisions on others (i.e., victims, parents and emergency service personnel) was also stressed as a valuable component to delivery [1a]. It was also suggested that young offender speakers can support engagement with the target audience [3]. Consequently, current testimonial interventions seemingly seek to achieve impacts through conveying real emotions [3]. The use of real-life stories was described as a key strength of current provisions as they increased the resonance potential and emotional impact of the message delivered [3]. In one of the workshops, it was made clear

that there are differing professional views about the assumed level of intervention effectiveness achieved through delivering emotionally impactful performances which have a visible effect on the audience [1]. One group concluded that there was value in authentic presentations, which were not over-dramatised to shock the audience [2a]. Another highlighted tone of voice considerations, saying that there was value in taking a positive and empowering tone [1a]. Providing thinking time for reflection, audience participation and interactivity was also described as an important intervention design consideration. It was also suggested that interventions need to account for different learning styles and focus on the audiences' specific needs [1b]. The emotional toll on presenters reliving their stories was also noted as a weakness of current performances [3]. Whilst there was not universal agreement amongst the groups about optimal delivery communication approaches, the current *modus operandi* of testimonials (i.e., real-life emotional impactful storytelling) received majority support from workshop attendees, which might, in part, be because they are not aware of other alternatives.

5.4.2.1.3 Consequences and practical tools

Conveying consequences associated with poor road safety behaviours was a common theme emerging from discussions about the content elements that are important for securing improvements in young driver safety [2d, 3f]. In addition to illustrating the impact on others (i.e., grief and loss), highlighting other long-term consequences beyond death and injury, such as the impact of losing a driving licence [2d], was also described as being of relevance [3f, 2]. It was suggested that given it can be hard for young people to step outside themselves, that there may be particular value in focusing quite closely on individual consequences [3].

The importance of testimonial interventions providing tools to support attendees to make practical changes was also covered during the discussions. The promotion of coping strategies/skills [2b, 3f] and S.A.F.E Plans [2b] (i.e., planned actions to take when faced with risks) was discussed, but the practicalities of delivering interventions that support the development of coping mechanisms in a large audience environment was queried [3]. Safety influences beyond the

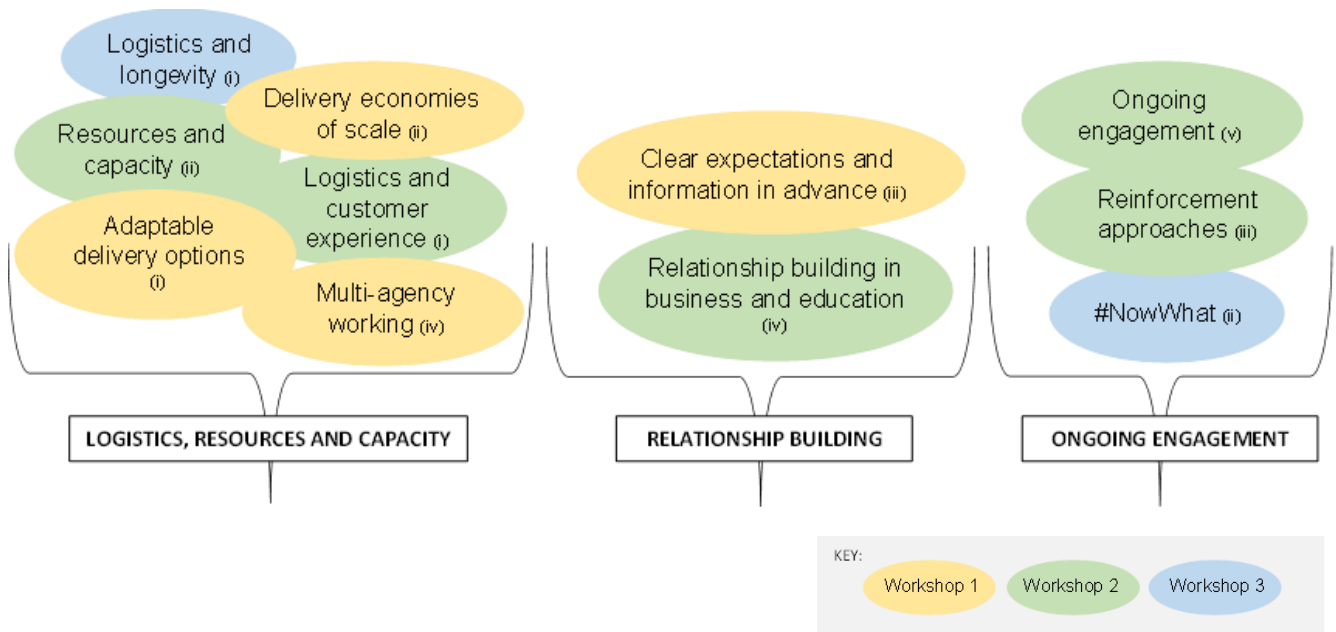
individual, such as parental contracts and black box/telematic insurance were also suggested as areas for promotion [2d], as was encouraging attendees to influence others (i.e., social and peer pressure, being a good friend etc.) to achieve positive road safety outcomes [3d]. Overall, the consequences of on-road behaviours and the safety promoting actions that can be taken to support positive change, clearly emerged from the discussion as the most important areas for interventions to focus on to secure improvements in young driver behaviours. Proportionally, a focus on consequences had the greatest weight of support (See Appendix D.6 – D.8).

5.4.2.2 Practical themes

Eleven themes from the twenty-four which emerging from the three consensus workshops, were clustered by the researcher into three major themes in response to the 'practical' element of the focus questions, using the same consensus approach used for the practitioner workshops (i.e., taking named clusters from workshops, clustering them and naming them). These eleven themes can be summarised into three overarching themes: logistics, resources and capacity; relationship building; and ongoing engagement (See Figure 5-6).

Figure 5-6 Practical consensus themes

Focus Question: What practical elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?



5.4.2.2.1 Logistics, resources and capacity

Ensuring adequate resources and staffing capacity to deliver testimonial interventions was identified by the workshops as being a key practical consideration in the delivery of effective interventions for this target audience. Adequate funding for the delivery of interventions emerged as one of the most important practical considerations during discussions [2ii].

Current resource constraints were presented as a limiting factor for delivery, with a lack of available budgets and funding, as well as the geographical variation in resource availability being key concerns [2,3]. Existing funding regimes were described as requiring significant effort from delivery bodies to secure and continually provide funding [2]. This consequently presented challenges with delivering planned activities [1], leading to difficulties with supporting highly stretched but motivated staff [1] to manage workloads and balance different priorities [2ii]. Organisational knowledge and skills were also raised as an

important practical consideration which impacts on the delivery of effective programmes [2ii]. Given these commonly experienced resource constraints, some workshop participants reported being limited in their capacity to deliver classroom-based initiatives [1] as more efficient provisions were required [3]. Value for money considerations were front of mind in the discussions [3i], with the benefits of economies of scale (i.e., larger venues) [1ii], allowing for interventions to be scalable [3i, 2ii] replicable and consistent [2ii].

In terms of intervention logistics, designing and delivering interventions to fit with the school timetable was described as vitally important, as was having practical venues which supported intervention delivery [3i]. Adaptable delivery options (i.e., school-based theatre sessions as well as large, hired theatres) which allowed flexibility of delivery depending on time of year and location was also described as important [1i]. Securing the right environment for the learning context, which removed any barriers to learning (e.g., physical or access to resources) was also recognised [2i] as was the value of securing a mix of real-life story tellers and actors [3i].

Multi-agency, collaborative working was frequently described as important for intervention success [3]. Consequently, interventions that make use of real emergency staff reported being better able to secure different agencies to support the interventions delivered [1iv]. The importance of getting buy-in across agency partners, whilst important, was also recognised to be challenging given the difficulty and complexity associated with agreeing common work programmes between organisations [1]. The diversity of different partnerships and lead agencies was also described as leading to challenges around intervention ownership and bringing together alternative perspectives [2]. The fire and rescue services were recognised as supportive partners who were in a good position to influence other key stakeholders. However, securing senior level buy-in [1] and individuals with strong leadership skills to drive the collaboration forward [1, 2] was seen as an important ingredient for success. Given the challenges presented by formal partnerships and collaborations it was suggested that there can

sometimes be value in focusing on projects rather than partnerships to secure effective collaboration [2].

Overall, the workshops identified several current resource and logistic constraints associated with delivering interventions to schools/colleges (e.g., school timetabling and ongoing resource funding that requires interventions to work at scale) which should be considered in the development of new pre-driver interventions.

5.4.2.2.2 Relationship building

Building relationships with schools, colleges and the businesses who support the funding of intervention delivery was discussed in the workshop. Business to Business (B2B) and educational relationships with students were considered as two separate, but related issues [2]. Where the B2B relationship was concerned, setting clear expectations and contracting accordingly was described as important [2].

Maintaining a good reputation with schools and colleges was regarded as essential for securing intervention buy-in [2iv], especially given difficulties associated with finding space in school and college timetables [1]. However, it was recognised that maintaining engagement with schools was a labour-intensive activity, taking significant time to build relationships from scratch [2]. Successful testimonial delivery was described as being predicated on accessibility, which in turn supported schools and colleges with being able to book and engage [2iv]. Attendees talked about the importance of providing clear information to schools in advance to ensure that they understand how the intervention will be delivered [1, 1iii]. Taking this approach also enables clear and realistic expectations to be set about what schools and colleges should expect from the intervention and, in turn, what is expected from schools and colleges in way of follow-up support (1iii).

5.4.2.2.3 Ongoing engagement

Maintaining engagement levels following the initial delivery of interventions was discussed [3] with attendees questioning how to support students to take responsibility for their actions post-intervention [3]. The duration of effects typically secured by current testimonial provision was highlighted as a key weakness [3]. It was suggested in all workshops that deliverers are honour bound to follow-up initial intervention delivery with, for example, how to cope workshops [2, 2iii] so that students had the opportunity reflect, review and follow-up on the initial input [1, 3ii]. Other suggestions made about how to support the delivery of messages in a more ongoing manner included practical reminders for teachers to follow-up on some of the topics and issues discussed, as well as providing practical tools, key take-away points and calls to action within the intervention itself for immediate application (e.g., safe passengers) [2, 3ii].

Improving resilience within this at-risk group was also described as being larger than the road safety message, given that risk reduction skills are a more all-encompassing skill for life [3]. This broader discussion about the value of transferring risk reduction education into other areas of youth risk taking, was informed by the difficulties that different educational programmes experience when competing for limited school time [2]. Examples of inequities in intervention take-up were also provided, as the universal take-up of programmes was limited in the areas also receiving other public health interventions around, for example, knife crime [2]. Interventions reaching other hard to reach groups, such as home education students, were also highlighted [2].

Overall, securing ongoing engagement was described as important for both the longevity of the programmes and for supporting relationship building within organisations [2v]. Encouraging a wider discussion with peers, parents and other social influences was also discussed [3ii] as was the value of evaluating programmes [3].

5.5 Discussion and conclusions

The research conducted for this paper allowed the practical and content elements of existing testimonial performance interventions to be identified, especially with regards to the ingredients considered necessary by deliverers for improving young driver road safety. Consequently, the results provide both practical insights for consideration in the development of a new pre-driver intervention and also highlight areas where deliverers may not be aware of the research evidence. These two different emerging insights from this research will be outlined in the sections that follow, concluding with learning points to apply to the design of a new pre-driver intervention (See Paper 6).

The pre-workshop survey results provide contextual information about the environment within which deliverers are currently operating. The results show that pre-driver education is being delivered across all secondary school age groups, with testimonial performances dominating in prevalence and reach in comparison to other intervention types. Multi-agency partnership working for the design and delivery of pre-driver education interventions is also commonly reported, with traditional 'fatal 5' topics (i.e., speeding, failure to wear a seatbelt, drink/drug driving and distraction/inattention) dominating within intervention materials, which consequently leaves less time for presenting and developing safety promoting implementation intentions (Brewster et al., 2015; Gollwitzer, 1999) and action plans (Michie et al., 2013) around the safety promoting behaviours identified in Paper 3. In addition, as already outlined in Papers 1 and 3, practitioners focusing on increasing knowledge to encourage behavioural change is not recommended nor effective (Michie and Johnston, 2012). Low, but largely stable budgets for this area of activity were reported, which may in part explain why testimonial performance styles have persisted for a long time, given the lack of resource available to develop evidence-based alternatives. It is interesting to note that whilst respondents recognised the value of road safety evaluation, they reported neither conducting it very often nor having the budget available to support the commissioning of intervention evaluation.

Practitioners suggested that there is a good case for considering the optimal timing of interventions and designing interventions to take account of the fact that pre-drivers will have had varied life experiences which will influence their response to interventions. Both of these assertions have been backed up by previous research (See Waylen & McKenna, 2008 and Cassarino & Murphy, 2018 for a further discussion). The practitioners also strongly felt there was value in providing locally relevant content to emphasise the applicability of the message to the audience. In the categorisation of persuasive road safety appeals by Guttman (2016), no element of 'localisation' is suggested as a specific element within the five types of appeal outlined (i.e., appealing to reason; appealing to negative emotions; appealing to positive emotions and social values; the threat of enforcement; and humour). Whilst one of the examples provided in the framework does set the message in the context of 'everyday scenes', overall, it appears to be the social context surrounding the examples provided (i.e., involvement of friends, peers, parents, enforcement staff etc.) that are the most important contexts to set intervention content within.

Reference was also made by several of the workshop attendees about the impact that different individual learning styles have on intervention effectiveness. The concept of learning styles was originally proposed by Kolb (1984), who set out four distinct learning styles based on a four-stage learning cycle (concrete experience; reflective observation; abstract conceptualisation; and active experimentation), with the consequent learning styles being diverging (feeling and watching), assimilating (thinking and watching), converging (thinking and doing) and accommodating (feeling and doing). Subsequent pedagogical research further testing the concept of learning styles, has largely debunked the approach as being a useful framework for developing educational content. Studies have failed to find an association between learning style and preferred (La Lopa & Wray, 2015) or beneficial learning strategies (Pashler et al., 2009) and no demonstrable benefits for student learning (Cuevas, 2015; Husmann & O'Loughlin, 2019) or student performance (Aslaksen & Lorås, 2019; Husmann & O'Loughlin, 2019) have been found. Consequently, whilst the design of future interventions should be alert to the effect that individual difference can have on

response to intervention content, designing based on learning styles is not advisable. Practitioners generally supported delivering interventions which promoted action planning and the development of coping mechanisms and strategies, an approach which has been supported by the research evidence (Michie et al., 2013; Sheeran & Orbell, 1999).

Practitioners also emphasised the importance of using real-life, authentic stories and emotional presentations to affect the audience in a way that would have a positive beneficial effect on their current and future road use behaviours. As already outlined in Paper 2, this approach has not been found to be conducive to achieving positive behavioural outcomes, with the drive for authenticity an overrated consideration. The current focus on consequences, whether health, social or economic, was strongly supported by workshop participants. Whilst consequences are a recognised behaviour change technique (BCT), as outlined in Paper 2, disproportionally focusing on consequences risks reducing the time available to address other high potential BCTs (See Paper 2) and therefore whilst there is noted value in consequence presentation, the evidence suggests that the strength and frequency of their inclusion should be tempered (e.g., Dale et al., 2017). Whilst road safety threat appeals have been found to attract attention (Lewis et al., 2007a), this has not been found to reliably translate into behaviour change (Carey et al., 2013).

The use of peer-age presenters, such as young offenders was also suggested. Whilst the use of peer-age presenters alongside co-production are increasingly employed within public health intervention designs (e.g., Ponsford et al., 2021; Swist et al., 2022) the specific use of young offenders to provide an age relevant example of consequences, has, to the researcher's knowledge, not been extensively studied in the road safety intervention literature. Examples of offender testimonial effects have been explored by Cuenen et al. (2016), which as described in Paper 1 had some immediate, but short-term effects on the socio-cognitive variables measured. The practitioners presented a mixed view about whether, in their opinion, the intervention presenter made a discernible difference to intervention effect over and above the content covered. Michie et al. (2013)

have identified the BCT ‘credible source’ (i.e., present verbal or visual communication from a credible source in favour of or against a behaviour) as relevant for supporting behaviour change and consequently it is advisable that future interventions deliver messages by an identified credible source. Practitioners also suggested that high quality production quality was important for securing intervention credibility. Further, practitioners expressed enthusiasm for audience participation, interactive content and the development of personal resilience skills in intervention designs, which has been found to show promise (i.e., Griffin et al., 2004).

Deliverers reported experiencing extreme resourcing and capacity constraints when delivering interventions, which has required providers to deliver programmes at scale, to the detriment of including intervention types (such as workshops, discussion groups and demonstrations) which may be more conducive to supporting the development of personal resilience skills. Resource constraints appear to have promoted multi-agency partnership working, at least in part to fill the resource gap. Practitioners reported challenges with delivering intervention content given agreement is needed from several parties. This may partially explain why testimonial interventions have persisted over decades, even though they have not typically been found to lead to desired behavioural outcomes (See Paper 1). Deliverers report being fully engaged in the time-consuming task of building relationships with schools and businesses, which means less attention can be paid to content creation.

Based on the feedback secured from the workshop and an evaluation of the relevant literature, the following intervention components have been identified as important to consider in the design of a new pre-driver intervention (See Table 5-3). Where identified intervention components represent a BCT (Michie et al., 2013) this has been noted.

Table 5-3 Content and practical considerations for the design of a new pre-driver intervention

Content	Practical
<ul style="list-style-type: none"> • Ensure content is relatable to attendees lives or current driving status (e.g., passenger related content). • Include young people in the design of the content. • Design in audience participation, interactivity and time for reflection. • Emotional storytelling is not a necessary component. • Sparing use of consequences, focusing largely on the social and economic consequences for the audience (BCT 5.3)*. • Provide follow-up tools for support, such as action planning exercises (BCT 1.4)*. 	<ul style="list-style-type: none"> • Design follow-ups with limitations of school timetable in mind. • Arrange for intervention delivery from credible sources (BCT 9.1)* • Fully consider practicalities of delivery and school timetable limitations. • Ensure any intervention film is of a high production quality. • Set clear and realistic expectations for schools/colleges about what will be included in the intervention.

* BCT Taxonomy (v1): 93 hierarchically-clustered techniques (Michie et al., 2013)

This research has highlighted pre-driver intervention deliverer perspectives related to the content and practical aspects of current interventions that are considered to be beneficial for young driver safety. This adds to the current evidence base as the views of delivery stakeholders are rarely collated. Whilst some of the perspectives presented by deliverers do not relate to the broader research evidence, undertaking this qualitative study has helped to highlight potentially useful intervention components to be considered in the design of a new intervention, reported in Paper 6.

There are several limitations associated with this research which should be noted. Firstly, the majority of the survey respondents and workshop attendees were representatives from fire and rescue services and therefore these results cannot be considered as representative of the broader group of providers who also deliver pre-driver education programmes in schools/colleges (i.e., police, local authorities and local road safety partnerships). Participants also held relatively senior positions, with the majority being between 35–55 years old (as determined by the survey responses) which may have impacted the perspectives presented in the responses received. A major strength of the study is that the findings will directly inform the design and delivery of a newly designed DriveFit programme, which is outlined in Paper 6.

6 PAPER FIVE – PRE-DRIVER BELIEFS AND PERCEPTIONS OF PREVENTATIVE MESSAGES

6.1 Abstract

Ensuring young people's perspectives are considered in the design of interventions which impact them is recognised good practice (e.g., Boaz et al., 2018). The use of focus groups for pre-testing interventions is recommended, as is collating relevant information about the target audience if resources are available to do so (ETSC, 2021). Whilst co-production of public health interventions with the public is recommended, Swist et al. (2022) note that this is not commonly practiced where young people are concerned. In road safety there are only a few examples of behavioural interventions eliciting target audience beliefs to inform intervention designs (e.g., Elliott & Armitage, 2009; Parker et al., 1996). This study seeks to contribute to this limited knowledge base.

The aim of this study was to use the Theory of Planned Behaviour (TPB) (Ajzen, 1991) to support the identification of pre-driver beliefs underlying learning to drive (i.e., experience and practice), fitness to drive (i.e., fatigue, drink and drug driving) and driving focus (i.e., mobile phone use and peer passenger distractions) and journey control (i.e., speeding) intentions. Behavioural, normative and control beliefs were elicited from a workshop ($n = 26$, 50% male, $M_{\text{age}} = 16.79$, $SD = 0.42$) and two subsequent focus groups ($n = 16$, 56% male) delivered within one school in Kent, UK in July 2021. Preventative messages covering these topics were also presented and discussed. The data collated was analysed using thematic analysis to answer two questions: What beliefs do pre-drivers hold about the learning to drive process and post-licensure risks; and what are pre-drivers' perceptions of preventative messages.

The study identifies pre-driver behavioural, normative and control beliefs and outlines how preventative messages were received. In addition, the research found that participants had a good knowledge of road risks, but a lack of understanding of enforcement consequences. Most participants were willing to engage in more varied practice over a 12-month learning to drive period and

considered individual skills and abilities as being the key determinant of road safety outcomes. Speeding was the most accepted risk behaviour amongst participants and mobile phone use in vehicles was described as a nuanced issue, given the legitimate and illegitimate functions of mobile phones in cars. It was recognised that passengers could play both supportive and unsupportive road safety roles and that some peer passengers may struggle to speak out against poor driving behaviours. There was a mixed response to the concept of passenger restrictions during early licensure and parents were identified as having both supportive and unsupportive road safety roles. Finally, input from the workshop provided some indication of preferred content and emotional tone for future interventions. The results inform the design of future pre-driver education interventions (See Paper 6).

6.2 Introduction

It is recommended that public health interventions are co-produced with the public, but this is not commonly practiced with interventions that are targeted at young people (Swist et al., 2022). The use of focus groups for pre-testing interventions is recommended, as is collating relevant information about the target audience if resources are available to support this (ETSC, 2021). Prestin and Nabi (2012) highlight the importance of holding focus groups with the target audience to understand self-efficacy barriers, which are vitally important to understand in the context of young driver safety. Not taking account of the knowledge, attitudes and broader perspectives of the target audience risks sub-optimal intervention content and delivery approaches as well as negative intervention effects. Interventions for pre-drivers are commonly developed by practitioners and road safety professionals based on their own personal opinions and assumptions, rather than needs identified by the target audience, a review of the literature and/or the application of psychological theory (See Papers 1, 2 and 4 for further information).

Interventions in the field of pre-driver education have had little effect on targeted attitudes and behaviours (See Paper 1). The Theory of Planned Behaviour (TPB) (Ajzen, 1991) is a commonly applied theory within psychosocial interventions for health promotion (Solomon & Cavanaugh, 2015), with studies on its application showing demonstrable effects on achieving positive health outcomes (Webb et al., 2010) including within road safety (e.g., Stead et al., 2005). The TPB (Ajzen, 1991, 2012), developed from the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) states that attitudes (i.e., favourable/unfavourable evaluation of behaviour), subjective norms (i.e., beliefs about others approval of the behaviours) and perceived behavioural control (i.e., perception of ease or difficulty of performing the behaviour), as well as actual behavioural control, shapes an individual's behavioural intentions and behaviours.

The TPB has been used by several road safety studies to understand antecedents of behaviour to inform intervention design (e.g., Elliott & Armitage, 2009; Parker et al., 1996). These studies have examined drivers behavioural, normative and control beliefs (as described within the TPB) related to drink driving (Parker et al., 1992b) and speeding, (Chorlton et al., 2012; Elliott et al., 2005; Parker et al., 1992b) as well as specific beliefs underlying pre-driver intentions to drink driving, speeding, mobile phone use whilst driving and driving whilst fatigued (Rowe et al., 2016). The findings of two of these studies (Elliott et al., 2005; Parker et al., 1992b) have also been used to develop interventions aimed at reducing driving violation intentions (Elliott & Armitage, 2009; Parker et al., 1996). The intervention trialled by Parker et al. (1996) ($n = 238$) included four videos which addressed identified behavioural, normative, control and anticipated regret speeding beliefs. The study found that two of the films (normative⁹ and anticipated regret¹⁰ focus) had a significant effect on changes in beliefs and general attitudes towards speeding, with the authors recommending identifying determinants of behaviour and seeking to modify them as an effective approach

⁹ illustrated complaints about speeding from passengers.

¹⁰ showing a situation where the driver helps an older person cross a road where people are travelling too fast. The driver also travels too fast immediately afterwards.

for achieving positive behavioural outcomes. The printed and distributed booklet intervention trialled by Elliott & Armitage (2009) ($n = 300$) aimed to encourage compliance with speed limits by changing beliefs identified within an earlier study (Elliott et al., 2005). The study found that the intervention had an impact on one control belief (i.e., long straight roads would facilitate compliance with speed limits), which mediation analysis confirmed related to improvements in perceived behavioural control and behavioural outcomes. The authors concluded that whilst only one small intervention effect was detectable, the findings were encouraging because the mode of delivery used for the study (i.e., printed brochure) was a less effective vehicle for persuasive communication than other more engaging methods of education, which could offer future promise. Rowe et al. (2016) in their study which identified the underlying pre-driver beliefs associated with risk intentions suggested that future interventions should seek to support negative beliefs about driving risks (e.g., speeding is enforced by the police) and contradicting positive beliefs (e.g., that speeding saves time), as the findings from their study suggest that this approach is likely to reduce violations. They highlight the need for randomised trials to test this hypothesis and suggest that the strength of association found between attitudes and intentions indicates that behavioural beliefs may be a suitable area for intervention focus.

This paper uses the TPB to identify pre-driver beliefs related to securing enough practice during learning to drive, ensuring fitness to drive (i.e., drink and drug driving and managing fatigue), maintaining driving focus (i.e., managing mobile phones and peer passengers) and controlling the journey (i.e., speeding). These findings are compared to those from previous belief elicitation studies and pre-driver perceptions of preventative messages are reviewed to inform the design of a pre-driver intervention (See Paper 6).

6.3 Method

Data for this belief elicitation study was collected from a workshop and two in-depth focus groups held with students from a Year 12 class (aged 16–17 years old) within a school in Kent (UK) in July 2021. The in-depth focus groups followed an all-class workshop. The school selected to take part in the workshop and in-

depth focus groups was identified by Kent Fire and Rescue Service who were both project funders and programme managers for the Pre-driver Theatre and Workshop Education Research (PdTWER)¹¹, of which this study was a part. The participating school was selected due to its current young driver education status (i.e., students had not already received any other form of pre-driver education prior to the workshop and focus group) and because it was possible to deliver the workshop and in-depth focus groups face-to-face, which was not possible in all schools and colleges at the time due to ongoing Covid infection levels and subsequent rules about external visitors attending schools.

The purpose of the one-hour workshop ($n = 26$, 50% male, See Table E.5-1, Appendix E.5) was to gather student views on learning to drive and the first six-months of driving to inform the development of the pre-driver film and workshop being developed. All students were provided verbal information about the project and their participation in the workshop (See workshop plan in Appendix E.1) and were asked to sign the hardcopy participation consent forms circulated (See Appendix E.2). The workshop was split into three parts. First, students were asked to provide their views, via a Mentimeter poll (through using their mobile phones), on questions related to their learning to drive stage and expected post-licensure behaviours. This was followed by a discussion, in five separate groups, about the key messages that were planned to be presented in the pre-driver intervention (See Appendix E.3). Finally, views were gathered through a further Mentimeter poll on the use of emotional appeal within road safety messaging before closing the workshop. The full workshop plan and Mentimeter questions asked can be seen in Appendix E.1. Data collected from the workshop session through Mentimeter was collated and analysed using SPSS version 28.

Following the whole class workshop, students taking part in the focus group sessions ($n = 16$, 56% male) were selected by the class teacher as a representative sample of the class. No further demographic data (i.e., age, driving stage etc.) was recorded at focus group stage, as this had been collated for the

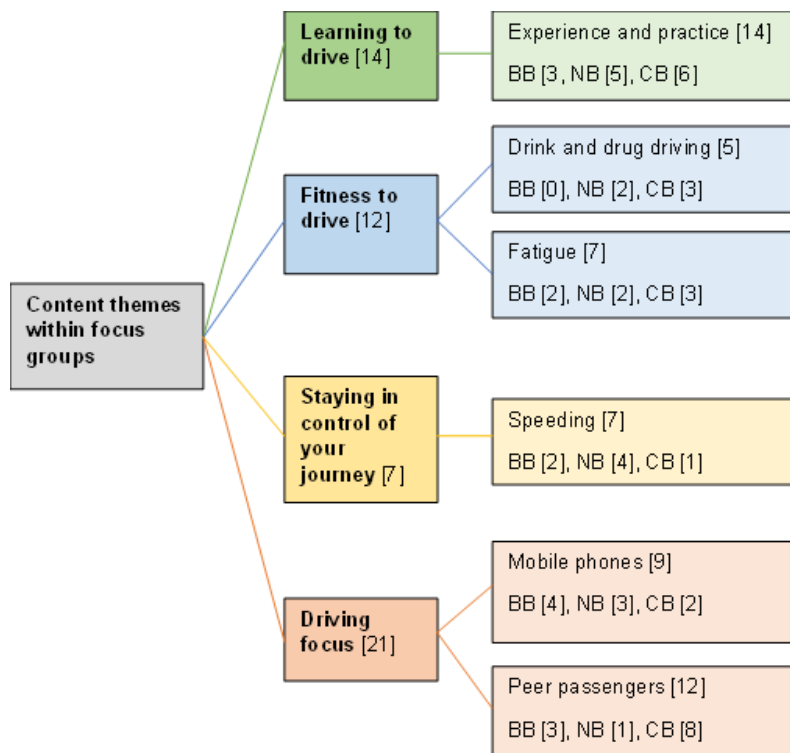
¹¹ <https://www.racfoundation.org/collaborations/pre-driver-theatre-workshop-education-research-pdtwer>

whole group in the earlier workshop, which limits the interpretation of the focus group results. Participants were asked about driving stage at the beginning of the focus groups, with the majority reporting that they were currently learning to drive with only a minority having already passed, or not yet learning. All students were provided with information sheets and consent forms to sign (See Appendix E.4). Students were informed that they were free to not take part in the discussion if they wished, by either re-joining the main class or by not answering the questions posed. The focus group discussions were recorded and transcribed for analysis. A facilitator topic guide was used to ensure consistency of questioning (See Appendix E.3), with further prompts provided if required within the discussion. Two facilitators were present for the focus group: one main facilitator who led the session and one observing facilitator (i.e., the DriveFit film producer), who contributed occasionally to the questioning in line with the topic guide. The objective of both focus groups was to establish the behavioural, subjective norm and control beliefs underlying responses to the key messages presented to the group (See Appendix E.3). Opportunities and challenges presented by the key messages as well as intentions and willingness to act on the messages were also discussed. Each of the focus groups discussed a different set of topics over a 25-minute period, to maximise input on the topics that were due to be covered within the DriveFit intervention (See Paper 6). All data from the focus groups was analysed thematically to answer two questions: what beliefs do pre-drivers hold about the learning to drive process and post-licensure risks; and what are pre-drivers' perceptions of preventative messages. This study has not employed the same TPB belief elicitation processes, as described in Rowe et al. (2016) (i.e., qualitative surveys), due to time constraints, which is a limitation of the method employed. The focus group transcripts were coded according to the behavioural, normative and control beliefs identified under each subject heading using NVIVO release 1.6.1.

6.4 Results

Four topics were discussed in the workshop and focus groups. Driving focus followed by learning to drive issues were covered the most in the focus group discussions, with the greatest number of references relating to control beliefs ($n = 23$), followed by normative beliefs ($n = 17$) and behavioural beliefs ($n = 14$) (See Figure 6-1).

Figure 6-1 Topics discussed with focus groups



Nb. [x] denotes the number of coded references.

The sections that follow outline the behavioural, normative and control beliefs underlying responses to the key messages presented.

6.4.1 Learning to drive

6.4.1.1 Experience and practice

Four preventative messages were presented to inform the discussion on securing sufficient experience and practice whilst learning to drive.

Experience and practice preventative messages:

- Learn to drive for 12-months before taking your test;
- Getting a minimum of 100hrs practice before taking the driving test;
- Getting a variety of practice whilst learning to drive; and
- Taking regular hazard perception tests.

The workshop participants were asked to provide their views on how long they expected to learn to drive. A spread of opinions were presented, with learning to drive for 3–6 months and securing between 20–50 hours of driving practice being the most selected answers (See Figure E.5-1 and E.5.2, Appendix E.5), both of which are lower than the evidenced-based ideal (See Paper 3, section 4.4.1.1).

Workshop participants were also asked how willing they would be to increase their experience and take regular online hazard perception tests before taking the driving test. The group were, on average most willing to get a variety of practice whilst learning to drive ($M = 7.92$, $SD = 2.45$), followed by learning to drive for 12-months before taking their driving test ($M = 7.00$, $SD = 3.25$). Respondents were much less willing to get a minimum of 100hrs practice before taking the driving test ($M = 4.56$, $SD = 3.25$) and reported some willingness to take regular online hazard perception tests ($M = 6.12$, $SD = 3.35$) (See Table E.5-2, Appendix E.5). These views, whilst from a small sample of the age group, provide some further understanding of the acceptability of safety promoting messages that could be included within a new pre-driver intervention.

The workshop participants were asked about the barriers they perceived relating to getting more practice pre-test (either through an increased number of hours, or practice over an increased number of months). Having enough time to get more driving practice given other commitments in life (principally schoolwork, but

also work, sporting activities and socialising) was identified as the most frequently mentioned barrier, followed by the cost of achieving more practice (See Table E.5-3, Appendix E.5). It was most common for the group to expect learning to drive to cost them more than £1,001 (See Figure E.5-3, Appendix E.5).

As parental involvement in the learning to drive process has been identified as crucial for supporting safer outcomes within young drivers (Cassarino & Murphy, 2018), the group were asked about their parents/guardians attitudes towards learning to drive, to see whether family attitudes posed a barrier to securing practice pre-licensure. Most respondents reported parental views that were supportive of young driver safety (i.e., ‘take as many lessons as you need to be confident before taking the test’ ($n = 19$) and ‘get insured on the family car and spend time doing practice between lessons’ ($n = 6$)). However, there was still some agreement with the non-supportive road safety statements posed (e.g., ‘buy whatever insurance policy is cheapest’ ($n = 3$)) (See Table E.5-4, Appendix E.5).

The subject of securing sufficient driving practice was further explored with the focus group, using the safety promoting messages as a basis for the discussion. Participants from both focus groups reported being significantly affected by recent experiences with trying to secure driving instructors who had waiting lists of “*about 3 months*” [1]¹² due to the knock-on effects created by Covid lockdowns. Consequently, the focus group discussions about learning to drive were significantly influenced by the long wait times for private driving tuition and driving tests, which created some uncertainty, “*I’m hoping that, considering the time it takes to book the test, that hopefully I’ll be driving by the end of the year latest, but who knows.*” [2]

On being presented with the concept of getting 100hrs of practice over a 12-month period, a view was expressed by several participants that getting to the required standard was based on individual skill and patience levels rather than a

¹² [1] denotes that quote came from the first focus group run. [2] denotes quotes from the second focus group.

defined amount of experience, *"It's dependent on the person really. Some people like to take their time and make sure they've got it right, where as some people want to just get it done"* [1] and *"Yeah, yeah, it just depends on the person, some people want to get it over and done with, hence why they take an intensive course, just get it over and done with."* [1] When the group were asked about when they hoped they would be able to pass their test, there was uncertainty presented by some about the timescales, *"I don't exactly know when yet"* [1] and hopeful expectations by others, *"Kind of soon, hopefully in the next 6 months, 7 months hopefully."* [1]

The consequences of not getting enough driving practice whilst learning to drive was discussed, with one participant saying that it would lead people to *"mess up"* [1]. In contrast one participant noted that *"If you knew how to drive well enough to pass the test"* [1] there would be value in securing experience post-test as *"you could practice on your own and when other people are in the car"* [1]. A strong belief in the driving licensure system being a credible backstop for ensuring the safety of licensed drivers even when drivers had a lack of driving experience was also expressed, *"They're not going to let you pass if you're absolutely shocking, you've got to be decent at least."* [1]

When asked about driving practice in the context of social groups (i.e., friends, parents/guardians), the only response received about how much driving practice friendship groups were doing whilst waiting for driving tests was *"I don't really know"* [1] indicating that driving practice was not a much discussed topic amongst the friendship groups of the participants. When asked whether, as a result of driving test delays the group saw people guessing when they needed a driving test and booking this in pre-emptively, two participants agreed to this being the case, with one stating that *"Yeah, I know that there is some app that you can pay £18 for and you can get a driving test sooner for cancellations and things"* [2], which may be indicative of the frustration and impatience experienced by this group and their peers due to current learning to drive delays. When the group were asked about how their parents were feeling about them learning to drive and whether they were keen for them to pass their driving test, one participant

said that *“Well, my parents want to get me passed as soon as possible, because my mum can’t drive, so she said when I pass I’ll be her taxi pretty much...it makes everything a lot easier.”* [1] No other focus group members provided an alternative perspective, indicating that for this group parents/guardians were supportive of swift progression through the learning to drive phase. This is in contrast with the workshop’s majority response, where parents/guardians were reported as saying learners should take the time and lessons they need to feel confident before taking the driving test.

When asked about their feelings of control around getting sufficient practice to support their learning to drive journey, the knock-on effect of Covid was again described as problematic, *“I feel like a lot of people would have already passed if it hadn’t been for lockdowns and stuff. Like you started in September, like [name] would have already passed”* [1] and *“Yeah, you can’t get any tests, the earliest tests at the moment are November”* [1]. Consequently, it appeared that the group felt quite out of control of their learning to drive journey due to these broader circumstances, which for one focus group participant meant that *“I still have my lessons once a week, but it’s annoying as you would be ready earlier, but you can’t get a test.”* [1] One participant spoke about the importance of securing a driving licence for employment purposes as *“Yeah you get certain shifts and they finish quite late, around 11pm, so it’s just easier, I can take myself home rather than my parents picking me up.”* [1] The availability of household vehicles to practice was also identified as a limiting factor for some participants *“I don’t have a car that I can use”* [1] whereas others were able to practice in the family car *“[I] just go out occasionally for like a small drive, just to get used to different cars”* [1]. One of the participants said that both themselves and their parents were *“being lazy”* [2] about sorting out insurance for the family car and making time for private practice which limited the amount of practice they were getting. Table 6-1 summaries the behavioural, normative and control beliefs elicited from the workshop and focus groups related to getting enough practice whilst learning to drive.

Table 6-1 Pre-driver beliefs related to getting enough practice whilst learning to drive

<i>Behavioural belief: Getting sufficient/enough driving practice would...</i>	
<i>Disadvantages</i> ...not be needed as the driving test determines whether you are good enough/safe enough ...be supported with practice after the test, which is just as valuable ...be dependent on the individual ...be difficult because I would get bored/impatient/lose interest ...lead to people driving without a driving licence	<i>Advantages</i> ...reduce the chances of messing up
<i>Normative belief: ...think getting sufficient/enough driving practice is important.</i>	
<i>Approvers</i> Parents... Peer passengers...	<i>Disapprovers</i> Parents...
<i>Control beliefs...would make getting sufficient/enough driving practice more/less likely</i>	
<i>Pressures</i> Delays in securing driving instruction and test dates... Travel to work needs... Friends and family teach differently to the driving instructor... The costs associated with learning to drive... The time learning to drive takes away from other activities in life... Being encouraged by parents to get through the test as quickly as possible...	<i>Facilitators</i> Having access to a private car and willing supervising drivers...

6.4.2 Fitness to drive

6.4.2.1 Drink and drug driving

Five preventative messages were presented to inform the discussion on avoiding impaired drink and drug driving.

Drink and drug driving preventative messages:

- Commit to not consuming any intoxicating substance before driving;
- Never drive for a social occasion where you think you might be tempted to take an intoxicating substance;
- Commit to not having more than one alcoholic drink if you have to drive the following morning;
- Support friends not to consume any intoxicating substances if they are driving; and
- Refuse to travel as a passenger with a driver who is intoxicated.

Workshop participants reported having the least control over whether they would drive after having taken drink or drugs ($M = 2.75$, $SD = 3.42$), in comparison to all the other risks presented (See Table E.5-5, Appendix E.5). The impacts of drink and drug driving safety were discussed with the first focus group. Normative beliefs around drink and drug driving were not explicitly discussed in the focus group, both for time limit reasons and because it appeared that drink and drug drinking was not a behaviour that the participants were comfortable with (See Table E.5-6, Appendix A.5, illustrating comfort levels as a passenger of a drink or drug driver). Considering the group's normative beliefs, when asked whether drink and drug driving was something that they saw a lot of people doing in their peer group one participant said that *"Well [laughing] our generation, yeah, I see a lot, because there are so many people that go out drinking and all this."* [1] This comment was echoed by other contributors who said that both and drink and drug driving is *"a lot more common nowadays"* [1].

As with many of the topics discussed during the focus group exercise, there was a strong focus on the groups control beliefs. One participant said that drink and drug driving occurred *"because it's more accessible [than it used to be]"* [1]. When discussing what the group would do if faced with a drink or drug impaired driver when travelling as a passenger one participant said, *"for me, if someone has drunk enough...I would never get in the car with them, I'd always be ok to say I'd not get in a car and things like that"* [1], a statement which one other participant agreed with *"100%"* [1]. The participant in agreement elaborated by saying, *"Well it's about your safety isn't it, if you know you're in danger you're going to speak up, I don't think, well I can only speak for myself, I don't think I would stay quiet if I felt I was in danger. Obviously, there are some people out there that struggle to speak out, so there's an issue there, but, as I say, it all depends."* [1] Again, individual difference was highlighted by contributors, which indicates that whilst there may be some confident young people who feel empowered to speak-up, the participants recognised that this was not a universal response.

In discussing how drivers who have consumed an intoxicating substance can get home, several group members suggested “*Taxis*” [1] or “*Uber*” [1] as an option. Local bus services were described as “*alright, but not at night*” [1] as “*at night, they don’t come very often do they, you’re better off getting a taxi or an Uber.*” [1] When parents were discussed as a potential option for providing lifts from home participants said, “*[it] depends on the person, depends on the parents really, if they’re willing to come and pick you up at whatever time.*” [1] Parents own limitations around safe driving were also identified “*because maybe, if it’s late at night, they might be tired and then their taking the risk coming to pick you up*” [1] and “*they could have had a drink as well*”. [1] The overall pre-driver beliefs elicited on drink and drug impaired driving are outlined in Table 6-2 below. Pre-driver beliefs that have been elicited from previous studies are also included within the table to inform future intervention design (See Paper 6).

Table 6-2 Elicited pre-driver beliefs related to driving after consuming drink and drugs

Behavioural belief: Driving after having consumed drink and drugs would...	
Dangers ...increase my chances of getting hurt* ...risk causing an accident* ...increase my chances of injuring myself* ...puts the lives of others at risk** ...lead to my being banned from driving** ...increase my chances of having an accident* ...impair my driving performance (e.g., poor judgement, slow reactions etc.) ...increase my chances of losing control of my car	Advantages ...be fun and give me a thrill* ...put me in a good mood* ...give me an advantage over other road users*
Normative belief: ...think that I should/should not drive after having consumed drink and drugs...	
Approvers People such as chavs...* People who have a drinking problem...* Foolish people (e.g., idiots)*	Disapprovers My family...* My parents...* Other road users...* Sensible people...* Most people...* My friends...* The police/authorities...* Peer passengers...

Control beliefs: ...would make driving after having consumed drink and drugs more/less likely	
Pressures Easy access to drink and drugs... Having friends that find it hard to speak out against drink and drug driving... Having no alternative way to get home...* Having friends with me...*	Inhibitors Having access to a taxis or Uber... Having parents who are able to provide lifts home (who are not tired or drunk themselves)... The presence of the police...* Knowing a victim of a road accident...* Having thought about the risks...* Having passengers in the car...*

* beliefs elicited in Rowe et al. (2016) with factor loadings above .65, ** beliefs elicited from Parker et al. (1992b) mean rating above 1.50. * Nb. slightly different presentation of beliefs questions in studies (i.e., discussing drink not drugs). Responses adapted for the questions posed here.

6.4.2.2 Fatigue

Six preventative messages were presented to inform the discussion on avoiding fatigue whilst driving.

Driving whilst fatigued preventative messages:

- Make a commitment not to drive drowsy or fatigued;
- Practice good sleep habits and aim to get 7–8 hours' sleep before driving the next day;
- Use sleep tech to monitor your progress;
- Plan journeys around your sleep needs (i.e., times of day when will be most sleepy);
- Support drivers to take a break when travelling as the passenger; and
- Know what to do if you feel sleepy whilst driving (e.g., caffeine & nap, take a break on longer journeys, check in on tiredness and know when to stop).

The focus group were asked what effect they thought fatigue would have on their driving safety. The negative safety consequences of fatigue were well recognised, *“It slows your reaction times doesn't it and you're not all aware of what is going on around you really as you're focused on trying not to fall asleep.”*

[1] One participant said, *“I don't really like driving when I'm tired because you could be at risk of danger, you could crash and that's my whole life gone really [Inaudible, laughter].”* [1] The group were also asked whether they had ever been

in the car as a passenger where the driver had struggled to stay awake, to which one participant responded *“No, not particularly”* [1], with no further disagreement from other participants, indicating that this was not behaviour that they recognised within their immediate social connections. Within the discussion, some questions around the legality of driving whilst tired were asked by the group, illustrating a potential knowledge gap [1]:

Young female: *“So, is it illegal to drive if you’re tired? Or if you’re doing it dangerously?”*

Facilitator 1: *It’s illegal to drive if you’re not in full control of your vehicle, so driving tired would be one of those, if it was impairing your driving, so that would be under careless or dangerous driving.*

Young female: *What would you get for that?*

Facilitator 2: *It’s at least six points, which is all you’ve got anyway, which means you’re back to L plates, obviously unless you kill someone and then that’s prison probably.”*

Finally, in discussing the groups control beliefs related to driving fatigued, consuming *“Caffeine”* [1] was suggested as one of the best things to do to stave off fatigue. One participant said, *“Me personally, I don’t think I would be driving, so I’d be asking my passenger if they can drive, or I’d find somewhere to stop.”*

[1] The effects of poor sleep on fatigue were also discussed, with one participant describing themselves as *“so bad”* [1] at staying up late at night. An animated discussion followed amongst the group about the sleep distractions they experienced, indicating that this was an important issue for participants. When the group were asked what they found kept them up late at night, maintaining social connections (i.e., *“I’m speaking to my girlfriend”* [1]) and using social media were mentioned as causes (i.e., *“I think social media is a real thing [agreement across the group]”* [1], *“You can sit there for hours, scrolling on your phone, not even realising you’re doing it”* [1], *“Like YouTube and stuff”* [1], *“And the time just flies”* [1]) whereas online gaming did not appear to be a current issue for the group (i.e., *“Used to [be an issue], not anymore”* [1]). The overall pre-driver beliefs

elicited on fatigued driving are outlined in Table 6-3. Pre-driver beliefs that have been elicited from previous studies are also included within the table to help inform future intervention design (See Paper 6).

Table 6-3 Elicited pre-driver beliefs related to driving whilst fatigued

Behavioural belief: Driving whilst fatigued would...	
<i>Dangers</i> ...Slow reaction times and reduce attention. ...create a crash risk ...impair my driving performance (e.g., poor concentration)* ...increase my chances of having an accident* ...increase my chances of hurting other road users* ...result in me having slower reactions to events on the road* ...increase my chances of falling asleep at the wheel* ...increase the probability of me dying*	<i>Advantages</i> -
Normative belief: ...think that I should/should not drive whilst fatigued	
<i>Approvers</i> -	<i>Disapprovers</i> Peer passengers... The police/authorities...* Sensible people...* Most people...* Older people...* Young people...*
Control beliefs: ...would make driving fatigued more/less likely	
<i>Pressures</i> Social media and other online media effecting amount of quality sleep... Needing to drive early in the morning...* Needing to drive late at night...*	<i>Inhibitors</i> Drinking caffeine... Asking a passenger to drive or find a safe place to stop... Having no real need to make a journey...* Being in an emergency situation...* Fear of having an accident...*

* beliefs elicited in Rowe et al. (2016) with factor loadings above .65 Nb. slightly different presentation of beliefs questions in study, responses adapted for the questions posed here.

6.4.3 Driving focus

6.4.3.1 Mobile phones

Three preventative messages were presented to inform the discussion on avoiding mobile phone use whilst driving.

Mobile phone preventative messages:

- Make a plan for managing your phone when in the car so that you are not distracted whilst driving;
- Reduce your mobile phone use in everyday life, to improve your health, wellbeing, relationships and to make it easier to unplug and focus whilst driving; and
- Discuss message response times with family and friends so that it is easier to delay responding to messages, which will reduce the pressure you feel to respond whilst driving.

Workshop participants reported some of the least control over whether they would use their mobile phone for messaging and calls whilst driving ($M = 3.63$, $SD = 3.44$), in comparison to all the other risks presented (See Table E.5-6, Appendix E.5), indicating that this is a behaviour that this group find difficult to manage. A nuanced discussion about the function and use of mobile phones in vehicles followed, recognising that there are legitimate and illegitimate uses of mobile phones whilst driving, *“I think it’s about knowing what’s dangerous to you and what’s not, obviously if you’re trying to get from one place to the other and you need a sat nav, it’s not really, you need that phone, but you don’t need to text someone”* [2] and *“So, I guess it’s kind of restricting yourself on how you use your phone, to support your needs.”* [2] These multiple use cases for a phone in a vehicle appeared to add an element of uncertainty about safe use of phones and a suggested reliance on ‘common sense’, *“It’s more common sense really than anything, because you use a sat nav to find where you’re going, so why can’t you use your phone as a sat nav or your phone as a radio I suppose, it’s still the same risk, you changing the radio to you putting on music. So, it’s just common sense really, do it when you know you’re not going to crash or when you’re going to lose*

control.” [2] One participant presented the legitimate use of phones as a sat nav as a special case for mobile phone engagement whilst driving, “But if like, say you’re driving and then you don’t know where you’re going and you set your sat nav, whilst you’re driving, I feel like that is an exception because otherwise you don’t know where you’re going. Do you know what I mean, you can’t always do it beforehand, because you don’t always know that you’re going to need sat nav.” [2]

The use of mobile phones generally (i.e., outside a vehicle context) was also discussed, which highlighted the negative wellbeing and health impacts excessive mobile phone use can have [2]:

Facilitator 1: *“How do you all feel about how much you use your mobile phones, would you like to use them more, less, or is it about right?”*

Young female: *Probably a bit less...than I actually use it.*

Young male: *I would agree.*

Facilitator 1: *And what do you think the benefits would be of using it less?*

Young female: *Umm...you probably could sleep more. Umm...more interaction, like actual interaction. Umm it would probably be a healthier mind. Rather than using it all the time.”*

When asked about the types of people who were most likely to use mobile phones whilst driving, one of the participants said, *“It depends on who the driver is” [2]*, which was followed by the qualification that *“Usually it’s my siblings more than my parents” [2]*. When asked about enforcement consequences for mobile phone use whilst driving, these were generally well recognised (i.e., *“Fine or points on your licence and stuff like that” [2]*). As has already been reported for other risk behaviours discussed, the focus group participants had questions about mobile phone enforcement [1], illustrating again a knowledge gap amongst this group about the specifics of the enforcement rules:

Facilitator 1: *“So are you aware of, as [Facilitator 2] mentioned earlier the new drivers act, which means you get 6 penalty points as your maximum*

in the first 2 years, so that's actually being caught on the mobile phone once and then that's your licence gone as that is now six penalty points.

Young female: *When do you get it back?*

Young male: *I didn't know about that.*

Young female: *When do you get it back? So, if I lose my licence, when do I get it back?*

Facilitator 2: *When you pass your driving test.*

Young female: *So, I have to do it all over again?*

Facilitator 1: *Yes, you have to do it all over again.*

Young male: *Is that paid for?*

[Laughter]

Young male: *Yeah, that's not fair, you break the law and we'll pay for your test [laughter]*

Young female: *Do you have to do the lessons again or do you just sit the test again?*

Facilitator 1: *Umm, you have to re-sit your theory as well.*

Young female: *Great!*

Facilitator 2: *After six months driving, you'd need to do lessons again to remember how you're supposed to drive [Laughing] to pass your test.*

Young female: *Yeah*

Young male: *Do you have to do community service?*

Facilitator 2: *No*

[Laughter]

Facilitator 1: *It obviously depends on what has happened, as a result of you being distracted or if you injure someone else.*"

Ways in which to manage mobile phone use whilst driving was also discussed. Current road safety messaging that encouraged people to turn off their mobile or keep it in the glove box was discussed. One participant described this as unrealistic *"because sometimes, the majority of cars now have Bluetooth, so you could keep it in your bag and it automatically connects to your phone, so but then, the idea is that phones are something that the majority of people need, so if you're in the car and put your bag in the backseat, you're going to end up crawling back when you're driving, if your phones going, so if you have it next to you, or in the glove box or the compartment down the side of the door, you know it's there and it's like what happens if someone does call me, then you know where it is."* [2]

Participants were also asked about how quickly they felt they needed to respond to messages when they came in, with one participant saying that *"It depends on who it is from"* [2]. Another participant suggested that context was also important *"And it depends on, if you have text them before they've responded or say if you're planning to do something and you've got like 10 minutes to prepare and sort out something then you've got to respond in a quick way, but if it's just 'oh can you drop this off to me tomorrow' then you're like, oh ok I'll leave that, it doesn't need an immediate response, but if it's an emergency you need that sense of urgency."* [2] When asked specifically about responses to parents, one participant said, *"I think it depends on the nature of the message, because if it's your mum and you need to be back by a certain time, then you can't ignore it because she's giving you the instruction sort of thing, but if it is her telling you that something has happened, then you're more inclined to phone her or whatever."* [2] The overall pre-driver beliefs elicited on mobile phone use are outlined in Table 6-4. Pre-driver beliefs that have been elicited from previous studies are also included within the table to help inform future intervention design (See: Paper 6).

Table 6-4 Elicited pre-driver beliefs related to mobile phone use whilst driving

Behavioural belief: Driving whilst using a mobile phone would...	
Dangers ...reduce my control of the car* ...increase my chances of having an accident* ...mean diverting my attention from the road* ...increase my level of distraction* ...increase my chances of trouble with the police	Advantages ...allows me to use other useful functions of the phone (e.g., Sat Nav) ...allow me to keep in touch/talk with people*
Normative belief: ...think that I should/should drive whilst using a mobile phone	
Approvers Young people...	Disapprovers The police... Peer passengers... Older people...* Sensible people...* My parents...* Police and other authorities...* Most people...*
Control beliefs: ...would make driving whilst using a mobile phone more/less likely	
Pressures The importance of mobile phones in everyday life... Needing to reply to an urgent text... Having a mobile phone easily accessible and connected to the car... Needing to make an important or urgent call...* Receiving an important call*	Inhibitors Driving near pedestrians or a school...* Police presence...* Knowing of road accidents involving drivers using mobile phones...* Driving in busy traffic...*

* beliefs elicited in Rowe et al. (2016) with factor loadings above .65, ** beliefs elicited from Parker et al. (1992) mean rating above 1.50. Nb. slightly different presentation of beliefs questions in studies, responses adapted for the questions posed here.

6.4.3.2 Peer passengers

Four preventative messages were presented to inform the discussion on managing peer passenger distraction.

Peer passenger distraction preventative messages:

- Drivers should only carry one passenger during the day when they have less than 6-months of post-test driving experience;
- Drivers should make clear the rules of their car to their passengers;
- Passengers should only travel with a newly qualified driver (with less than 6-months experience) during the day, when they are the only passenger; and
- Passengers should take responsibility for their own safety, help the driver with certain tasks and support their concentration by not distracting them.

Workshop participants were invited to rate the comfort they would feel as a passenger if the driver in the car was taking part in a series of risk taking behaviours. Overall, respondents stated that they would feel moderately, or not at all comfortable with the risk taking behaviours proposed, with speeding ($M = 5.52$, $SD = 3.19$) and driver distraction from other passengers ($M = 4.76$, $SD = 3.73$) being the behaviours that they would be most comfortable with and an impaired driver (by drink or drugs) being the situation that they would be least comfortable with ($M = 2.08$, $SD = 3.10$) (See Table E.5-6, Appendix E.5).

How best to speak out as a passenger about driver behaviours was discussed in the focus groups [1]:

Young female: *"I think I'd more take it in a different way and be like, you could hurt yourself, so if they thought about it in that way rather than saying I'll get out, because you're endangering yourself and they're more likely to make you get out of the car and maybe not drive well themselves either."*

Young female: *Yeah, that's true, because you could get out and they could still carry on or take someone else.*

Young male: *Yeah, hmm.*

Young female: *And then you'd feel guilty if anything happened to them, rather than you trying to persuade them not to actually drive the car, if you knew that they were driving dangerously [in audible] or could drive dangerously."*

In response to asking about whether providing information about consequences and risk information would be enough to motivate the conversations amongst peers, one participant said, *"I think that is a personal thing, because I know, if I was in my car and I was driving and my mates were being stupid and distracting me, I'd just turn around and be like, either get out or stop it, give me a minute [Laughter], I'm not going to crash with all of us in it, but some people might not be able to say that"* [1]. Another participant said, *"So like, I would be able to say to my mates, stop, I was going to say something else then, but then I remembered*

the recording [laughter], but some people might not be able to, so it might be something that you need to do.” [1]

Comfort with speaking up was also described as relating to the position someone was in, *“I feel like, the driver is more likely to say it than the passenger, because, say like someone is giving me a lift somewhere, I feel obligated to them, whereas, if I were the driver I’d be like, I don’t need to drop you to this place, it’s not necessary for me, so just get out. I’m going to get there regardless, but the passenger won’t get there regardless.” [2]* Another participant said, *“I think it depends on the driver though [inaudible], if you’re a bit of a violent driver and do stuff like that and kind of frighten the passenger from talking to you, you kind of need to level with them and say...the driver needs to understand the passenger and the passenger the driver...they need to understand each other’s needs.” [2]*

In discussing the impact that friends have on drivers, one participant said, *“Umm, I don’t know I don’t feel like any of my friends like pressure me to go fast or drive a certain way.” [2]* However, one participant said, *“Umm, you can’t really do much about friends, because that’s them, you can’t really tell them what to do” [1]* and consequently *“If they’re not going to listen to you, they’re not likely to listen to anyone else, because they’re more likely to listen to you than some random person.” [1]*

Participants were also asked whether there was anything they thought passengers could do to help newly qualified drivers if they are passengers in their car, with one suggestion simply being, *“Keep quiet [laughter]” [2]*. Another contributor elaborated on this general point, *“Like use common sense, because if you were put in that position, then you know what you’re going to want, type of idea, like you’re going to want that bit of quiet and it’s just like, don’t be an idiot type of idea to them because you know what they’re doing, you know like if you look at it hold on a minute what has he done there, that looks a bit difficult you’re going to try and be respectful to them, knowing that they’re in a new circumstance.” [2]* The responsibility that passengers had to ensure that their sensitive to driver needs was also discussed (i.e., *“If you know like you’re being a passenger seat driver, that’s going to not be like great for the new driver*

because they think like you're commenting on how they're driving and like they haven't been driving for very long, so it's not like they're too confident about what they are doing and it could like make them feel worse and they're not going to want to give people lifts and things because they feel like their friends aren't taking them seriously, judging them" [2]).

The use of the car used as a fun 'venue' as well as a vehicle for getting from A to B was also discussed. One of the participants said, *"Yeah, well you haven't had it for long, so, you've probably been driving for ages so now you're used to it, but because its new you're like, oh it's something exciting."* [1] Other participants said, *"It gives you a sense of freedom"* [1] and *"Yeah, like when you come to secondary school, it's the little things like, you were in uniform before and now we're not and the novelty has worn off."* [1] These responses indicate that participants saw the car as a source of freedom as well as supportive of mobility needs.

The concept of limiting passengers in the first 6-months of licensure was introduced. Some reservations about the value of this approach were expressed *"I suppose that you need to throw yourself in at the deep end, to learn and get used to having like multiple people talking at once, like talking to you, like minor distractions"* [2] with others recognising that *"depending on who you are, you never know, so if you can gradually build up the number of people who are in it, or like the nature of those people who are in your car, because if you have like people who are quiet or are going to sit there doing nothing, not really being a distraction then that is no different to you being in the car on your own, or with your driving instructor, but rather if you have like a really good friend who is obnoxious, noisy, then that's different to what you are used to. So, I think it depends on the driver themselves and what they feel comfortable with."* [2] One participant said *"It's unrealistic. Because for some people, you can end out of a job because of it [in audible] and if you never learn with multiple people, you're stuck to one person, how are you going to learn to do it with more people."* [2] Another participant said, *"I think it would depend on how long, like if that were to be a rule, how long would it be for, because like when you first start driving you don't have the confidence just yet to like be in the car full time doing it on your*

own.” [2] The overall pre-driver beliefs elicited on peer passenger distractions are outlined in Table 6-5. Belief elicitation studies have not previously assessed pre-driver peer passenger distraction beliefs and therefore these findings provide new insights upon which to develop interventions for this at risk group (See: Paper 6).

Table 6-5 Elicited pre-driver beliefs related to peer passenger distractions

Behavioural belief: Driving whilst travelling with peer passengers would...	
<i>Dangers</i> ...cause a safety issue if passengers don't consider drivers needs	<i>Advantages</i> ...help build up driving experience ...support feelings of freedom and independence
Normative belief: ...think that I should/should not drive with peer passengers	
<i>Approvers</i> Friends...	<i>Disapprovers</i> -
Control beliefs: ...would make the dangers associated travelling with peer passengers more/less likely	
<i>Pressures</i> Passengers keeping quiet about poor driving behaviour through a lack of confidence or due to the power dynamics... A difficult driver...	<i>Inhibitors</i> Passengers speaking out against poor driving behaviours... Safe and helpful passenger behaviours... Passenger limitations/rules...

6.4.4 Staying in control of the journey

6.4.4.1 Speeding

Four preventative messages were presented to inform the discussion on staying in control of driving speed.

Speeding preventative messages:

- Plan to control your car within the speed limit every time you drive, despite the challenges faced (i.e., if running late, trying to keep up with traffic or being pressured by other drivers);
- Adjust your speed within the speed limit when you experience different driving conditions (i.e., weather or traffic);
- Monitor your speed frequently whilst driving; and
- Manage your space on the road by leaving a 2-second gap to the car in front.

Workshop participants reported having most control over whether they would drive over the speed limit as a driver ($M = 6.29$, $SD = 3.30$), in comparison to all other risks presented (See Table E.5-5, Appendix E.5). The inevitability of speeding was presented by one of the focus group participants who said *“Yeah, I think speeding is inevitable”* [2], with the role of enforcement as a potential brake on behaviours recognised *“I feel like it’s going to occur no matter what people put in place, but um like by putting restrictions in place it doesn’t occur as much as it would without it.”* [2]

As with the fatigue discussion several questions were raised by participants about the rules around the enforcement of the speeding behaviour [1]:

Young female: *“If you’re speeding, don’t you get to choose whether you do the course or get points on it? Because there’s like a speed awareness course isn’t there?”*

Facilitator 1: *Yeah, there is, so if you are only marginally exceeding the speed limit, like by a small amount, then you’ll get a speed awareness course, it’s not that big [an] amount actually.*

It was also recognised that *“There’s also like the speed awareness course, depending on how much you’ve gone over the speed limit when you’ve been caught and I think that’s really the only thing that kind of stops people, because they don’t want to spend that amount of time, completing that course, rather than the fine you can just pay it off, that’s that.”* [2] In the discussion that followed the implications of taking a speeding course on insurance costs led one of the participants to concede that maybe *“You do it actually [i.e., take the speed awareness course], because it makes sense”*. [2]

When asked about perceptions of other people keeping to the speed limit, one participant said that on local roads *“My umm parents speed when they’re on a road that they know, because there’s no danger of hitting anyone, because they know the road and think that I can go fast and it’s like, it’s like just a few seconds, so it doesn’t really matter.”* [2] In discussing the reason why people speed, one participant said that *“I feel like younger people try to show off, so they speed.”* [2]

Another said *“I think it depends on the circumstance, if the roads are empty then people are obviously more inclined with speeding, but like, if someone else were to speed... we’d be a bit annoyed by it, but if they were in the same situation, they wouldn’t care if they were speeding”* [2], which illustrates how people can take different perspectives on speeding depending on their individual circumstances (i.e., if they are a local resident or driving through someone else’s residential area).

One of the participants described the conditions which they would be tempted to speed as being on *“empty roads, because sometimes you feel like there’s nothing in front of me, no one behind me, so you’ll just speed up to get to where you are going faster. It’s just like, might as well.”* [2] In discussing potential tools to support speed reduction (i.e., speed limiters, travelling using a lower gear and keeping a good gap in front from other people) the ‘two-second rule’ and adjusting speed to take account of different driving conditions received good recognition amongst the group [2]:

Young female: *“It comes up in the theory as well that and how many seconds you’re meant to leave in certain weathers.*

Facilitator 1: *Oh yeah, do you know what it’s meant to be in the fog?*

Young female: *I know that in the rain its four seconds and then in the snow its ten?*

Young male: *Yeah, its times two, you times the dry for snow times eight it’s a massive, big gap, so that you know you’ve got enough stopping distance, so you don’t go into the guy in front.*

Facilitator: *And so, do you talk about some of these things with your driving instructor or is it mostly in the theory test?*

Young male: *Some of the things I’ve picked up, that I used in the theory, I picked up from my driving instructor, such as the different types of traffic lights, the toucan traffic lights, so that people can go and that popped up, that’s useful, so I learnt that from him rather than the website I used.”*

The overall pre-driver beliefs elicited on speeding are outlined in Table 6-6 below. Pre-driver beliefs that have been elicited from previous studies are also included within the table to help inform future intervention design (See: Paper 6).

Table 6-6 Elicited pre-driver beliefs related to speeding

<i>Behavioural belief: Driving over the speed limit would...</i>	
<i>Dangers</i> ...be inevitable ...increase my chances of injuring other road users* ...increase my chances of injuring myself* ...increase my chances of trouble with the police* ...increase my chances of having an accident* ...put the lives of others at risk** ...increase the chances of my having an accident**	<i>Advantages</i> ...make me look good/cool* ...gives me a thrill*
<i>Normative belief: ...think that I should/should not drive over the speed limit</i>	
<i>Approvers</i> Passengers... People who are important to me (i.e., parents)... Young people who show off... People whose speeding is dependent on the road environment... People who enjoy speeding...* Young people...* Men...*	<i>Disapprovers</i> The police... Police/Other authorities...* Sensible people...* Most people...* My family...* My friends...*
<i>Control beliefs: ...would make driving over the speed limit more/less likely</i>	
<i>Pressures</i> Empty roads... Being in a rush...* Being in an emergency...*	<i>Inhibitors</i> The presence of police enforcement... Using tools like 'the two second rule'... Certain weather conditions (e.g., rain, fog)...* Having passengers in my car...* The presence of police/speed cameras...*

* beliefs elicited in Rowe et al. (2016) with factor loadings above .65, ** beliefs elicited from Parker et al. (1992b) mean rating above 1.50. Nb. slightly different presentation of beliefs questions in studies, responses adapted for the questions posed here.

6.4.5 Intervention content type and framing

In addition to eliciting pre-driver risk behaviour beliefs and perceptions of safety messages, the qualitative research sought pre-driver views on useful content types and intervention framing to support the relevance of a newly designed intervention for this target audience. To test the respondents broad

understanding of risks, the workshop participants were asked about their perceptions of new driver collision involvement. Sixty-nine percent of respondents thought that the percentage of new drivers being involved in a collision in their first six months of driving was higher than recent research in the UK indicates (9%) (Helman et al., 2018) (See Table E.5-7, Appendix E.5).

To inform intervention design decisions about emotional tone (See Paper 6), the workshop participants were also asked what emotional states they thought road safety advertisements should seek to inspire. Three current recent advertisements covering passenger distraction¹³, drink driving¹⁴ and mobile phone use¹⁵ were shown to participants as a primer for this question. Confidence ($n = 12$), inspiration ($n = 12$) and fear ($n = 12$), were most frequently selected emotional states that the group thought advertisements should inspire (See Table E.5-8, Appendix E.5).

Finally, workshop participants were asked to share the names of their favourite YouTubers and/or social media influences, to provide an understanding of the style and type of content frequently consumed by the target audience. Whilst only 6 students within the group provided responses to this question, they highlighted content with a total of 67.7 million subscribers ($M = 8.47$ million, $SD = 7.33$ million) (See Table E.5-9, Appendix E.5). In reviewing the content delivered by these identified creators, several common themes emerged such as the use of demonstrations and the provision of new information to viewers. Studio-based authentic discussions with friends as well as on location-based content was delivered and much of the content was portrayed in a humorous and light-hearted way. Workshop participants were also asked to vote for the intervention name that they preferred of the two that were being considered for the programme (See: Table E.5-10, Appendix E.5). DrivePlanUK received higher support (61.5%), than Young Driver Bootcamp (7.7%).

¹³ <https://youtu.be/byLITSGoK5g>

¹⁴ <https://youtu.be/dRE7ecKmJsk>

¹⁵ https://youtu.be/H_W2Y5LXNJg

6.5 Discussion and conclusions

The workshop and focus groups conducted for this research has identified several additional behavioural, normative and control beliefs which had not been outlined in previous research (Elliott et al., 2005; Parker et al., 1992; Rowe et al., 2016), which provides new insights upon which to develop interventions for this at-risk group (See Paper 6). The way in which the proposed preventative messages were received also provides useful feedback to inform intervention design. In addition, there were several overarching themes that emerged from the research with implications for intervention design, which span several of the risk behaviours and preventative approaches, which are discussed in the sections that follow.

Participants reported good knowledge of the risks faced by young drivers but overestimated the risk of collisions experienced by this group within their first six months of driving licensure. Recent research in the UK indicates that approximately 1 in 11 new drivers (9%) will experience a collision over the first six months of independent licensure (Helman et al., 2018). Interventions for pre-drivers are often designed on the premise that the target audience are not informed about the risks they face and consequently information provision forms a key component of their delivery (See Papers 1 and 2 for more detail). Whilst it is not necessary, or advisable for interventions to labour crash risk information, audiences should be supported to develop an accurate understanding of the crash risks for new drivers and what actions can be taken to ameliorate them.

Both the findings from the workshop and focus group discussions illustrate that young people are not currently securing enough pre-licensure practice (as determined by available research see Paper 3, Section 4.4.1.1), although there appears to be a willingness amongst this audience to engage in more varied practice and to learn over a 12-month period. It is important that interventions seeking to promote the uptake of a greater amount of pre-licensure driving experience are sensitive to the time and financial constraints that young people report limiting their driving experience. In the short-term communication on this subject should be mindful that the learning to drive process has been severely

disrupted by Covid related test and driving instructor availability backlogs, which has affected learners' experiences and their feelings of control related to the learning to drive process.

A common theme related to the impact of individual ability on safety outcomes arose from the focus group discussions. For instance, the amount of driving experience required before successfully passing the driving test as well as the ability to speak up as a passenger was described as dependent on individual abilities rather than on any learnt skillset. Whilst individual variability in performance, skills and confidence has been found to contribute to driving performance (e.g., Stavrinou et al., 2015), individual difference was seemingly given more weight by the participants than warranted, as evidence suggests that, for instance, more driving experience is beneficial for all drivers (See Paper 3, Section 4.4.1.1). Future pre-driver interventions could seek to address misunderstandings about the effect individual differences have on the risks relevant to this target audience, to support young people to understand that they have agency and control in influencing outcomes.

Another theme that emerged was a lack of knowledge amongst participants of the enforcement consequences associated with speeding, using a mobile phone and driving whilst fatigued. Whilst previous pre-driver intervention effectiveness research has found good evidence for programmes having an impact on knowledge outcomes, there are limitations with using knowledge improvement as a vehicle for behavioural change (See Appendix A.4.6). Consequently, a new pre-driver intervention (See Paper 6) would be well placed to address the identified knowledge gaps about legal consequences associated with unsafe road user behaviour, but the limitations of such an approach are important to note.

Where speeding behaviour was concerned, workshop participants reported speeding being the risk behaviour that they felt most comfortable with as a passenger, as well as being the risky behaviour that they felt/expected to feel most in control of as a driver. Given the recognised prevalence of speeding behaviours (Elliott & Armitage, 2009), it is interesting to note that participants believed that they had control over this behaviour. During the focus groups, the

inevitability of going over the speed limit was discussed, with examples provided of important others (e.g., parents) speeding in specific circumstances. Speeding behaviours are prevalent in the general population and are responsible for increasing the severity of collision consequences (Elliott & Armitage, 2009) and therefore the new intervention reported in Paper 6 will address the attitudes, subjective norms and perceived behavioural control related to this behaviour, using approaches that have demonstrated previous success (e.g., Elliott & Armitage, 2009).

Mobile phone use in vehicles was described by the focus group as a nuanced issue given the specific function of mobile phones and their legitimate use within vehicles (e.g., sat nav). The legitimate use of mobile phones for a limited number of specific purposes (i.e., navigation in a fixed cradle), appeared to blur the concept of 'proper' and 'improper' use for some participants. Simulator research by Oviedo-Trespalacios et al. (2019) ($n = 35$, 63% male, $M_{age} = 22.9$, $SD = 4.0$) investigated different self-regulation approaches adopted to managing mobile phone related activities whilst driving and found that there were certain strategic (i.e., overall decisions such as not using the phone at all whilst driving), tactical (i.e., not using a mobile phone in specific situations) and operational (i.e., temporarily stopping using the mobile phone) decisions that drivers made regarding their phone use. The authors suggest that there may be potential for technology based interventions to be applied to support these different self-regulation approaches. Consequently, future road safety advertisements and intervention content addressing mobile phones may need to consider moving away from messaging that only recommends that phones are turned off and stowed away, as this may not resonate with young road users who are more likely to recognise the multi-purpose function of mobile phones in vehicles. Making the safety case very clear for avoiding mobile phone use whilst driving also appears to be important for this target group who have expressed some confusion about legitimate and illegitimate usage. In addition, addressing the cause of wanting to stay connected (e.g., response time expectations, as outlined previously by Delgado et al. (2016) in Paper 4, Section 4.4.3.1), might also help to remove temptations to engage in mobile phone communication whilst driving.

The driver-passenger relationship, as well as its impact on safety, was also covered in the discussions. Workshop participants reported experiencing quite a lot of discomfort as a passenger when drivers engaged in risk-taking behaviours, but also reported themselves having a good degree of control over not getting distracted by passengers when thinking of themselves as a driver. It was recognised in the focus group discussions that some people may feel more comfortable than others about speaking up as a passenger about risky driving behaviours, with the power imbalance between drivers and passengers also noted as a reason why some passengers may not speak up. Some focus group participants thought that there was value in getting used to passengers early in the driving licensure process, with the safety value of 'good passengers' also proposed (See Cassarino & Murphy (2018) for a further discussion). The car was recognised as both a 'venue' and a symbol of freedom and personal space to support social interaction. This echoes findings from previous qualitative research conducted with this age group where driving was found to provide independence and be representative of a transition into adulthood (Fylan & Caveney, 2018), illustrating the importance of setting intervention content and messaging in this context. Mixed views were also presented about the feasibility of early solo licensure passenger restrictions, a measure with known demonstratable safety benefits (See Paper 3, Section 4.4.1.1.). Future interventions may be well placed to consider supporting the development of personal skills to enable safety promoting conversations, which have been demonstrated in and promoted by several previous studies (e.g., Buckley & Watson, 2014; Griffin et al., 2004). In the absence of formal graduated driver licensing, the promotion of caution in carrying peer passengers during early licensure may help to fill the knowledge gap in understanding about the safety impact of peer passengers during early licensure.

The role of parents in supporting a safe transition to independent mobility was also discussed in both the workshop and subsequent focus groups. Parents were recognised as having a road safety supportive role (e.g., providing lifts and funding the driving lessons needed to support safety) as well as potentially negative road safety impacts (e.g., demonstrating speeding in certain

circumstances and creating a road safety risk whilst tired or intoxicated when providing lifts home). As recognised by previous research, road safety supportive parents/guardians can have a positive effect on their children's safety (Simons-Morton, 2007), but equally not all young people have access to positive parent-child relationships and engaged parents/guardians, which should be considered within intervention design (Guttman & Gesser-Edelsburg, 2011).

The workshop responses also provided useful feedback on the emotional tone and content types of relevance for a newly designed intervention. Positive emotional appeals, which seek to inspire and engender feeling of confidence were rated highly amongst participants, as has been found in previous research (Lewis et al., 2007b). Appeals which promote fear were also rated as important which resonates with previous research (See Appendix A.4.13) which finds fear appeal approaches to be rated highly, regardless of their objective impacts. Overall, these workshop findings demonstrate an interest in a varied experience incorporating both positive and negative emotions. The identification of preferred content types by a small proportion of the group ($n = 6$) highlights the value of demonstrations and information provision delivered in a humorous style, either on-location or through engaging studio sets. Whilst it would be unwise for interventions to compete with popular entertainment formats, these results provide useful insight into the intervention design components which may maximise engagement with the target audience.

There are several limitations of note with this study. Firstly, the sample of young people included in this analysis was small ($n = 26$), taken from one school in Kent, UK. Consequently, the results of this analysis are limited in their applicability to the broader pre-driver population, but they highlight some of the issues of concern amongst this group. A more extensive process of qualitative research, involving several schools was planned, but in-person access to schools/college was severely limited in July 2021, due to Covid restrictions for external visitors. The results of this exercise may also have highlighted different issues if conducted at a time when participants were not being affected by significant delays in the learning to drive process because of Covid. The study was also limited in its ability

to cover all subject areas in-depth in the time available for the qualitative research and consequently it is recommended that future belief elicitation exercises concentrate on a maximum of four risk behaviours, as was the case in Rowe et al. (2016). Overall, this study adds to existing research by providing further insight into pre-drivers' perceptions of safety promoting messages. It has also elicited the behavioural, normative and control beliefs related to the learning to drive process and post-licensure risks, which has informed the intervention design reported in Paper 6.

7 PAPER SIX - INTERVENTION DESIGN AND PILOT

7.1 Abstract

Road safety interventions are frequently designed on the basis of intuition and personal knowledge rather than research evidence and behavioural theory (Kinnear et al., 2013b). Further, the process of intervention design is rarely documented within published research. This study has aimed to create and pilot a pre-driver intervention (hereafter called DriveFit) to improve attitudes and intentions towards safe road use amongst 16–18 year olds, using the Theory of Planned Behaviour (TPB) (Ajzen, 1991) as the underlying theoretical framework.

The intervention was designed iteratively, first through establishing important intervention components from a deliverer perspective by reviewing existing delivery approaches ($n = 6$) and deliverer perceptions of effective intervention components ($n = 33$). A workshop ($n = 26$) and two focus groups ($n = 16$) were conducted with young people and the intervention was piloted with two schools ($n = 75$). Feedback was then collected from the project's Strategic Partnership Board. Piloting the DriveFit film and online workshop has identified several improvements (e.g., reducing the length of and increasing the interactive elements in the film) which were made ahead of trialling the intervention in full (See Paper 7). The findings of this study are discussed with reference to the evidence-based iterative approach adopted.

7.2 Introduction

The way in which pre-driver road safety interventions are designed is rarely clearly described. One of the reasons for a lack of design information about pre-driver interventions is that they are often based on deliverers intuition and personal experiences (Launchbury et al., 2007). Even where intervention effectiveness has been evaluated, descriptions of interventions, rather than the process of their development is provided (e.g., Cutello et al., 2020b; Dale et al., 2017; Poulter & McKenna, 2010).

The SPIRIT guidance checklist for clinical trials (Chan et al., 2013) states that there should be the inclusion of information on “*Interventions for each group with sufficient detail to allow replication, including how they will be administered.*” It is also recognised that a “*failure to review the cumulated evidence [can lead] to unnecessary duplication of research or to trial participants being deprived of effective or exposed to harmful interventions.*” Similar recommendations are made within the CONSORT 2010 guidelines for reporting parallel group randomised trials (Moher et al., 2010), which recommends that sufficient description is provided on how and why interventions were administered. Whilst these guidelines apply specifically to medical and public health trials, the benefits of such approaches would also support the consistent delivery and evaluation of road safety interventions.

Multi-stage intervention design processes have been outlined in a small number of previous studies (i.e., McDonald et al., 2018; Scott-Parker et al., 2019), which demonstrate the value of applying this approach for the design of road safety interventions. A study by Scott-Parker et al. (2019), which reports on a multi-agency collaboration to identify high-risk young drivers for targeted intervention, clearly demonstrates the intervention outcome benefits afforded by engaging with stakeholders who have a pivotal role in improving young driver road safety. Several studies have also recognised the value afforded by intervention pilot testing to highlight theoretical or content issues (McDonald et al., 2018) allowing for the modification of programmes ahead of full roll-out (e.g., Hartos et al., 2001).

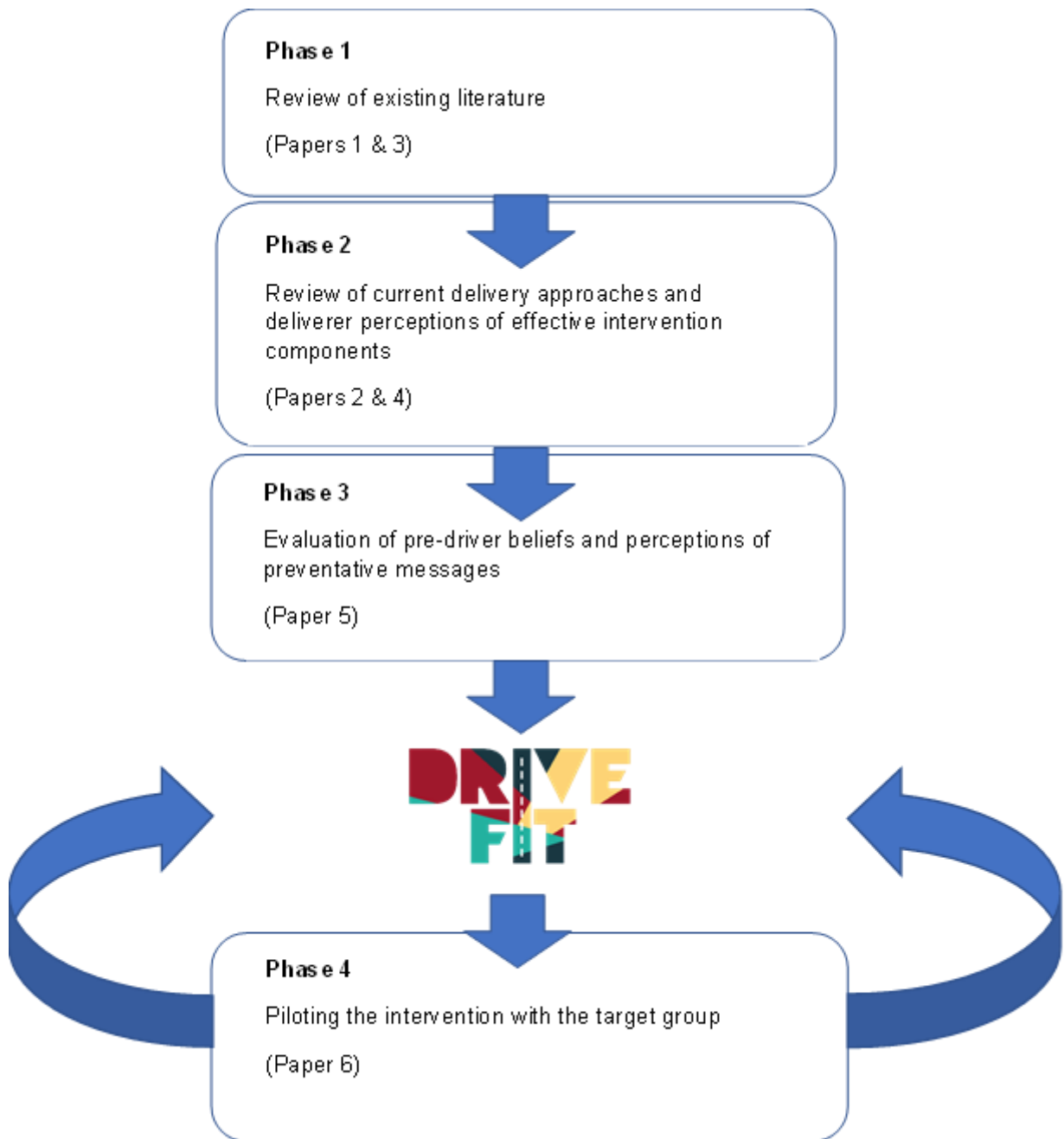
Existing literature (See Paper 1) has found that it is common for pre-driver interventions to focus on emphasising consequences and providing information, yet only small, short-term beneficial effects can be seen on antecedents of behaviour. Positive emotional appeals and using active learning to support the development of personal resilience skills have emerged as promising approaches to apply within pre-driver intervention design.

A review of young driver risk taking behaviours and preventative actions (See Paper 3) has identified five main areas of content for the DriveFit intervention: 1) Maximising the learning to drive process; 2) Making decisions that support safety; 3) Maintaining focus; 4) Ensuring fitness to drive; and 5) Staying in control of the journey. The review of deliverer perspectives (See Papers 2 and 4), alongside the research evidence, has identified design elements to include in the DriveFit intervention (e.g., robust study design, high-quality production and the use of a broad range of high potential BCTs) and avoid (e.g., negative emotional appeal, passive impersonal learning, heavy focus on consequences etc.). Eliciting pre-driver beliefs and perceptions of preventative messages (See Paper 5) has highlighted the value of intervention content addressing knowledge gaps (e.g., mobile phone, speeding and fatigue enforcement) and seeking to influencing unrealistic expectations (i.e., around learning to drive) and unsafe road safety attitudes (i.e., speeding and mobile phone use). This study outlines the iterative process that has been taken to create a pre-driver intervention (DriveFit) to improve attitudes and intentions towards safe road use amongst 16–18 year olds and provides a clear and transparent description of the intervention to inform future research.

7.3 Method

This paper describes the four stages of iterative intervention development applied to the DriveFit programme, by using previous findings from earlier papers in this thesis and one new study (See Figure 7-1). The sections that follow outline the DriveFit intervention and the pilot study methodology.

Figure 7-1 DriveFit development model



7.3.1 DriveFit intervention

The intervention was titled DriveFit to signify that the intervention was focused on supporting young and novice drivers to build their driving abilities and fitness. The name was agreed following feedback from the target audience on some early intervention name suggestions (See Paper 5, Section 6.4.5).

The DriveFit intervention consisted of a 40-minute film delivered in the classroom followed by a 45-minute online facilitated workshop within 2-weeks. The two-part approach adopted aimed to extend the duration of the intervention, given concerns raised by previous research about the importance of intervention dosage (Glendon et al., 2014; Kinnear et al., 2017; Markl, 2016; Poulter & McKenna, 2010).

The film was designed with reference to the evidence base, views of current deliverers and the target audience (See Appendices F.1 and F.2). The Theory of Planned Behaviour (TPB) (Ajzen, 1991) was used to theoretically underpin the intervention (See Section 1.1.4.1, Chapter 1) with Behaviour Change Techniques (BCTs) (Michie et al., 2013) and implementation intentions (Gollwitzer, 1999) also incorporated into the intervention design to maximise effectiveness (See Section 1.1.4, Chapter 1).

The logic model for the intervention (See Table 7-1) illustrates that, in the short-term, the intervention aims to change attitudes, subjective norms and perceived behavioural control for safer passenger and driver intentions. Whilst the health outcome in the logic model will not be specifically measured as part of this research, the logic model is based on previous research, with the meta-analysis by Armitage and Conner (2001) finding a intention–behaviour correlation of $r = .47$. The behavioural intentions that are addressed and measured within this trial are those that are related to death and injury amongst young and novice drivers.

Table 7-1 DriveFit logic model

<i>Inputs</i>	<i>Immediate impacts</i>	<i>Short-term impacts</i>	<i>Behavioural impacts</i>	<i>Health Outcomes</i>
Providing a film and workshop to 16-18 year old students will...	Result in the delivery of the DriveFit programme in intervention schools and colleges which will...	Result in changes to student attitudes and subjective norms towards what it takes to be a good driver and the development of students' self-efficacy and skills for being safe passengers and drivers, which...	will result in safer passenger and driver intentions and behaviours and ultimately,	Reduced deaths and serious injuries amongst this at risk group.

The film used a talk show style interview format where expert guests provided information, demonstrations and tips about how pre, learner and newly qualified drivers can best manage the learning to drive process as well as the risky driving behaviours associated with speeding, tiredness, mobile phone use and intoxicated driving (drink and drug driving) (See Appendices F.3 – F.10)¹⁶. For example, the film addressed, amongst others, various speeding beliefs: driving at the speed limit makes it easier to detect hazards and uses less fuel (Elliott & Armitage, 2009) (Behavioural beliefs); speeding is disapproved of by the police and attracts citations (Rowe et al., 2016) (Normative beliefs); and the importance of and process for selecting a safe speed (Fylan, personal communication about NDORS Speed awareness course content, February 24th, 2021) (Control beliefs). Table 7-2 below provides a brief description of the topics addressed within the DriveFit film.

Table 7-2 Topics addressed in the DriveFit film

Segment	Overall purpose	Key Message	Delivery mechanism	Appendix reference info
Maximising the learning to drive process				
Getting sufficient driving experience	To promote extensive practice whilst learning to drive	Learning to drive for 12 months and securing over 100 hours of supervised practice in varied circumstances, with a mixture of professional and private practice will make attendees better and safer drivers.	Interview with Bill Pope from the DVSA ¹⁷	F.3
Gaining necessary cognitive skills	To challenge the belief that you need only do hazard perception training to pass your theory test	Improving your hazard perception skills will make you a better and safer driver	Interview with Professor David Crundall from Nottingham Trent University ¹⁸	F.4

¹⁶ DriveFit film clip <https://www.youtube.com/watch?v=TdsqjFwOHjs>; Full DriveFit film <https://www.youtube.com/watch?v=xBSUjkn0LU&t=2s>

¹⁷ <https://www.youtube.com/watch?v=Jph1KW2q0u8>

¹⁸ <https://www.youtube.com/watch?v=N59b55LQAq0&t=3s>

Segment	Overall purpose	Key Message	Delivery mechanism	Appendix reference info
Making decisions that support safety				
Making safety supportive vehicle and insurance choices	To inform the audience of how to make vehicle and insurance choices which support safety	Vehicle and insurance choices made by new drivers and their parents can support their safety and comfort in the first 6 months of driving and beyond	Interview with Dr Neale Kinnear from TRL ¹⁹	F.5
Maintaining focus: Reducing distractions in-car distractions				
Mobile phone use	To promote unplugging from technology and focusing on the driving task	Mobile phone use whilst driving is avoidable and controllable	Interview with Dr Neale Kinnear from TRL ¹⁹	F.6
Passengers	To promote reducing the number of peer passengers carried in the first six months of solo driving	Peer passenger distractions can be controlled by both drivers and passengers	Interview with Dr Neale Kinnear from TRL ¹⁹	F.7
Fitness to drive				
Managing fatigue	To challenge the belief that driver sleepiness is unavoidable	Driver sleepiness is controllable and avoidable	Interview with Professor Ashleigh Filtness from Loughborough University ²⁰	F.8
Avoiding drink and drug impaired driving	To inform the audience that being a passenger in an intoxicated driver's car or being intoxicated whilst driving is something under their control	Drink and drug driving is avoidable and controllable	Interview with Olly Taylor MPS from Devon and Cornwall Police ²¹	F.9
Controlling the journey				
Managing Speed	To promote skilful drivers as being able to control their car within the speed limit	Selecting an appropriate speed and staying in control of speed is important and can be achieved with practice and planning	Interview with Olly Taylor MPS from Devon and Cornwall Police ⁵	F.10

The film employed a total of 16 Behaviour Change Techniques (BCTs) (See Appendix F.11) from the 93-item hierarchically clustered techniques Behaviour Change Technique taxonomy (Michie et al., 2013), 11 of which had been

¹⁹ <https://www.youtube.com/watch?v=rKvRZd0P2HI>

²⁰ <https://www.youtube.com/watch?v=rGRMmTVky4c&t=1s>

²¹ <https://www.youtube.com/watch?v=0BTftBTUVuY&t=2s>

identified by previous research as high potential BCTs for this target audience (Fylan, 2017; Sullman, 2017). Examples of how these BCTs were applied are provided in Table 7-3.

Table 7-3 Examples of BCTs applied in the DriveFit intervention

BCT		Example of application
1.1	Goal Setting (behaviour)*	Participants encouraged to set a goal to practice driving for 2-hours a week, over 12-months.
1.2	Problem solving*	Prompt participants to identify barriers to securing sufficient driving practice whilst learning to drive (e.g., lack of time) and discuss ways in which they could overcome them (e.g., planning to drive car at the weekend when travelling to a destination anyway with a supervising driver).
1.4	Action planning*	Encourage a plan to stop for a 20-minute rest if have been driving for more than 2-hours.
1.9	Commitment	Participants asked to pledge not to drive whilst tired, in the same way they would make a decision not to drink and drive.
2.3	Self-monitoring of behaviour*	Participants asked to record how much driving practice that they are getting.
3.1	Social support (unspecified)*	Participants asked to provide support and company to drivers, by 'doing it together' if they have all had poor sleep (i.e., at a festival).
3.2	Social support (practical)*	Participants asked to arrange a designated driver when going for a night out to avoid driving whilst intoxicated with drink or drugs.
4.1	Instruction on how to perform the behaviour*	Advice provided to participants on how to set Drive Safe Mode on a mobile phone.
4.2	Information about antecedents*	Participants provided information about the antecedents to fatigue (i.e., yawning, heavy eyelids etc.).
5.1	Information about health consequences*	Participants presented with information about the likelihood of being involved in a collision dependent on the number of peer passengers.
5.3	Information about social and environmental consequences	Participants informed that taking up telematics insurance can help to lower car insurance costs.
5.5	Anticipated regret*	Raise awareness of expectations of future regret (i.e., going to prison, collision and injuries) around speeding.
6.1	Demonstration of the behaviour	Demonstration to participants about how to apply the two-second rule in a vehicle, to reduce speed and provide more time and space to react.
6.3	Information about others' approval	Participants told that there is a social stigma associated with drink driving.
7.1	Prompts/cues*	Participants recommended to share the driving with an accompany driver to increase their experience when doing local trips or visiting family.
9.1	Credible sources	Interview on speed provided by a high status professional (i.e., police).

Nb. * = High potential BCTs as outlined in Paper 2

The online workshop that followed the film used the ORID (Objective; Reflective; Interpretive and Decisional) framework (ICA-UK, 2014) (See Appendix F.12) to encourage participants to remember the film and extract relevant learning for their own personal situations. The workshops were delivered by one of two commissioned professional facilitators (one accredited with the International Association of Facilitators, with over 40 years' experience and the other working at this standard with over 4 years' experience). The facilitators delivered the 45-minute workshop using MS Teams, to a pre-defined protocol (See Appendix F.13), with a random sample of workshops observed by the researcher to check fidelity. The facilitators were experts in facilitation, rather than road safety and were supported by the study researcher before and after workshop sessions to address any subject matter issues raised. The 45-minute workshop was designed to be delivered in four parts: an introduction and warm-up; remembering and reviewing the DriveFit film; personal action planning; and concluding with a summary of the discussion and participants completing the post-intervention survey (See Appendices G.3 – G.5).

For the introduction, participants were given information on the format for the session. To increase engagement during the workshop, participants were introduced to the Mentimeter voting tool and then asked to submit their answers to a warm-up poll about their learning to drive stage. This was followed by a review of what participants remembered about the DriveFit film using an all class Mentimeter poll, a paired student discussion with post-discussion feedback reported to the facilitator and peers, followed by a class discussion and a facilitator led review of the key film themes. Participants reviewed how easy or difficult they expected to find adopting the actions promoted by the DriveFit film (e.g., managing my driving speed) and identified scenarios they were most likely to find themselves in. The situations that they scored as easy or difficult to deal with were then discussed amongst their peers. The participants reflected on these situations and considered what actions they could take, what barriers they might face and what 'if-then' implementation intention plans they could apply to these

situations, supported with worked examples (Box, 2021a)²². The participants were then invited to commit to their if-then plans/implementation intentions by completing a DriveFit postcard for them to retain. A website²³ and a notebook containing the film graphic illustrations (See Appendix F.14) were also provided to support the programme through offering additional information to students, parents and guardians.

7.3.2 DriveFit pilot

Once the DriveFit intervention had been developed, a sample of young pre- and new drivers from two schools in Kent (UK) took part in the DriveFit programme and provided feedback, which was used to refine the intervention. To measure the response to DriveFit film students, an online survey using Qualtrics was administered ($n = 75$; Age = 16.76, $SD = 0.63$; Male = 13%; See Table F.19.1-1, Appendix F.19.1). Participants were asked whether they liked/disliked the film and whether it kept their attention. Participants were also asked about their emotional and cognitive response to the film, whether they felt it was beneficial and their expected use of the intervention website. Open text response questions were also included which enabled participants to provide more detailed feedback (See Appendix F.15).

Students were also asked in a separate survey about their views of the DriveFit workshop (See Appendix F.16). Two separate surveys were administered to enable the DriveFit film to be trialled separately from the workshop if the participating schools/colleges were not able to support the delivery of the DriveFit workshop as well as the DriveFit film. At the beginning of piloting, delivery partners engaging with the schools encountered difficulties with securing school engagement for piloting due to school timetable pressures. Whilst both schools were able to pilot the film, only one was able to run the DriveFit workshop ($n = 50$). The survey, administered online via Qualtrics, asked similar questions to those posed about the DriveFit film (See Appendix F.16).

²² <https://roadsafetygb.org.uk/wp-content/uploads/2023/05/DriveFit-guide-for-developing-Safe-Drive-Plans.pdf>

²³ www.drivefit.info (no longer active)

Teachers who supported the piloting of the DriveFit intervention were also surveyed following the pilot to seek their views on ease of delivery, class response to DriveFit and any suggested improvements. Again, separate film and workshop surveys was administered (See Appendices F.17 and F.18), with only one teacher filling these surveys out. The teacher reported their class ($n = 22$) were A level students who had not received any other road safety education in the past six months and suggested that the DriveFit intervention fitted within the personal, social and health elements of the curriculum. All survey responses were analysed using SPSS version 28 and NVIVO 1.6.1 (for open text response coding).

Feedback on the DriveFit film was also gathered informally (i.e., via email and discussions) from members of the project's Strategic Project Board ($n = 6$) and representatives from trial delivery bodies ($n = 6$), which was reviewed and considered in the final revisions of the DriveFit intervention before delivering the cluster randomised controlled trial (cRCT) (See Paper 7).

7.4 Results and discussion

The DriveFit intervention was piloted ahead of delivery as part of the randomised controlled trial evaluation (See Paper 7), to make any relevant adjustments to the DriveFit film and workshop based on student, teacher and other partner feedback, which is outlined in the sections below.

7.4.1 Student feedback

To measure engagement with the film, participants ($n = 75$) were asked whether the film kept their attention (Scale: 1:5, Strongly agree – Strongly disagree). On average students neither agreed nor disagreed with this statement ($M = 3.30$, $SE = 0.13$, $n = 71$). Aspects of the film that the students said helped to keep their attention included the provision of tips and the topics discussed, the film containing both “good” and “important” information as well as the inclusion of the hazard perception demonstration video (See Table F.19.1-2, Appendix F.19.1). Respondents also reported finding the use of interviews, role play and graphic illustrations helped maintain attention. Those who said that the film did not keep

their attention (See Table F.19.1-2, Appendix F.19.1) said this was the case because it was boring and not very interesting, exciting, or engaging. The film was also described as too long, repetitive and conversation heavy, lacking a diversity of speakers and new information. Students reported liking and disliking the DriveFit film for similar reasons (See Table F.19.1-3, Appendix F.19.1). When asked about their cognitive and emotional response to the film, the students agreed that the film was credible, useful, important and informative as well as boring (See Table F.19.1-4, Appendix F.19.1). Overall students agreed that they benefited from the film, that it made them more aware of their responsibilities as passengers and drivers/future drivers and that they planned to take the learning provided from the film and apply it to how they behave as a driver/future driver (See Table F.19.1-5, Appendix F.19.1).

When asked about the content that they thought should be included on the DriveFit website, hints and tips for travelling safely, followed by DriveFit video clips, were the most recommended content, with prompts and planners to support goal setting the least rated of all the suggestions (See Table F.19.1-6, Appendix F.19.1). Students were also asked about their planned use of the website (Scale 1:5, 1 = Strongly agree, 5 = Strongly disagree). On average, the students agreed that they would visit the website at least once ($M = 2.91$, $SE = 0.13$) and share the website with their parents/guardians ($M = 2.97$, $SE = 0.13$). There was neither agreement nor disagreement about sharing the website with friends or via social media, or with the expectation to visit more than once (See Table F.19.1-7, Appendix F.19.1), suggesting that a website accompanying DriveFit was unlikely to receive much use.

On average, the students agreed (Scale 1:5, 1 = Strongly agree, 5 = Strongly disagree) that the workshop kept their attention ($M = 2.44$, $SE = 0.12$, $n = 50$). The main reasons given for this was that the use of interactive tasks (i.e., polling, discussions and if-then activities) as well as the useful presentation of information (See Table F.19.2-1, Appendix F.19.2). Only a small number of participants ($n = 4$) gave reasons for why the workshop did not keep their attention. The main reason given was that the workshop was boring (See Table F.19.2-1, Appendix

F.19.2). When the students were asked what they liked about the workshop, the activities and the provision of new information and advice as well as the interactive and informative nature of the workshop were appreciated (See Table F.19.2-2, Appendix F.19.2). The reasons provided for disliking the workshop included it being too long and boring (See Table F.19.2-2 Appendix F.19.2). When asked about their cognitive and emotional response to the workshop, the students agreed that the workshop was important, credible, informative, useful, interesting, enjoyable and amusing and (See Table F.19.2-3, Appendix F.19.2). The participants also agreed that there would be a beneficial effect of the workshop (e.g., on decisions and behaviours as a driver or passenger), that it provided new insights, covered ideas that they saw themselves doing and was considered beneficial to them personally (See Figure F.19.2-4, Appendix F.19.2). When asked about whether any information should be included from the DriveFit workshops on the DriveFit website, most responses indicated that no information from the workshop was needed (See Table 19.2-5, Appendix F.19.2). Overall, the students rated (Scale 1:10, 1 = Poor, 10 = Excellent) the DriveFit programme (film and workshop) as above average ($M = 6.79$, $SE = 0.31$, $n = 47$), with the workshop rated higher than the film (See Figure F.19.2-6, Appendix F.19.2).

7.4.2 Teacher feedback

The film and workshop were described in the teacher feedback as easy to set up and the information provided ahead of time was rated as clear and easy to understand. Students were also reported as being able to fill out their post-intervention surveys without difficulty. When asked whether any changes could be made to the set-up process, the teacher responded that no changes were needed "*as it was great already*". The teacher stated that the film and workshop were credible, useful, important and boring (See Table F.19.3-1, Appendix F.19.3). Whilst the hints and tips provided in the film and workshop were described as pitched at the right level, the film was described as securing low levels of attention in the class (2 out of 10). The teacher provided extensive feedback about how the film could be improved to increase attention and engagement:

“There were too many introductions at the beginning - these could be made as and when the guest was invited to the sofa?”

The comedy value was uncomfortable (clipping the badger etc.), although it brought ease it also made students snigger and some asked whether it was for year 12.

Too much talking - older versions of things like this kept some attention as there were physical changes in the interactions. This was all in one location.

Length was an issue - we stopped at 29 minutes for a short break.

Some of the items they discussed (hazard perception) some students had not thought about theory tests etc. so were unsure what it was about. Maybe discuss this before, access a hazard perception training programme before hand?”

Suggestions were also made about how the film could increase accessibility and inclusivity, particularly for SEN students:

“Differentiate for those who have lower attention spans with break off activities? Scenarios that they may find themselves in and what they would do etc. Play the film for what may happen.”

The teacher expressed concerns about the film, rating it as poor, stating, *“the video needs re-evaluating for whether it is fit for students aged 16-18 years, time management in connection with time and engagement”*, although they did agree that they would share the film with colleagues. In response to a request for further comments about the DriveFit film the teacher raised the issue that staying safe was made to look expensive by the film:

“Some of it was money orientated - the app - although value for money was a concern for some students, some commented on whether it could be made free for up to 21 year olds as it would be most impactful, after 21 they can be charged. They would have jobs by then also so again money would not necessarily be a problem. Is being safe based on economics, excluding individuals from lower pay

ranges? One guest spoke of benefits of driving a newer car (5 years +) some laughed as this is not accessible to them, does this mean they are less safe/will be less safe/scare mongering?"

In contrast, the teacher reported that the workshop secured above average levels of attention amongst the class (7 out of 10). When asked how the workshop could be improved to assist with maintaining student attention the teacher said, *"Some of the time given for discussion was a bit too long but hard to determine over a team's call - conversations went off topic"*. The DriveFit workshop also received more overall support than the film (rated 6 out of 10). When asked how the workshop could be improved the teacher suggested, *"More engaging activities in the workshop...some extension of activities, [as currently it is] mostly recapping nothing new to consider. Maybe introduce some scenarios or stories from people who have had negative experiences."* Overall, whilst the teacher agreed that they would support the dissemination of the DriveFit programme to parents, they disagreed that the programme would support safer behaviours amongst their students. They did however agree that the film would make their students more aware of their responsibilities as drivers/future drivers, but not as passengers.

7.4.3 Partner feedback

Feedback from partners was supportive of the film, but some key improvement points were identified. Firstly, the length of the film was described as potentially having an impact on student engagement and their ability to retain information contained in the session. The length of the session was also described as problematic as the schools and colleges were heavily focused on academic catch-up for students following disruptions to learning resulting from Covid. It was suggested that the information and materials could be divided into key topics which were shorter, which would link more effectively with the Ofsted Personal Development Framework²⁴ which would support school/college uptake of the intervention.

²⁴ <https://www.gov.uk/government/publications/education-inspection-framework/education-inspection-framework>

The complexity of the terminology used in the film and its potential impact on understanding and engagement was also raised. It was queried whether the session was accessible to all and whether it had factored in different abilities and Special/Additional Educational Needs (SEN) requirements. It was also suggested that because of different learning styles that more should be made of the graphic illustrator in the film and that shorter sessions would support different abilities. More modelling in the film, over and above that provided by the VR demonstration was also suggested, with the use of images, diagrams, key words presented on screen to underline key points raised to prompt understanding and eliminate misconceptions. The number of topics and learning points raised in the film was also flagged as a limitation, without the use of shorter videos, recaps, student reflection and guided discussion breaks. In addition, a lack of interaction amongst students whilst watching the film was described as a weakness which could potentially effect participant engagement and understanding. Some film elements (e.g., canned laughter and use of jokes) were also identified as not meeting the expectations of the target audience and it was suggested that consideration to be given to including participants more who were not drivers, to ensure that those that those who could not afford to drive or had chosen not to do so would not be left behind. A specific problem with the film content which recommended charging mobile phones away from bedrooms at night was also highlighted as providing advice contrary to that provided by fire and rescue services nationally about responsible charging.

7.4.4 Changes made to the DriveFit intervention ahead of trial delivery

Piloting the DriveFit intervention identified several improvements to be made before the intervention was trialled in full. The film was amended to take account of the concerns expressed by the students, teachers and delivery partners about the length of the film by cutting speaker introductions at the start of the film. Unfortunately, it was not possible to completely change the mode of delivery for the intervention (i.e., shorter bite size videos interspersed with teacher-led interactive sessions) as this was not the mode of delivery that the trial schools/colleges had signed up to deliver.

To address concerns raised about the lack of interactivity afforded by the film a holding frame stating '*Time for a short discussion, please pause here*' was inserted at the mid-way point of the film and the lesson plan provided teachers with suggestions for discussion topics and how to encourage active engagement of students throughout watching the film (Appendix G.6). From the outset, the intention was to have more examples and demonstrations included in the DriveFit film to support student engagement, but time limitations meant that some of these more engaging demonstrations originally scoped (e.g., demonstration of effects of multi-tasking on attention and experiments related to reaction times and fatigue) could not be included. Covering fewer topics in one intervention would have allowed for more engaging learning approaches to be included in the intervention to maximise the learners' experience. To further support student engagement with the film, hard-copy notebooks which included the graphic illustrations from the film were provided to support student notetaking. To address the accessibility concerns raised, a sub-titled version of the film was provided to participating schools/colleges. Two further edits were made to the film to address points arising during piloting. Firstly, the laughter track was deleted and a discussion section on charging mobile phones overnight was deleted as this was identified to be contrary to responsible safe charging guidelines issued by fire and rescue services.

The workshop received more support than the film, with the only suggested changes from the teacher surveyed being to reduce discussions, going off topic and to include more extension activities as well as scenarios and stories from people who had negative experiences. It was also suggested that efforts should be taken to ensure that the intervention was relevant to all participants (i.e., drivers and non-drivers) and that more information should be provided on certain topics that were not well known to participants (i.e., hazard perception). To address these issues, the workshop protocol was further tightened (i.e., more polling questions added) and a polling question about driving stage was added at the beginning of the workshop, to ensure the facilitator was aware of participants driving stage and could adjust the workshop questioning accordingly. Whilst no specific extension activities were included, a volitional help sheet was provided

to support the if-then planning exercise. The study researcher and employed facilitators prepared a question and answer sheet to respond to likely queries, to allow the facilitators — who were not road safety experts — to respond authoritatively, in a factually correct manner to the questions raised. The suggestion from the teacher to include personal scenarios illustrating negative experiences was not adopted as the intervention was designed purposefully to be positively framed, although there may be some value in future interventions including everyday scenarios to inform discussions. The piloting phase did not highlight any necessary website changes, but it did show that the website was unlikely to be a well-used resource. Despite this, the decision was taken to keep the website as a mechanism to support the delivery of the intervention to schools/colleges.

7.5 Conclusions

DriveFit has taken an evidence-based and theoretically grounded approach to the development of a pre-driver education intervention based on several studies reported in this thesis. Previous studies have demonstrated that designing interventions using the TPB are beneficial and accordingly, DriveFit adopted this theoretical underpinning as well as the appropriate use of Behaviour Change Techniques and implementation intention setting exercises. Piloting the intervention enabled the film and workshops to be adjusted to reflect this feedback before conducting a randomised controlled trial (reported in Paper 7). Engagement with the target audience has also ensured that the intervention has been designed in relation to the beliefs and perspectives of pre-drivers, which is not typically seen in the development of interventions (e.g., Cutello et al., 2020b). The small sample size is a limitation of the study and workshops with different geographic regions would have provided more comprehensive feedback. The iterative approach to intervention design reported in this paper is applicable to road safety intervention design and is recommended as a valid approach for the design of future road safety interventions.

8 PAPER SEVEN – A CLUSTER RANDOMISED CONTROLLED TRIAL (CRCT) EVALUATION OF THE DRIVEFIT PRE-DRIVER EDUCATION INTERVENTION USING THE THEORY OF PLANNED BEHAVIOUR

8.1 Abstract

Pre-driver road safety education programmes are popular and commonly delivered with the aim of improving safety amongst this at-risk group but have rarely been found to be effective (Kinnear et al., 2013b). A pre-driver education intervention (DriveFit) was designed and evaluated with a cluster randomised controlled trial (cRCT) using the Theory of Planned Behaviour (TPB) (Ajzen, 1991). The responses of 16–18 year old students ($n = 437$) from 22 schools in Devon, UK were analysed and showed that the DriveFit intervention led to some small improvements in risk intentions, attitudes and other measures, which differed by sub-group. Significant, but small beneficial effects of the DriveFit programme were found for 9 out of the 16 study measures at T2 (i.e., Intentions - speeding; Attitudes - all, mobile phone use, fatigue and speed; and Other - subjective norms, perceived risk, attitudes to driving violations and driver coping) and 8 out of 16 measures at T3 (Intentions - mobile phone use and all; Attitudes - all, mobile phone use, drink driving and speeding; and Other - perceived risk and attitudes to driving violations). Apart from speed intentions, a trend towards intentions becoming safer at T3 was noted. Mobile phone use and speeding attitudes, a composite measure of attitudes, as well as attitudes towards driving violations and perceptions of risk, improved at T2 and T3, with the size of the effect slightly reduced at T3. Participants expressed safe views at baseline (T1), which overall left minimal room for improvement. Whilst previous research has found that education interventions deliver small self-reported effects that diminish over time (e.g., Poulter & McKenna, 2010), this study finds small, but longer lasting attitude effects (which diminish in magnitude over time) and a trend towards improving intentions, over and above the control group. The findings provide some guidance on future research to design and evaluate educational interventions for pre- and novice drivers.

8.2 Introduction

Approaches to improve young driver safety have typically included some form of education. However, the evidence on the effectiveness of young and novice driver education (Fisher & Dorn, 2016) and pre-driver education programmes in particular, remains both mixed and limited. Waylen and McKenna (2008) found that young people exhibit several risky driving attitudes ahead of the age that they learn to drive. They argue that given by age seventeen attitudes are already well established, there is a need to initiate driver education at a younger age to support the development of safe driving attitudes.

Most young driver safety interventions typically focus on increasing awareness and knowledge of risk-taking behaviours. Whilst some of these interventions have been found to influence Theory of Planned Behaviour (TPB) (Ajzen, 1991) components such as attitudes (Burgess, 2011; Parker, 2002; Poulter & McKenna, 2010), subjective norms (Burgess, 2011) perceived behavioural control (PBC) (Burgess, 2011; Elliott & Armitage, 2009; Poulter & McKenna, 2010) and beliefs (Burgess, 2011; Poulter & McKenna, 2010), as well as knowledge (Bojesen & Rayce, 2020; Mayhew et al., 2014a; Zask et al., 2006), this has not typically translated into lasting behaviour change (Bojesen & Rayce, 2020; Raftery & Wundersitz, 2011) or direct effects on collision risk (Helman et al., 2010). Instead, short-term benefits are common, including improvements in attitudes to risky driving (Cutello et al., 2020a), violations (Feenstra et al., 2014), risk perception and self-efficacy (Lanning et al., 2018). There have also been several studies reporting no overall effect of educational interventions (Dale et al., 2017; Markl, 2016), with the potential for unintended outcomes in some intervention designs (Poulter & McKenna, 2010). One of the main criticisms of educational interventions for young people is that they are rarely underpinned with behavioural theory (Kinnear et al., 2013b) and typically take a one size fits all approach to content provision (Pressley et al., 2016). These shortcomings in intervention design could explain the weak and inconsistent findings reported to date.

Existing research demonstrates a lack of consensus about how pre-driver education can best be designed and delivered to improve young driver safety. Interventions have frequently been delivered in a non-scientific way, often designed by road safety professionals based on prevailing beliefs about what works, with evaluations – where they are run – being poorly conducted and not controlling for the quality of the programmes assessed. The failure to systematically evaluate interventions means that previous research has not been built on to develop a robust evidence base for the effectiveness of pre-driver and novice driver educational interventions (Lonero & Mayhew, 2010). This study empirically evaluates the effectiveness of a newly designed positively framed education programme called DriveFit (See Section 7.3.1, Paper 6).

Four hypotheses were tested:

1. Compared with baseline (T1), DriveFit improves self-reported intentions towards road safety amongst 16–18 year old pre-drivers and newly qualified drivers immediately after delivery (T2) compared to a no treatment wait list control group;
2. Compared with T1, DriveFit improves self-reported intentions towards road safety amongst 16–18 year old pre-drivers and newly qualified drivers 8–10 weeks after delivery (T3) compared to a no treatment wait list control group;
3. Compared with T1, DriveFit improves self-reported socio-cognitive measures (attitudes, subjective norms and perceived behavioural control), perception of risk, attitudes to driving violations, driver coping and efficacy amongst 16–18 year old pre-drivers and newly qualified drivers at T2 when compared to a no treatment wait list control group; and
4. Compared with T1, DriveFit improves self-reported positive socio-cognitive measures (attitudes, subjective norms and perceived behavioural control), perception of risk, attitudes to driving violations, driver coping and efficacy amongst 16–18 year old pre-drivers and newly qualified drivers at T3 when compared to a no-treatment wait list control group.

8.3 Method

8.3.1 Design of DriveFit

The DriveFit intervention was developed following an evidence-based iterative approach, which incorporated existing research and qualitative research with existing intervention deliverers and the target audience (See Section 7.3.1, Paper 6). The DriveFit intervention, which was designed with reference to the Theory of Planned Behaviour (Ajzen, 1991) aimed to change participant attitudes, subjective norms and perceived behavioural control to result in safer passenger and driver intentions. DriveFit consisted of a 40-minute film delivered in the classroom followed by a 45-minute online facilitated workshop within 2-weeks and was piloted with the target audience ahead of trial delivery (See Section 7.4.1, Paper 6). Behaviour Change Techniques (BCTs) were incorporated within the intervention, which have been mapped and are available to view alongside an overview of key intervention components and delivery structure in Section 7.3.1 (Paper 6). Briefly, the film used a talk show style interview format where expert guests provided information, demonstrations and tips about how pre-, learner and newly qualified drivers could best manage the learning to drive process as well as the risky driving behaviours associated with speeding, tiredness, mobile phone use and intoxicated driving (i.e., drink and drug driving). The film was followed, within two weeks by an online workshop delivered by one of two facilitators using the ORID (Objective; Reflective; Interpretive and Decisional) framework (ICA-UK, 2014). At the end of the workshops, participants committed 'if-then' implementation intentions (Gollwitzer, 1999) to postcards for them to retain. A website was also available to support the programme and provide additional information to students, parents and guardians.

8.3.2 Design and procedure

To evaluate the DriveFit programme, a school/college-based cluster randomised controlled trial (cRCT) was conducted within government-funded, non-fee paying (state), all-ability, co-educational schools/colleges in Devon, UK. cRCTs are an ideal research design for evaluating the effectiveness of educational interventions delivered in school and college settings and is a research design commonly

applied within the medical research field. To date only one other study evaluating young and novice driver education (Bojesen & Rayce, 2020) has employed this robust research design. The protocol for the trial was developed, delivered and reported on in accordance with CONSORT 2010 guidelines (Schulz et al., 2010) and Standard Protocol Items: Recommendations for Intervention Trials (SPIRIT) guidance (Chan et al., 2013) and the study was retrospectively registered with the ISRCTN (Box, 2021b). Ethical approval for the study was gained from the Cranfield University Research Ethics Committee (CURES/3733/2018) and all data for the study was collected and managed in line with GDPR requirements.

Fifty-six government-funded, non-fee paying (state), all-ability, co-educational schools/colleges with a mixture of socioeconomic status, representative of county level variability, were invited to take part in the study. Head teachers, sixth form and college leaders from all eligible schools were sent an invitation letter and school information sheet with details of how to take part in the trial in July 2021 (See Appendix G.1) as well as an electronic link to an information video describing the PdTWER project.²⁵ Participating schools and colleges were offered a £200 cash incentive for taking part in the trial.

A follow-up email to each school/college was sent to confirm their involvement or to secure their consent to participate if a response had not yet been received. Up to ninety participants (16–18 years old) in 40 participating schools/colleges were eligible to participate in study measurements. To estimate the required sample size an online calculator (Kohn & Senyak, 2021) (See Appendix G.2), with results based on Donner et al. (1981), was used to establish the number of participants per group required within a standard randomised controlled trial, adjusted for a cRCT using the following parameters: Power = 80%; significance level = 5%; $SD = 1.1$ based on a review of Poulter and McKenna (2010) (Range: 1.28-1.68; $M = 1.46$) and other evaluation surveys run at an earlier part of this research study programme (Range: 0.6-1.45; $M = 1.01$); an intraclass correlation coefficient of 0.05 (Cohen, 1988; Hutchison, 2009; Hutchison & Styles, 2010; Lin et al., 2018);

²⁵<https://www.racfoundation.org/wp-content/uploads/PdTWER-School-and-college-trial-recruitment-Study-4-Devon.mp4>

and an average cluster size of 60 (i.e., two classes within each school). Students received a participant information sheet (See Appendix G.3) and consent form to complete before taking part in the online baseline (T1) and post-intervention surveys (T2 and T3) (See Appendix G.4-G.5). Participants were informed that they could discontinue all or any part of the study (either or both measurements and intervention) at any time, up until two-months post-intervention, with no impact on their education.

Following recruitment, T1 survey measurements were taken in September 2021, after which participating schools/colleges were randomised to control (no treatment wait list control) and intervention (DriveFit) groups through stratified randomisation, based on the percentage of disadvantaged students (below and above participating school/college median calculated from data accessed from gov.uk for the number of disadvantaged students completing study within each school/college²⁶) and type of educational establishment (school or college). Randomisation was stratified by these variables given the evidence of differential road safety outcomes by both education type (e.g., Riaz et al., 2019) and disadvantage (e.g., Christie et al., 2008). Randomisation lists for each stratum were prepared in Excel using random number generation for allocation by an employed trials advisor, who was independent from the study management team and had previous cRCT trial experience. Randomisation took place after T1 measurements were complete to ensure schools and participants were unaware of their group allocation at T1. Following randomisation, it was not possible to blind participants to randomised allocation as the intervention schools were aware that they were receiving an intervention and the researcher was aware of intervention groups whilst conducting the analysis. The control groups ran under wait list control conditions and received no treatment or 'usual care' during survey data collection.

The trial was delivered between November 2021 and January 2022. Following the completion of the trial, the control groups were offered part of the intervention

²⁶ <https://www.find-school-performance-data.service.gov.uk/#SearchSchools>

(film only) to watch within their classrooms. A wait-list control, as opposed to a more robust placebo-controlled / active control / sham intervention was adopted for several reasons. Firstly, there is no standard, evidence-based intervention in place for pre-drivers and therefore the decision was taken to measure the absolute (as opposed to the relative effect) of the DriveFit intervention in comparison to the control condition. Using a wait-list control was also important for securing support from local intervention deliverers and facilitated the recruitment of schools and colleges to the trial. This in turn motivated greater engagement with survey returns than would have been likely if a traditional control group had been used. Whilst active controls are common in medical research, the delivery of double-blind trials for behavioural interventions is much more challenging, due to researchers being aware of the intervention content being delivered. Single-blind trials in contrast, where only the participants are blinded, present ethical issues (i.e., exposure of participants to the risks associated with taking part in a sham intervention and whether the active deception involved in blinding participants is compatible with informed consent). In addition, practically running a sham intervention alongside DriveFit was outside the resources available for this trial. The data collected as part of this research is available to view on Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion²⁷.

8.3.2.1 Dependent Measures

The questionnaire administered to evaluate the intervention consisted of five sections (See Appendix G.4 and G.5). The first included socio-demographic questions about gender, age and ethnicity as well as school/college attendance, form tutor information and first and surname details for survey matching purposes (matched in R, version 4.1.2, with the 'RecordLinkage' package, version 0.4-12.1). The second section included questions about participants' learning to drive stage, hours and months of driving practice achieved/expected before taking their driving test, actual/planned supervising driver type and the number of cars/van

²⁷ See <https://doi.org/10.17862/cranfield.rd.23670651.v1>

available for use within the household. The subsequent sections included the intention, attitude and other survey measures which are outlined below.

In addition to participant data collection at baseline (T1), data was collected immediately after the workshop (T2) and 8–10 weeks after intervention delivery (T3). The surveys took participants approximately 10-minutes to complete. The primary outcome measurement for evaluating DriveFit was follow-up at T2 and T3 adjusted for T1 in self-reported intentions related to mobile phone use whilst driving (INT_MOB), drink driving (INT_ALCO), driving whilst tired (INT_FATIGUE) and speeding (INT_SPEED), as well as a composite all intentions measure (INT_ALL) (See Appendix G.6). These items were adapted from standardised Theory of Planned Behaviour (TPB) measures (Conner & Sparks, 2005; Rowe et al., 2016). Cronbach alpha scores were calculated to ensure that the items were measuring the same construct (See Appendix G.6). For all measures, a Cronbach's alpha of 0.65 or higher was considered satisfactory for data clustering (Field, 2013). All survey items were coded so that lower scores indicated safer intentions. The composite measure for INT_ALL, excluded the INT_ALCO measure, as this measure experienced floor effects and was therefore not considered appropriate to include within the composite measure of intention.

The secondary outcome measurement for evaluating DriveFit was follow-up at T2 and T3 adjusted for T1 in self-reported attitudes related to mobile phone use whilst driving (ATT_MOB), drink driving (ATT_ALCO), driving whilst tired (ATT_FATIGUE) and speeding (ATT_SPEED) as well as a composite all attitudes measure (ATT_ALL) with drink driving responses excluded from the composite attitude measure for the same reasons as outlined for the composite intention score.

Self-reported TPB measures for subjective norms (SNORM) and perceived behavioural control (PBC) items related to speeding were also measured and analysed in the same way, as were responses to four other standardised survey sets: an adapted perception of risk scale (P_RISK) (Glendon et al., 2014; Ivers et al., 2009); the Attitudes to Driving Violations Scale (ADVS) (West & Hall, 1997);

four measures adapted from the task-focused items on the Driver Coping Questionnaire (DCQ) Scale (Matthews et al., 1996); and an adapted efficacy measure (EFF) for pre-drivers (Ford et al., 1998).

Table 8-1 Survey measures*

Measure	Variable code	No. items	Scale	Details
All intentions (Excluding ALCO)	INT_ALL	8	1:7	Unlikely - Likely Not at all willing – Very willing
Mobile phone use intentions	INT_MOB	2	1:7	
Drink driving intentions	INT_ALCO	2	1:7	
Driving whilst fatigued intentions	INT_FATIGUE	2	1:7	
Speeding intentions	INT_SPEED	2	1:7	
All attitudes (Excluding ALCO)	ATT_ALL	16	1:7	Harmful – Beneficial Negative – Positive Foolish - Wise Unpleasant - Pleasant
Mobile phone use attitudes	ATT_MOB	4	1:7	
Drink driving attitudes	ATT_ALCO	4	1:7	
Driving whilst fatigued attitudes	ATT_FATIGUE	4	1:7	
Speeding attitudes	ATT_SPEED	4	1:7	
Perceived behavioural control (speeding)	PBC	2	1:7	Complete control – No control
Subjective norms (Speeding)	SNORM	1	1:7	Think I should not – Think I should Would disapprove – Would approve
Attitudes to driving violations scale	ADVS	7	1:5	Strongly agree - Strongly agree
Perception of risk scale	P_RISK	10	1:4	Rarely safe – always safe
Driver coping questionnaire scale	DCQ	4	1:6	Very much – Not at all
Efficacy	EFF	1	1:5	Strongly agree – Strongly disagree

*Full survey details provided in Appendix G.6

8.3.2.2 Analysis

Generalized Estimating Equation (GEE) is used to model longitudinal or clustered data and is typically applied to model non-normal data. It is *“a marginal model that allows for the effect of explanatory variables on the outcome and correlation between observations to be modelled separately. The treatment group coefficient from the model represents the average difference between the treatment and control groups”* (p.111) (Campbell & Walters, 2014). The responses to the survey measures at T2 and T3 were compared between intervention and control groups using GEE, with adjustments made for T1 values for all measures. GEE estimates the regression coefficients for marginal models (Liang & Zeger, 1986) and a working correlation matrix is specified to model the correlation between

individuals within clusters. An estimate of the intervention effect, 95% CI and p value was calculated. The analysis was run in SPSS version 28.

The GEE model applied used Gamma with log link to account for the positively skewed data, with the following parameters: Condition (Control, Intervention); T1 value of the outcome (included as a covariate in the model to understand the impact of condition on measure, after controlling for measure values reported at T1); Gender (Male, Female); Age (16, 17, 18+); Driving Stage (I have passed my test or am currently learning, Learning in the next 12 months – 5 years, Maybe learning at some point – never learning); Ethnicity (White, Non-white); Education type (College, School); School/college disadvantage level (Below median, Above median); the number of cars in a household (Low: 0-1 cars, Medium: 2-3 cars, High: 4-5+ cars); and time between survey completion (T1_T2: 3-4 weeks; 5-6 weeks; 7-8 weeks; 9-10 weeks; 11-12 weeks; Over 12 weeks and T1_T3 – 11-12 weeks; 13-14 weeks; 15-16 weeks; 17-18 weeks; over 19 weeks). Control variables were selected based on evidence of their impact on road safety outcomes (i.e., Age and gender (Rhodes & Pivik, 2011); driving stage (Roman et al., 2015, (Waylen & McKenna, 2008); ethnicity (Boufous et al., 2010; Christie et al., 2008); education type, (Riaz et al., 2019); disadvantage (Christie et al., 2008); and number of cars in the household as a proxy for socioeconomic status (SES) (Chen et al., 2010)). Time was also included in the model to account for variations in survey response times at T2 and T3.

The GEE models included a subject variable (school ID) which assumes that observations in separate clusters (schools/colleges) are independent and that observations within a cluster (school/college) may be correlated. An exchangeable correlation structure was applied, which assumes all pairs of responses within a subject (school/college) are equally correlated. Participants with a missing value of the outcome at T3 follow-up were excluded from the analysis at T2 and T3. Sub-group analysis by prespecified moderators (gender, education type and school/college level deprivation) was performed. The interaction between randomised group and each moderator was also stratified if the interaction was $p < 0.05$, with the intervention effect (difference between

intervention and control and 95% CI) estimated (i.e., model values, rather than raw means) for each sub-group.

To establish whether there were any significant differences between the control and intervention groups or by survey response, a two-way ANOVA was conducted to examine the effects of condition (Intervention/control) and response (T1 only/T1-T3 responses) at T1 for all survey scale items. A chi-square analysis was also conducted to establish whether there were any significant differences, by condition or response for the categorical socio-demographic variables. Finally, ANOVAs were conducted on the final dataset of responses (connected participant data at T1, T2 and T3), to establish whether there was any difference in response by socio-demographic groups at T1.

8.4 Results

8.4.1 Descriptives

A total of 2,030 participants from 32 schools/colleges returned a questionnaire at T1, following an initial request to participate in the study being sent to a total of 56 schools/colleges. Only 24 of the 32 schools/colleges that had responded at T1 were eligible to progress in the trial (i.e., 8 schools/colleges returned <30 student responses at T1 and were excluded from the trial). Following survey matching across the study period (T1-T3, using surname and school/college attendance), valid data was collected for 437 participants from 22 schools/colleges (Control: $n = 210$, DriveFit: $n = 227$). This represents a significant drop out rate, due to school/college level (i.e., teacher) and student motivation to complete all three surveys so that responses from individuals could be joined across all three measurement periods. The intervention was delivered remotely (i.e., by pre-recorded film and online workshop) and therefore reliant on schools/college teachers to promote student survey completion. The last survey for the intervention group (T3) was completed at the end of the facilitated workshop, prompted by the facilitator. The trial was delivered during a testing time for schools/colleges (e.g., catch-up learning following Covid lockdowns and Covid related absences from the classroom), which was also a contributory factor in response rates and school level drop-out. Survey length may also have been a

contributory factor in response rates. The measurement sessions for the DriveFit cRCT are outlined in Figure 8-1 and the descriptive features of the sample are described in Table 8-2.

Figure 8-1 Measurement sessions for DriveFit cRCT

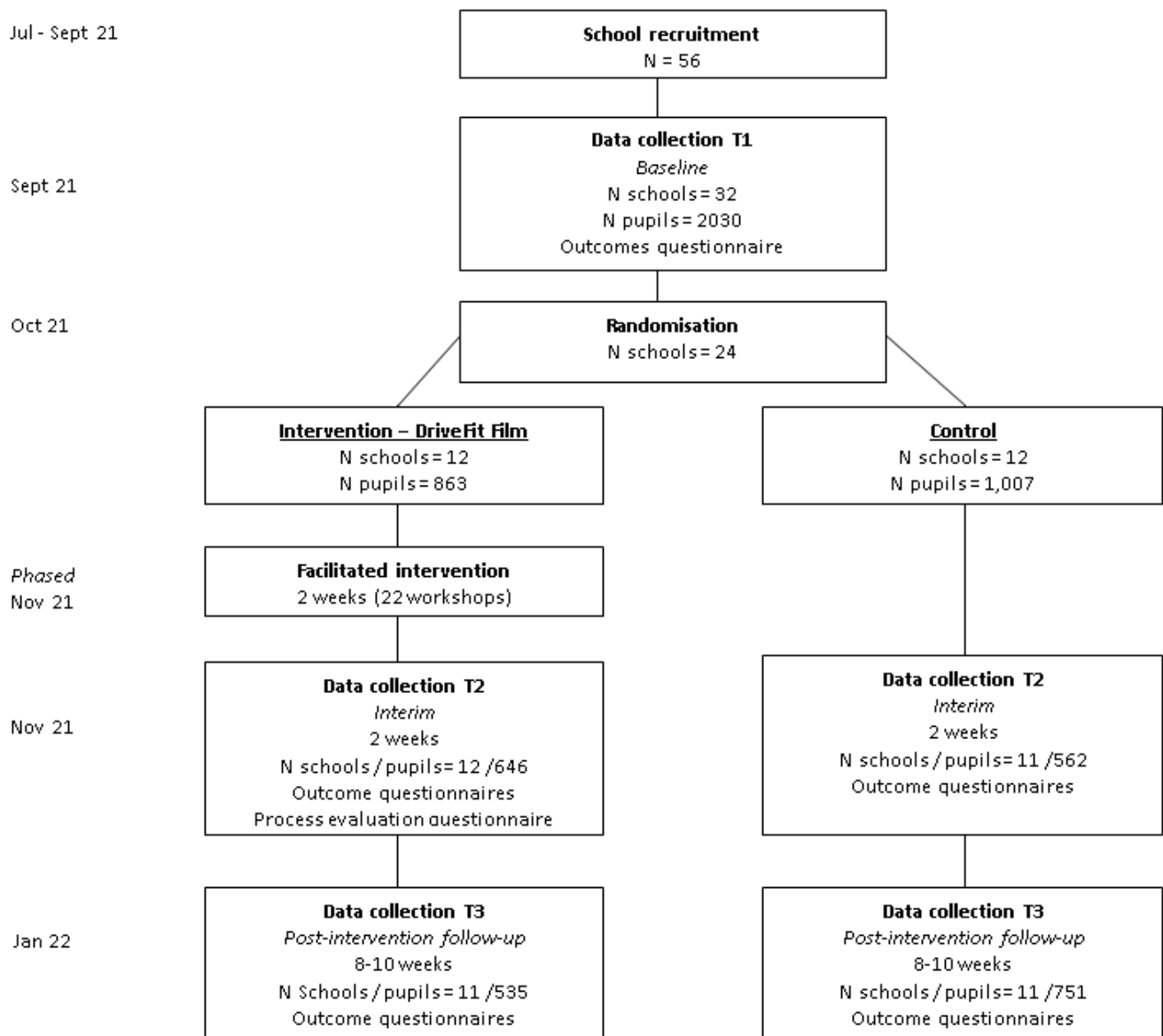


Table 8-2 Descriptive statistics of participants in the cluster randomised controlled trial

		Control group	Intervention
N schools		11	11
N participants		210	227
Age (SD)		16.24 (0.49)	16.36 (0.60)
Gender	Male (%)	99 (47.2)	79 (34.8)
	Female (%)	104 (49.5)	143 (63.0)
	Unknown (%)	7 (3.3)	5(2.2)
Driving stage	Passed test or currently learning (%)	29 (13.8)	35 (15.4)
	Learning in the next 12 mnths–5 yrs (%)	163 (77.6)	164 (72.2)
	Maybe learning at some point or never learning (%)	18 (8.6)	28 (12.3)
No. household cars	Low (0-1 cars) (%)	51 (24.3)	56 (24.7)
	Medium (2-3 cars) (%)	146 (69.5)	135 (59.5)
	High (4-5+ cars) (%)	13 (6.2)	36 (15.9)
Ethnicity	White (%)	194 (92.4)	212 (93.4)
	Non-white (%)	12 (5.7)	11 (4.8)
	Unknown (%)	4 (1.9)	4(1.8)
Education type	College (%)	107 (51.0)	139 (61.2)
	School (%)	103 (49.0)	88 (38.8)
Disadvantage level	Below median (%)	147 (70.0)	82 (36.1)
	Above median (%)	63 (30.0)	145 (63.9)

The Chi-square tests for association that were conducted to determine differences in the proportion of socio-demographic categorical variables for 1) control participants at T1 only and T3; 2) intervention participants at T1 only and T3; 3) T3 responses for control and intervention groups found some differences in group characteristics, with some groups not being well represented within the final T3 data analysis (i.e., T1 only and valid T3 control responses: education type $\chi^2 (1, 1007) = 10.97, p < .001$) and disadvantage level (i.e., above or below median school level disadvantage) $\chi^2 (1, 1007) = 4.34, p = .037$). The GEE analysis method employed in this study controls for socio-demographic factors and considers any variation in sample characteristics and does not present limitations for the interpretation of the GEE results. At T1, both intervention and control groups were largely road safety supportive (See Table 8-3 and Table 8-1 for measure scale details).

Table 8-3 Reliability and mean scores for socio-cognitive behavioural variables drawn from the Theory of Planned Behaviour and other measures, at T1 for control and intervention groups

Variable	Cronbach's α (T1)	Control group ($n = 209^a$) Mean (SE) T1	Intervention group ($n = 225^a$) Mean (SE) T1
INT_ALL	0.80	1.80 (0.05)	1.75 (0.06)
INT_MOB	0.87	1.39 (0.09)	1.44 (0.06)
INT_ALCO	0.88	1.08 (0.07)	1.10 (0.03)
INT_FATIGUE	0.81	2.08 (0.14)	2.00 (0.08)
INT_SPEED	0.90	1.91 (0.13) ^b	1.80 (0.08) [*]
ATT_ALL	0.91	1.61 (0.04)	1.55 (0.05)
ATT_MOB	0.82	1.36 (0.04)	1.39 (0.05)
ATT_ALCO	0.73	1.11 (0.02)	1.15 (0.04)
ATT_FATIGUE	0.88	1.71 (0.05)	1.65 (0.06)
ATT_SPEED	0.90	1.77 (0.076) ^b	1.60 (0.06) [*]
PBC	-	1.98 (0.11) ^b	2.04 (0.12) [*]
SNORM	0.77	1.46 (0.06) ^b	1.52 (0.07) [*]
ADVS	0.66	17.77 (0.23) ^b	17.27 (0.24) [*]
P_RISK	0.68	17.78 (0.19) ^c	17.74 (0.21) ^{**}
DCQ	0.84	8.03 (0.29) ^c	7.97 (0.29) ^{**}
EFF	-	1.63 (0.08) ^d	1.78 (0.09) ^{***}

^a Unless otherwise specified ^b $n = 206$ ^c $n = 204$ ^d $n = 199$, ^{*} $n = 222$ ^{**} $n = 221$ ^{***} $n = 219$

A two-way ANOVA was conducted to examine the effects of condition (Intervention/control) and response (T1 only/T1-T3 responses) at T1 for all survey scale items. The results show that for INT_ALL ($F(1,1785) = 4.171$, $p = .041$, $\eta_p^2 = .002$), INT_MOB ($F(1,1785) = 4.372$, $p = .037$, $\eta_p^2 = .002$), INT_ALCO ($F(1,1785) = 3.796$, $p = .052$, $\eta_p^2 = .002$) and PBC ($F(1,1785) = 7.591$, $p = .006$, $\eta_p^2 = .004$) there was a statistically significant difference between the survey responses received at T1 by those participants who completed the T1 survey only and those who completed the surveys for all measurement periods. This indicates that participants who completed the survey at all measurement periods had safer views on some measures in comparison to those who discontinued involvement in the study at T1. This has been taken account in the interpretation of the results.

One-Way ANOVAs were also conducted to establish whether there was any difference in the responses (for respondents providing data at all timepoints) at T1 by sub-groups. Across the majority of measures the main effect of gender was found, with females reporting safer road safety intentions, attitudes and other responses than males (e.g., INT_MOB, $F(1,421) = 13.070$, $p < .001$, $\eta_p^2 = .030$). However, there were some measures (i.e., INT_ALCO, INT_FATIGUE, PBC and

EFF) where there was no statistical difference at T1 between males and females (e.g., INT_FATIGUE, $F(1,421) = 1.930$, $p = .165$, $\eta_p^2 = .005$). There was no differential effect by age (e.g., INT_ALL, $F(2,431) = .507$, $p = .603$, $\eta_p^2 = .002$), ethnicity (e.g., ATT_SPEED, $F(1,419) = .415$, $p = .520$, $\eta_p^2 = .001$), education type (e.g., PBC, $F(1,426) = .002$, $p = .961$, $\eta_p^2 = .000$) or disadvantage level (e.g., INT_FATIGUE, $F(1,432) = .035$, $p = .851$, $\eta_p^2 = .000$) at T1. A differential effect by driving stage was found for several of the measures (i.e., INT_ALCO, ATT_ALL, ATT_MOB, ATT_ALCO, ATT_FATIGUE, PBC). Where there was a differential effect, the safest responses were provided by respondents closer to licensure (i.e., having passed their test/learning to drive). The only variation to this was found for PBC ($F(1,425) = 9.784$, $p < .001$, $\eta_p^2 = .044$), where those who were planning to learn to drive in the next 12 months–5 years, provided a safer response (i.e., more control) than those that had already passed their driving test/were currently learning to drive and those that were maybe/never learning to drive. A differential effect by the number of household cars was found for INT_ALCO ($F(2,431) = 3.816$, $p = .023$, $\eta_p^2 = .017$), where responses were least safe for those in low car ownership households and the safest for those in medium car ownership households. Given car ownership was used in this study as a proxy for SES and lower SES has been associated with increased relative crash risk (e.g., Chen et al., 2010), this finding contributes to the evidence base about the types of risk behaviours that certain sub-groups may be at greater risk from engaging in.

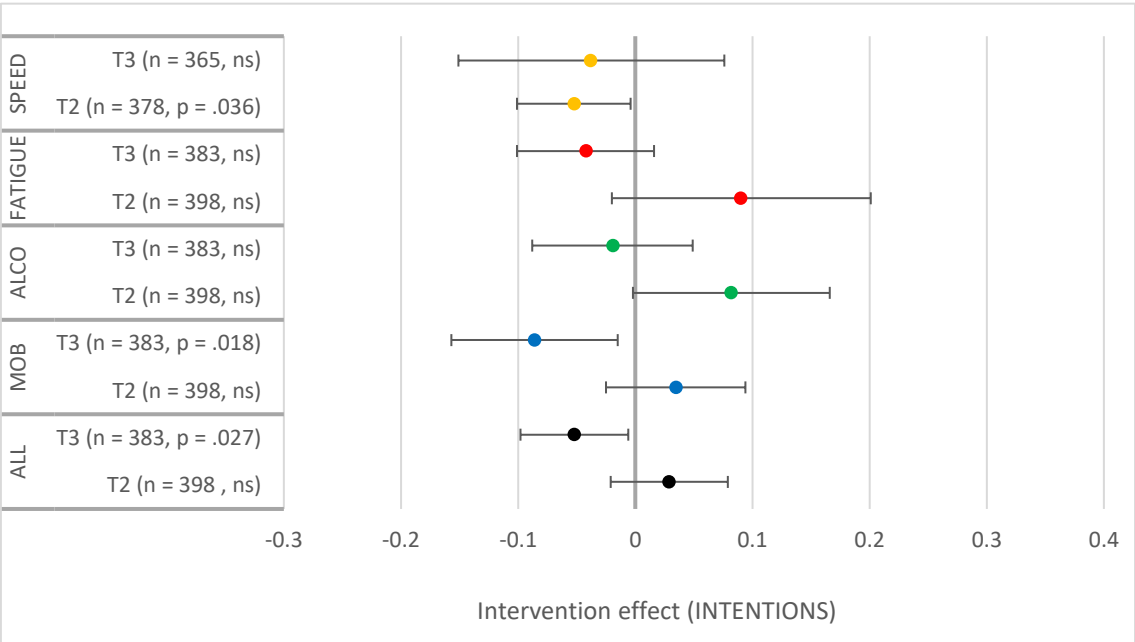
8.4.2 GEE results

8.4.2.1 Intentions

The GEE model outputs show that DriveFit had a small beneficial effect on speed intentions at T2 and on the composite measure of all intentions and mobile phone intentions at T3, when compared to the control condition (See Figure 8-2). The intervention speed intentions effect at T2 (Intervention vs control difference: $B = -.052$ with CI $-.101$, $-.004$, $p = .036$) equates to a 1/20th of a scale point improvement in speed intentions.

Mobile phone intention at T3, the largest improvement noted ($B = -.086$ with CI $-.157, -.015$, $p = .018$) equates to a 1/12th of a scale point improvement in mobile phone use intentions. As outlined in Table 8-3 (Section 8.4.1), it should be noted that for all measures, participants provided largely safe responses at T1, meaning that there was minimal room for improvement, which may in part explain the modest improvement in scores. Apart from speed intentions, there is a trend towards intentions becoming safer at T3 than at T2.

Figure 8-2 Intervention effect on intention outcomes presented as T1-adjusted difference to control, with 95% Confidence Intervals

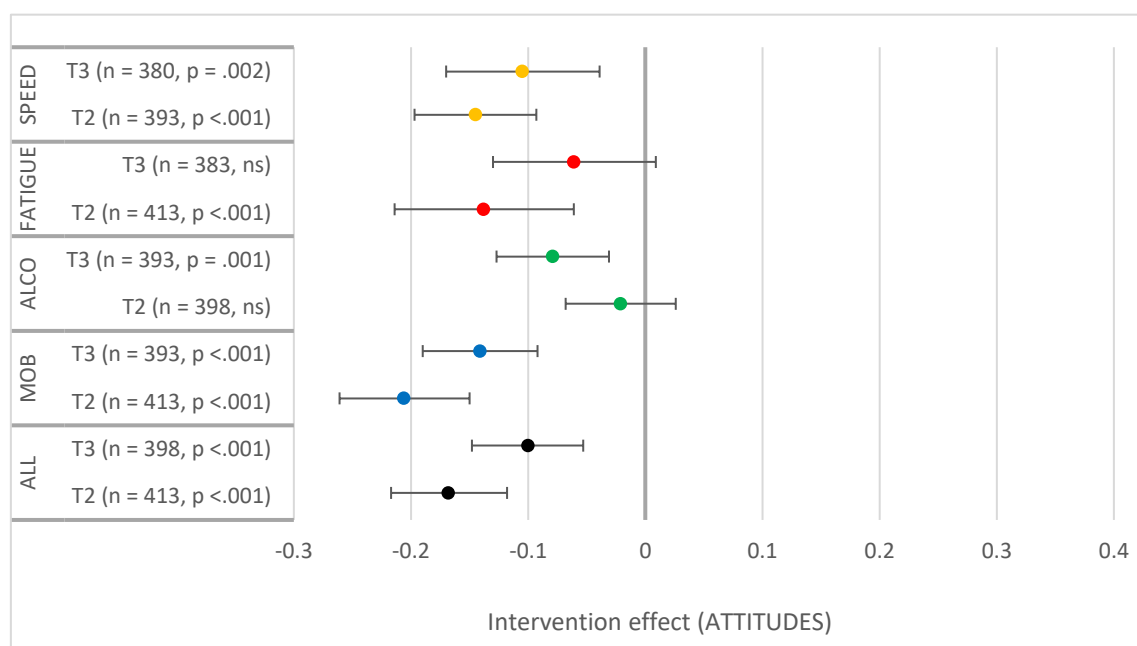


Post-hoc exploratory analyses were run to investigate sub-group differences. The results show that the programme had a beneficial effect for females for all significant condition outcomes ($T2_INT_SPEED - B = -.063$ with CI $-.101, -.025$, $p = .001$; $T3_INT_MOB - B = -.140$ with CI $-.231, -.048$, $p = .003$; $T3_INT_ALL - B = -.103$ with CI $-.157, -.049$, $p = .002$). For further details of sub-group results see Appendix G.8.

8.4.2.2 Attitudes

The effect of DriveFit on attitudes was found to be greater than for intentions. Significant beneficial effects were seen at T2 and T3 for mobile phone use and speeding attitudes as well as for the composite measure of all attitudes, with the magnitude of the effects diminishing slightly between T2 and T3. A significant beneficial effect on fatigue attitudes was found at T2, but this was not significant at T3. In contrast, a significant beneficial effect for drink driving attitudes was found at T3, but not at T2 (See Figure 8-3). DriveFit had the largest beneficial effect at T2 on mobile phone attitudes ($B = -.206$ with CI $-.261, -.150$, $p < .001$) and the composite measure of all attitudes ($B = -.168$ with CI $-.217, -.118$, $p < .001$).

Figure 8-3 Intervention effect on attitude outcomes presented as T1-adjusted difference to control, with 95% Confidence Intervals



The post-hoc sensitivity analyses run for these measures indicates that DriveFit typically had a greater beneficial effect for females, than for males (i.e., T2_ATT_ALL – Female: $B = -.218$ with CI $-.253, -.182$, $p = .000$, Male: $B = -.102$ with CI $-.194, -.010$, $p = .029$), apart from for mobile phone use attitudes and drink driving attitudes where there was a similar order of magnitude effect for males and females at T3 for mobile phone use (Female: $B = -.145$ with CI $-.236, -.054$,

$p < .001$, Male: $B = -.153$ with CI $-.277, -.029$, $p = .015$) and greater effects for males for drink driving attitudes (Female: $B = .070$ with CI $-.109, -.032$, $p < .001$, Male: $B = -.116$ with CI $-.196, -.036$, $p = .004$). It is however interesting to note that the intervention did have a beneficial effect for males for several of the attitude measures (i.e., T2_ATT_ALL, T2_ATT_MOB, T3_ATT_MOB and T3_ATT_ALCO).

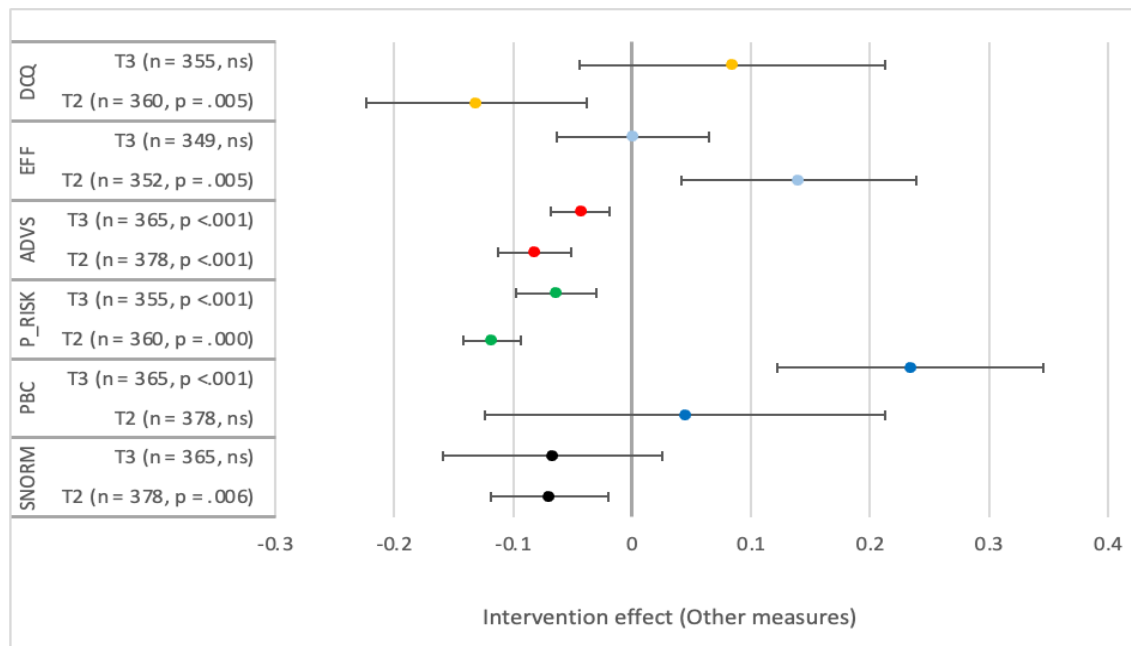
Some differential effects by education type were found, with beneficial intervention effects for school participants for all attitudes (T2: $B = -.097$ with CI $-.139, -.055$, $p < .001$, T3: $B = -.119$ with CI $-.198, -.040$, $p = .003$), mobile phone use (T2: $B = -.095$ with CI $-.151, -.038$, $p = .001$ and T3: $B = -.145$ with CI $-.229, -.062$, $p < .001$), fatigue (T2: $B = -.120$ with CI $-.185, -.056$, $p < .001$) and alcohol (T3: $B = -.078$ with CI $-.119, -.036$, $p < .001$). There were fewer significant effects found for college students, but where they were found they were greater or similar to those for school students (i.e., T2_ATT_MOB: $B = -.195$ with CI $-.239, -.152$, $p = .000$ and T3_ATT_MOB: $B = -.104$ with CI $-.195, -.012$, $p = .027$ and T3_ATT_ALCO: $B = -.087$ with CI $-.161, -.014$, $p = .020$).

Some further differential effects were found by disadvantage level, with beneficial intervention effects found for participants from below median disadvantage educational institutions for all attitudes (T2: $B = -.169$ with CI $-.253, -.084$, $p < .001$, T3: $B = -.075$ with CI $-.129, -.021$, $p = .006$), mobile attitudes (T2: $B = -.176$ with CI $-.261, -.091$, $p < .001$, T3: $B = -.129$ with CI $-.199, -.060$, $p < .001$), alcohol attitudes (T3: $B = -.115$ with CI $-.159, -.072$, $p < .001$), fatigue attitudes (T2: $B = -.203$ with CI $-.294, -.112$, $p < .001$) and speed attitudes (T2: $B = -.165$ with CI $-.285, -.044$, $p = .008$, T3: $B = -.081$ with CI $-.161, -.001$, $p = .047$). Some lesser beneficial effects were also found for those from above median disadvantage education institutions, but these were confined to effects immediately after the intervention at T2 for all attitudes ($B = -.105$ with CI $-.127, -.084$, $p = .000$), fatigue attitudes ($B = -.144$ with CI $-.258, -.031$, $p = .013$) and speed attitudes ($B = -.144$ with CI $-.212, -.077$, $p < .001$). For further details of sub-group results see Appendix G.9.

8.4.2.3 Other measures

DriveFit had some significant beneficial effects on the other measures included within the survey. Beneficial effects of the intervention were seen at both T2 and T3 for perceptions of risk (P_RISK) and attitudes to driving violations (ADVS), with effects remaining significant, but diminishing in magnitude at T3 (See Figure 8-4). There was a beneficial effect on the measure of subjective norms (SNORM) and driver coping (DCQ) at T2. The largest effect at T2 was for driver coping ($B = -.131$ with CI $-.223, -.038$, $p = .005$) and for perception of risk ($B = -.064$ with CI $-.98, -.030$, $p < .001$) at T3.

Figure 8-4 Intervention effect on other outcomes presented as T1-adjusted difference to control, with 95% Confidence Intervals



The post-hoc effect analysis found that there was a beneficial impact of the intervention for females on attitudes to driving violations (ADVS) (T2: $B = -.108$ with CI $-.150, -.066$, $p < .001$, T3: $B = -.068$ with CI $-.102, -.034$, $p < .001$) and perceived risk (P_RISK) (T2: $B = -.135$ with CI $-.155, -.115$, $p = .000$; T3: $B = -.055$ with CI $-.088, -.023$, $p < .001$). For males, there was a beneficial effect of the intervention on P_RISK at both time points (T2: $B = -.081$ with CI $-.130, -.032$, $p = .001$; T3: $B = -.078$ with CI $-.156, -.001$, $p = .050$), but no beneficial effect on ADVS.

In addition, there was a benefit at T2 of the intervention on female subjective norms (SNORM) ($B = -.087$, with CI $-.141, -.033$, $p = .002$) and driver coping (DCQ) ($B = -.206$, with CI $-.276, -.137$, $p < .001$), which was not found at T3. A disbenefit of the intervention on perceived behavioural control (PBC) was found for males ($B = .312$, with CI $.104, .519$, $p = .003$), college students ($B = .137$, with CI $.005, .269$, $p = .042$) and students from above median level disadvantage educational settings ($B = .525$, with CI $-.612, .952$, $p = .000$). A disbenefit for efficacy (EFF) was found for the same group, excluding college students (Males: $B = .234$, with CI $.052, .416$, $p = .012$; Above median disadvantage: $B = .237$, with CI $.043, .430$, $p = .017$).

Differences in intervention effect by educational setting were also found. There was a greater beneficial effect on ADVS for participants from colleges than schools at T2 (College: $B = -.147$, with CI $-.179, -.115$, $p = .000$, School: $B = -.044$, with CI $-.067, -.021$, $p < .001$) and a beneficial effect on P_RISK for college participants at T2 and T3 (T2: $B = -.153$, with CI $-.192, -.114$, $p < .001$, T3: $B = -.083$, with CI $-.138, -.028$, $p = .003$). The lower effect for schools (T2: $B = -.094$, with CI $-.123, -.064$, $p < .001$) was not present at T3. There was a beneficial effect of the intervention on DCQ for school participants at T2 ($B = -.084$, with CI $-.158, -.010$, $p = .025$), but no detectable effect for college participants.

A benefit of the intervention for participants from below median disadvantage educational settings was also observed for the following measures: ADVS (T2: $B = -.096$, with CI $-.131, -.061$, $p < .001$, T3: T2: $B = -.037$, with CI $-.086, -.008$, $p = .012$); P_RISK (T2: $B = -.117$, with CI $-.178, -.057$, $p < .001$, T3: T2: $B = -.074$, with CI $-.131, -.016$, $p = .012$) and DCQ (T2: $B = -.178$, with CI $-.333, -.024$, $p = .024$). For further details of sub-group results see Appendix G.10.

8.5 Discussion and conclusions

This study found significant beneficial effects of the DriveFit intervention on 9 out of 16 study measures at T2 (i.e., speeding intentions, a composite measure of all attitudes (excluding alcohol), mobile phone use attitudes, driving whilst fatigued attitudes, speeding attitudes, subjective norms associated with speeding, perceptions of risk, attitudes to driving violations and driver coping) and 8 out of 16 study measures at T3 (i.e., mobile phone use intentions, composite measures of all intentions and attitudes (excluding alcohol), mobile phone use attitudes, drink driving attitudes, speeding attitudes, perceptions of risk and attitudes to driving violations), with the largest beneficial effects on attitudes. Where significant attitude effects were still detectable at T3 (i.e., for the composite measure of all attitudes (excluding alcohol), mobile phone use attitudes and speeding attitudes), these were reduced in magnitude. In contrast, for study intention measures (apart from speeding intentions) there was a trend towards intentions becoming safer at T3 than at T2, with the mobile phone use and composite intention measure showing beneficial effects of the intervention, over and above control at T3. Whilst previous research has found that education interventions deliver small self-reported effects, that diminish over time (i.e., Poulter & McKenna, 2010), this study finds small, but longer lasting attitude effects (which diminish in magnitude over time) and a trend towards improving intentions, over and above the control group, over time. Given this intervention was only measured up to the 8–10 weeks post-intervention point (T3), the longer-term effects are not known. The temporal attitude-intention gap demonstrated within these study findings (i.e., changes in attitudes at T2, followed by changes in intentions at T3), is an intriguing finding. It is feasible that there is a temporal impact of attitudes on intentions, although this has not been found in previous studies within this field. A cursory review of studies within the broader public health field reveals that an attitude-intention gap has been noted in a small number of studies, most frequently in relation to environmental behaviours (e.g., McLelland et al., 2022). However, the gaps described appear to be fixed, rather than temporal, as seen in this study. In contrast, the intention-behaviour gap (Sheeran, 2002) (i.e., difficulties experienced with translating goals into actions)

is well known and commonly noted in behavioural studies, with implementation intentions (Gollwitzer, 1999) recommended to assist individuals with meeting their goal intentions. It would be interesting whether the delayed impact of attitudes on intentions seen in this study, could be replicated in future studies and in particular whether mediators of this relationship could be established. If found, this would provide an important theoretical contribution related to the impact of interventions on the relationship between Theory of Planned Behaviour components over time. The DriveFit intervention evaluated here is also different to other evaluated pre-driver interventions given that it is both designed based on the TPB and is positively framed. There is evidence that fear appeal interventions, such as the one evaluated by Poulter and McKenna (2010), can have relatively weak, but reliable effects on attitudes, intentions and behaviours (Witte & Allen, 2000). In contrast to previous findings, consistent attitude improvements were seen across most of the attitude measures and intentions trended towards improving over time, suggesting that there may be a more positive outcome for positively framed educational interventions, with follow-up workshop components.

The greatest effect of DriveFit, both for intentions and attitudes, was found for mobile phone use and fatigue. This finding is important because young and novice drivers have been found to underestimate the risks associated with driving whilst using a mobile phone (Cazzulino et al., 2014), a behaviour that significantly reduces driving performance and increases crash risk (Caird et al., 2008). Social pressures, other life demands (e.g., studying and work) as well as biological changes have been found to lead to sleep deprivation amongst adolescents, which increases their risk of sleep related collisions (Carskadon & Acebo, 2002; Millman, 2005). Whilst the intervention effects for these risks are small (possibly due to the safe attitudes presented at baseline and therefore less potential for improvement), this evidence of risk attitude change is informative for the development of future interventions. These findings add to the existing literature, as several studies to date have not been able to break down the effect of interventions on multiple risk behaviours (e.g., Poulter and McKenna (2010) which focuses solely on speeding behaviours).

The DriveFit intervention also had a beneficial effect on subjective norms at T2, but not at T3. Previous studies have also found intervention induced beneficial changes in subjective norms (Burgess, 2011; Cuenen et al., 2016; Poulter & McKenna, 2010) immediately post-intervention. Post-hoc sub-group analysis for this study found subjective norm benefits for females, but not males. Burgess (2011) in their intervention analysis found that males' behavioural intentions were mainly due to more appropriate attitudes towards road safety post-intervention, as opposed to changes in perceived subjective norms, whereas females' intentions seemed to be influenced to a greater extent by perceived behavioural control and changes in attitudes due to changes in perceived subjective norms. For future studies, further consideration should be given to how longer lasting impacts on subjective norms can be achieved, potentially through delivering interventions that consider the social environment of parents and peers (Cassarino & Murphy, 2018).

In addition, the DriveFit intervention also had a beneficial effect on driver coping immediately post-intervention. The Driver Coping Questionnaire (DCQ) captures how people cope with the stress of driving and includes several dimensions (confrontive coping, task focused, emotion-focused, reappraisal and avoidance). The adapted survey used for this study focused on future task focused coping such as efforts to drive safely when demands are high (i.e., slowing down and being more vigilant). A consistent relationship between the Driver Stress Inventory and DCQ scales have been established (Dorn, 2021; Matthews et al., 1997), suggesting that coping mediates the associations between driver stress vulnerability and stress outcomes. Task focused coping has been positively correlated with alertness and hazard monitoring, suggesting that drivers who focus on a problem appear to direct their efforts towards the task itself by adopting rational strategies such as information seeking, taking precautions and making plans. The small, but detectable improvement in driver coping at T2 did not last until T3, suggesting that consideration should be given to how DriveFit could promote longer lasting coping strategies.

“Risk perception refers to the subjective experience of risk in potential traffic hazards” (Deery, 1999, p.226) and has been found to reliably predict risky driving behaviour (Hatfield & Fernandes, 2009). A beneficial intervention effect for perception of risk was also found at T2 and to a lesser extent at T3. This study also found gender differences in perception of risk at T1, with females rating driving situations as less safe than males (also reported by Farrand & McKenna, 2001) as well as an overall intervention effect, which was not seen in the evaluation of a negatively framed testimonial education programme by Glendon et al. (2014). The present intervention differs from others by being theoretically based and positively framed with a focus on developing plans to manage behaviours. Whilst it is not possible to ascertain what component of DriveFit achieved beneficial risk perception effects, when others have not, there are several potential differences that could have had an influence. These include a different focus, content, emotional tone and active learning approach.

Similar beneficial intervention effects were also seen for attitudes to driving violations at T2 and to a lesser extent at T3. In their paper on the role of personality and attitudes in traffic collision risk, West and Hall (1997) found that drivers with higher levels of social deviance and more positive attitudes to driving violations (ADVS) sped more and self-reported a greater number of collisions. Consequently, they suggested that ADVS had value as an indicator of collision liability and for identifying risky drivers. Whilst DriveFit had a beneficial effect on ADVS scores overall, the sub-group analysis identified that this overall finding only applied to females, not males. Further research is needed to establish how best to target interventions to influence young males.

Two disbenefits of the intervention were noted for the efficacy and perceived behavioural control measures at T3. Two potential explanations are proposed. Firstly, both measures consisted of one survey item only (See Appendix G.6). Whilst it is feasible that the intervention led to participants feeling less confident (EFF) and less in control (PBC), it is also possible that the survey item did not reliably measure the outcome. Secondly, further analysis of the findings from certain sub-groups showed that males and those from above median level

disadvantage educational establishments reported feeling less confident, as well as less in control (with less control also applicable to college participants). Previous research has found that inaccurate self-assessment of driving skills among males may be a contributory factor to young male collision rates (Martinussen et al., 2017). It is therefore feasible that a more realistic assessment of confidence and control may be beneficial for educational interventions targeting young males, although further investigation is required. If this finding could be replicated by future research, the results would provide an important contribution to theoretical understanding (i.e., changes to PBC in different directions can be beneficial for safety, but it depends on the sub-group targeted).

Taking the results together, a clear differential intervention effect by gender and educational setting can be seen, which has also been reported by other studies (Cuenen et al., 2016; Riaz et al., 2019). Evaluations to date have typically found greater beneficial intervention effects for females (Burgess, 2011; King et al., 2008) and a minority have also found beneficial effects for males (e.g., Cuenen et al., 2016), particularly those with less safe T1 measures providing more opportunity for improvement. The effect of programmes by gender has not been explicitly evaluated by many studies (e.g., Feenstra et al., 2016), but overall, where sub-group analysis has been conducted, there appears to be a consensus that females present safer attitudes and intentions than males at T1 (Carcary et al., 2001; Riaz et al., 2019). Within this study females presented safer at T1 than males for most measures and the beneficial effects of the DriveFit intervention were typically found to be more frequent and stronger for females than males. However, beneficial intervention effects were found for males, the most consistent being T2 and T3 effects on perceptions of risk and mobile phone use attitudes. Males were found to have less safe PBC and EFF responses at T3, which differs from previous study findings (e.g., Cuenen et al., 2016). Both the PBC and EFF measures in this study consisted of only one survey item (due to a lack of internal consistency for measured PBC items and the use of a single EFF measure), which makes this finding less robust and reliable. It is possible that highlighting the importance of taking control of managing road risks in the DriveFit intervention may have led males to make more realistic assessments of their PBC

and EFF post-intervention. However, given the lack of corroboration of this finding in existing research, this anomaly is potentially the result of survey item reliability issues. The finding does however indicate that exploring intervention effects on male PBC and EFF is an important area of investigation for future studies and that if these findings can be replicated, there would be an important contribution to theoretical understanding. Whilst there was no overall differential effect on T1 measures by education type, a differential beneficial effect of DriveFit was found for school students for some of the measures, which again highlights the importance of evaluating sub-group effects and adjusting intervention content and delivery to better suit the needs of specific target groups.

Based on these study findings, there are various ways that the impact of educational interventions may be improved. Whilst the intervention was designed with reference to existing evidence, as well as qualitative research with the target audience, the film and workshop delivery may have benefited from involving more peer-age participants, as previous research has found peer-to-peer education to support beneficial road safety outcomes (e.g., Eyler et al., 2010). The workshops were facilitated online and this format may not have had the same impact on intentions and attitudes compared with that of a classroom-based in-person group discussion. It is also not known what specific features of the intervention (i.e., film and/or workshop) had the greatest impact on the results. Further work is required to ascertain whether there is an effect of different delivery formats. Cuenen et al. (2016) emphasises the importance of understanding the impact of separate components of interventions, such as presentations and workshops. It is also possible that the duration of the intervention period was not sufficient to change some intentions and attitudes. Future research may need to investigate the effect of different intervention delivery periods. It is likely that short term interventions will have a less pronounced effect on pre-driver intentions and attitudes. Revisiting original intervention content with new materials has been found to boost road safety attitudes (O'Brien et al., 2002), similarly, further work is required to develop DriveFit to extend the intervention period.

A phased approach is recommended to extend the initial positive benefits with the use of follow-up positively framed messages to motivate and maintain safe behaviour post-licensure. Without regular DriveFit follow-up road safety messages during the early months of driving, the benefits of the intervention may wane as it competes with the influences that young people experience in day-to-day life.

Several limitations of the study should be noted. Firstly, despite a purposive sampling of schools with varied socioeconomic status, participants may not be entirely representative of the wider population in the UK. The final sample size is somewhat small and the statistical power of the analysis to detect an effect is reduced with an increased risk of a Type II error. This drop out may have been reduced with a shorter survey. It is recommended that future studies ensure that evaluation surveys focus on most important variables only to maximise response rates. Secondly, one of the difficulties with drawing firm conclusions from these findings are that there are known limitations associated with self-reported methods (Hessing et al., 1988) including poor reliability (Af Wåhlberg & Dorn, 2015), socially desirable responding and common method variance (Af Wåhlberg et al., 2010). One way to overcome the limitation of self-report methods would have been to use in-vehicle data recording measures to assess actual driving behaviours such as speed. Whilst this approach has been used to evaluate young driver interventions (Tapp et al., 2013), it would have involved excluding pre-drivers from the present research. Despite their limitations, self-report survey data provides important information about precursors to behaviour and previous research has found that under certain conditions (i.e., anonymity and no associated response consequences) self-report surveys provide acceptable levels of validity (Zhao et al., 2006) which can be corroborated using other sources of data (Taubman - Ben-Ari, 2010).

As outlined in the method section of this paper, whilst there was good cause for not using a sham intervention/ active control for this study, applying such a control condition would have eliminated the potential for a differential 'Hawthorne Effect' (McCarney et al., 2007) between intervention and control groups.

A major strength of this study has been the rigorous evaluation of a positively framed intervention programme underpinned by the Theory of Planned Behaviour (Ajzen, 1991) and Behaviour Change Techniques (Michie et al., 2013) using a cRCT design, which has been supported by national level delivery partners. This study adds to the growing body of literature on pre-driver education effectiveness and identifies important areas of further research.

9 PAPER EIGHT – AN EVALUATION OF THE SDSA SURREY PRE-DRIVER EDUCATION INTERVENTION USING THE THEORY OF PLANNED BEHAVIOUR

9.1 Abstract

Testimonial pre-driver road safety education interventions have typically been found to deliver small, short-term impacts on socio-cognitive measures (e.g., Poulter & McKenna, 2010). The effect of a pre-driver education intervention (Safe Drive Stay Alive Surrey) on Theory of Planned Behaviour (TPB) components was evaluated with a comparison study. The responses of 16–18 year old students ($n = 188$) from 6 schools in Surrey, UK were analysed and compared to comparison control students ($n = 210$) from 11 schools in Devon, UK. The study has examined the impact of the SDSA Surrey intervention on pre-driver intentions, attitudes and other measures immediately post-intervention (T2) and 8–10 weeks post-intervention (T3). The evaluation found that the SDSA Surrey intervention led to some small improvements in risk intentions, attitudes and other measures at T2, with minimal positive and some negative intervention effects at T3. Significant beneficial effects of the SDSA Surrey programme were found for 6 out of 16 study measures at T2 (i.e., Intentions – fatigue; Attitudes – speed, drink driving, mobile phone use, all; Other – attitudes to driving violations) and 1 out of 16 study measures at T3 (i.e., Intentions – speed). The largest beneficial effects were for attitudes at T2, which were not detectable at T3. There were also detrimental effects of the intervention for 3 out of 16 study measures at T2 (i.e., alcohol intentions, efficacy and perceived behavioural control) and 2 out of 16 study measures at T3 (i.e., drink driving attitudes and efficacy). There were also some effect differences by sub-group. Participants expressed safe views at baseline (T1), which overall left minimal room for improvement. This study confirms the findings of previous research, which has found that testimonial education interventions typically deliver small self-reported effects, that diminish over time (e.g., Poulter & McKenna, 2010). The findings add to existing research and inform the design and delivery of pre-driver interventions.

9.2 Introduction

Testimonial pre-driver education interventions are popular and typically delivered by emergency service workers, bereaved family members and road traffic collision victims with the purpose of persuading participants to improve their road safety attitudes and behaviours. Such interventions typically rely on fear and/or threat appeal and questions have been raised about their potential detrimental effects on young and novice drivers (Poulter & McKenna, 2010). Whilst threat appeals can attract observer attention (Lewis et al., 2007a), this has not been found to reliably translate into improvements in driving behaviour (Carey et al., 2013). It has also been suggested that threat appeals may provoke an increase in risky behaviours (Carey et al., 2013). However, threat appeals may have a beneficial impact on behaviour if there is a predominantly female audience, or the intervention is addressing circumstances where there is high susceptibility and high severity conditions requiring one-time only behaviours (Tannenbaum et al., 2015). Given the continuous behaviours associated with at-risk driving behaviour and young males being especially vulnerable to crash involvement compared with females (Cassarino & Murphy, 2018), threat appeal effects may be diminished in this context. Fear appeals have also been found to be counter-productive for males (Goldenbeld et al., 2008) leading to defensive reactions such as avoidance of threatening information (Brown & Locker, 2009) and message rejection (Hastings, 2002). Males have also reported being less likely to find threat-based material presented as being applicable to themselves (Lewis et al., 2007a). The mixed picture related to the impact of fear appeal approaches has led some behavioural scientists and health promotion professionals to conclude that threat appeals should be used with caution.

In Paper 1, three studies evaluating the impact of Safe Drive Stay Alive (SDSA) (Dale et al., 2017; Poulter & McKenna, 2010; Symons et al., 2008) were analysed to inform a critical review seeking to establish the effectiveness of pre-driver education at increasing young driver safety. Two studies (Poulter & McKenna, 2010; Symons et al., 2008) used the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and one study (Dale et al., 2017) used the Health Action Process Model (HAPA) (Schwarzer, 1992) as the theoretical frameworks to evaluate the impact

of SDSA interventions delivered in different geographical contexts throughout the UK (i.e., London (Symons et al., 2008); location not specified, (Poulter & McKenna, 2010); Fife (Dale et al., 2017)). Collectively, these analyses, which largely focus on attitudes and intentions related to speeding, conclude that SDSA interventions have a limited and short-term impact on antecedents to behaviour. Poulter and McKenna (2010) consistently found that immediate intervention impacts on intentions, attitudes, perceived behavioural control and subjective norms disappeared at five-months post-intervention. Dale et al. (2017) in contrast concluded that there was no overall effect of the intervention on speed intentions and recommended that future interventions reduce the frequency of risk consequences and include a broader range of evidence-based behaviour change techniques within their content. Poulter and McKenna (2010) conclude that future interventions should be designed with reference to socio-cognitive theories such as the TPB and that there is value in adopting implementation intentions (Gollwitzer, 1999) to support participants to develop actionable strategies (See Section 1.1.4.3, Chapter 1 for a further discussion on implementation intentions).

This paper builds on the findings of this previous work, by analysing the impact of a different variation of SDSA (SDSA Surrey) using the TPB. Like previous studies, the research reported in this paper has analysed the effect of an intervention which has not been designed with reference to behavioural theory. What is unique about this study is that the evaluation has been run in parallel with an evaluation of a newly designed theoretically-based pre-driver intervention (DriveFit, See Paper 7) using the same evaluation metrics. This allows for a comparison of study outcomes (See Chapter 11), which furthers understanding about the effectiveness of different intervention types and components on influencing antecedents to behaviour in pre-drivers (i.e., intentions, attitudes and other measures).

This study aimed to empirically evaluate the effectiveness of the SDSA Surrey intervention. Based on the current research evidence, the following four hypotheses were tested:

1. Compared with baseline (T1), SDSA Surrey improves self-reported intentions towards road safety amongst 16–18 year old pre-drivers and newly qualified drivers immediately after delivery (T2) compared to a no treatment wait list control group;
2. Compared with T1, SDSA Surrey improves self-reported intentions towards road safety amongst 16–18 year old pre-drivers and newly qualified drivers 8–10 weeks after delivery (T3) compared to a no treatment wait list control group;
3. Compared with T1, SDSA Surrey improves self-reported socio-cognitive measures (attitudes, subjective norms and perceived behavioural control), perception of risk, attitudes towards driving violations, driver coping and efficacy amongst 16–18 year old pre-drivers and newly qualified drivers at T2 when compared to a no treatment wait list control group; and
4. Compared with T1, SDSA Surrey improves self-reported socio-cognitive measures (attitudes, subjective norms and perceived behavioural control), perception of risk, attitudes towards driving violations, driver coping and efficacy amongst 16–18 year old pre-drivers and newly qualified drivers at T3 when compared to a no treatment wait list control group.

9.3 Method

9.3.1 SDSA Surrey

SDSA Surrey consists of a 60-minute film shown in classrooms to students. The film provides negatively framed testimonials from emergency services, bereaved family members and road traffic collision victims which emphasise the consequences of poor road safety behaviours. The film is based on practitioner experiences and is therefore not designed with reference to a theory of behaviour. The intervention has been running as a live performance for sixteen years which has inspired similar productions in various different locations throughout the UK, over which time several evaluations have been conducted (i.e., Dale et al., 2017; Poulter & McKenna, 2010; Road Safety Analysis, 2015; Symons et al., 2008), which have typically found the intervention to have small and short-term effects. SDSA Surrey was adapted to be delivered via an online film in 2020 in response

to Covid restrictions. Increasingly SDSA Surrey has incorporated messages related to Behaviour Change Techniques, but the intervention remains, at its core, a fear-based consequence-focused presentation. The SDSA Surrey content delivery process is outlined in Appendix B.3. The stated aim of the SDSA Surrey, which is run by Surrey Fire and Rescue Service is *“to raise road safety awareness amongst young people and to positively influence their attitudes to driving and as passengers.”*²⁸ As outlined in Appendix B.3, several road safety risks for young drivers and passengers are discussed during the performance (speeding, mobile phone use, inattention, inexperience, non-seatbelt wearing, drink and drug driving, fatigue, emotional responses, passenger distraction, safe system issues and peer pressure). A follow-up tutor resource pack is also available²⁹, although it is not known how and whether this resource is used by schools, with take up assumed to be low. More information about the SDSA Surrey intervention is available at www.safedrivesurrey.org.

9.3.2 Design and procedure

To evaluate the SDSA Surrey film, a school/college-based comparison study was conducted. As with the DriveFit evaluation (See Paper 7), a full cluster randomised controlled trial (cRCT) had been planned with government-funded, non-fee paying (state), all-ability, co-educational schools/colleges in Surrey. However, given low response rates from invited schools this was not possible. The exact reason for low response rates is unknown but is expected to be a combination of Covid related school timetable pressures and the fact that the main delivery body contact was unable to follow-up with schools at the recruitment stage due to illness. Fifty-three government-funded, non-fee paying (state), all-ability, co-educational schools/colleges in Surrey with a mixture of socioeconomic status, representative of county level variability were invited to take part in the study. Head teachers, sixth form and college leaders from all eligible schools were sent an invitation letter and school information sheet with details of how to take part in the trial in July 2021 (See Appendix H.1). These

²⁸ <https://safedrivesurrey.org/>

²⁹ <https://safedrivesurrey.org/useful-info/follow-up-tutor-resource-pack/>

documents described the study procedures (e.g., student recruitment and consent, measurements) and included an electronic link to an information video³⁰ describing the PdTWER project of which this study was part. A follow-up email to each school/college was sent in early September 2021, after the initial invitation, to confirm their involvement or to secure their consent to participate if a response has not yet been received. Participating schools and colleges were offered a £200 cash incentive for taking part in the trial.

Following recruitment, baseline survey measurements were taken in September 2021. Nine schools/colleges signed up to take part in the trial, six of which returned at least 30 student baseline surveys, which was the cut off set for school/college progression within the trial. As it was not possible to recruit enough schools/colleges to run a cluster randomised controlled trial in Surrey, the study was instead conducted as a comparison study, with all participating schools receiving the SDSA Surrey film. The control group in Devon (See Paper 7), which were asked the same survey questions as students in Surrey, formed the control group condition in the SDSA Surrey analysis. The road network, population and car ownership characteristics for Surrey and Devon are provided in Table 9-1. Whilst Surrey has a larger population, the proportion of 15–19 year olds and the split between males and females within the counties is broadly similar. The number of cars within households is also largely consistent across Devon and Surrey. The road network and road traffic levels are however different, with more miles of road length in Devon and a greater proportion of motorways in Surrey, with more vehicle miles travelled in Surrey than Devon. Whilst the two areas have different road network make-ups, with the population and car ownership levels being comparable, the Devon control group data was considered to be an appropriate comparator for the Surrey intervention survey responses.

³⁰<https://www.racfoundation.org/wp-content/uploads/Study-5-Surrey-School-I-College-recruitment.mp4>

Table 9-1 Surrey and Devon road network, population and car ownership characteristics

Measure	County	
	Surrey	Devon
Population (2021) ³¹	1,203,100	811,600
All ages 15-19 years (% of total pop) ⁴	69,800 (5.8%)	44,900 (5.5%)
Females aged 15-19 years (% of total pop) ⁴	34,100 (2.8%)	21,900 (2.7%)
Males aged 15-19 years (% of total pop) ⁴	35,700 (3.0%)	23,000 (2.8%)
Billion Vehicle Miles (Annual) ³²	7.1	4.6
Total road length (miles) ³³	3,444.5	8,101.9
All motorway (miles) ⁶	63.6	24
All 'A' roads (miles) ⁶	387.7	706.4
All minor roads (miles) ⁶	2,933.2	7,371.5
No Cars in household ³⁴	13%	17%
1-2 cars in household ⁷	75%	73%
3 or more cars in household ⁷	12%	10%

Following the assignment of all participating Surrey schools/colleges to the intervention condition, it was not possible to blind participants to condition allocation as the intervention schools were aware that they were receiving an intervention (i.e., the SDSA Surrey film) and the researcher was aware of intervention groups whilst conducting the analysis.

The SDSA Surrey film was delivered in schools/colleges over the same timescales as the DriveFit trial (between November 2021 and January 2022). As was the case with the DriveFit intervention, data was collected at baseline (T1), immediately after film delivery (T2) and 8–10 weeks post-intervention (T3). The surveys took participants approximately 10-minutes to complete. The study was run using the same ethical approval as provided for the DriveFit trial and details of the study were included in the ISRCTN trial registration (Box, 2021b). As was

³¹ ONS (2021). P02 Census 2021: Usual resident population by five-year age group, local authorities in England and Wales

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationandhouseholdsestimatesenglandandwalescensus2021>

³² DfT (2020). Local Authorities: Estimated motor vehicle traffic <https://roadtraffic.dft.gov.uk/local-authorities>

³³ DfT (2022). RDL0102: Road length (miles) by road type and local authority in Great Britain <https://www.gov.uk/government/statistical-data-sets/road-length-statistics-rdl>

³⁴ ONS (2011). QS416EW – Car or van availability. Nomis: Official census and labour market statistics <https://www.nomisweb.co.uk/query/construct/summary.asp?menuopt=200&subcomp=>

the case for the DriveFit trial, up to ninety year 12 and/or year 13 students (16–18 years old) in participating schools/colleges were eligible to participate in study measurements (See trial sample size calculation parameters in Section 8.3.2, Paper 7). Non-participating classes in intervention schools/colleges were offered the opportunity to watch the film at a time convenient to them, without survey measurements. No exclusion criteria were applied to participants. A sub-titled film was made available to support the accessibility of the film. Students received a participant information sheet (See Appendix H.2) and consent form to complete before taking part in the online baseline (T1) and post-intervention surveys (T2 and T3) (See Appendix H.3-H.4). Participants were informed that they could discontinue all or any part of the study (either or both measurements and intervention) at any time, up until two-months post-intervention, with no impact on their education.

The outcome assessment, questionnaire instruments, process evaluation, analysis approaches as well as the data management and monitoring processes used for this study replicated those used for the DriveFit study to allow for a comparison between the two interventions (See Chapter 10).

Table 9-2 Survey measures*

Measure	Variable code	No. items	Scale	Details
All intentions (Excluding ALCO)	INT_ALL	8	1:7	Unlikely - Likely Not at all willing – Very willing
Mobile phone use intentions	INT_MOB	2	1:7	
Drink driving intentions	INT_ALCO	2	1:7	
Driving whilst fatigued intentions	INT_FATIGUE	2	1:7	
Speeding intentions	INT_SPEED	2	1:7	
All attitudes (Excluding ALCO)	ATT_ALL	16	1:7	Harmful – Beneficial Negative – Positive Foolish - Wise Unpleasant - Pleasant
Mobile phone use attitudes	ATT_MOB	4	1:7	
Drink driving attitudes	ATT_ALCO	4	1:7	
Driving whilst fatigued attitudes	ATT_FATIGUE	4	1:7	
Speeding attitudes	ATT_SPEED	4	1:7	
Perceived behavioural control (speeding)	PBC	2	1:7	Complete control – No control
Subjective norms (Speeding)	SNORM	1	1:7	Think I should not – Think I should Would disapprove – Would approve

Measure	Variable code	No. items	Scale	Details
Attitudes to driving violations scale	ADVS	7	1:5	Strongly agree - Strongly agree
Perception of risk scale	P_RISK	10	1:4	Rarely safe – always safe
Driver coping questionnaire scale	DCQ	4	1:6	Very much – Not at all
Efficacy	EFF	1	1:5	Strongly agree – Strongly disagree

* For full details of the questionnaire instruments and analysis method applied see Appendices H.3–H.5 and section 8.3.2, Paper 7.

The data collected as part of this research is available to view on Cranfield University’s institutional data repository, CORD, which preserves data for at least 10 years after project completion³⁵

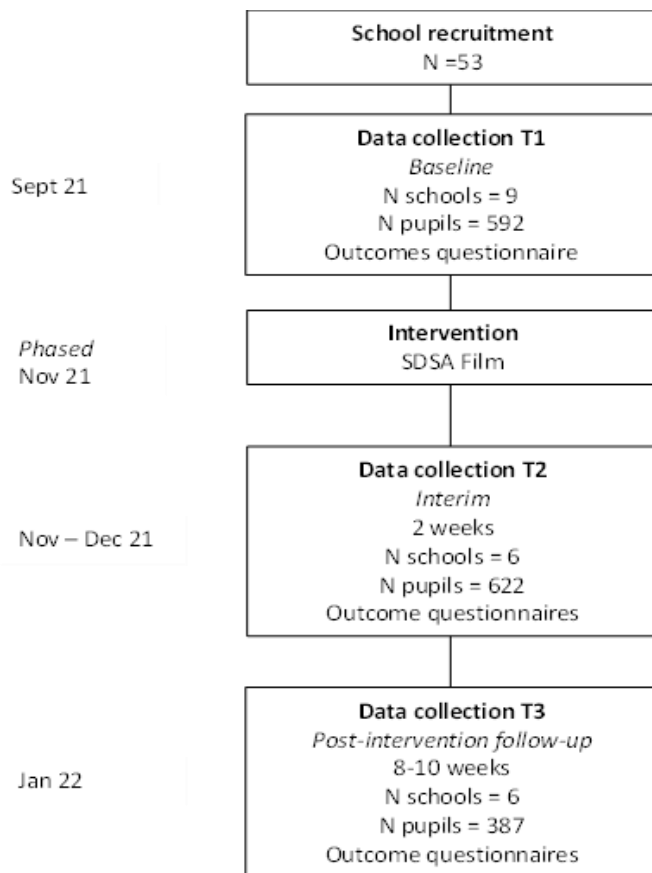
9.4 Results

9.4.1 Descriptives

A total of 592 participants from 9 schools/colleges returned a questionnaire at T1, following an initial request to participate in the study was sent to a total of 53 schools/colleges. The measurement sessions for the SDSA Surrey comparison study are outlined in Figure 9-1. The Devon control group is outlined in Figure 8-1, Section 8.4.1, Paper 7.

³⁵ See <https://doi.org/10.17862/cranfield.rd.23670651.v1>

Figure 9-1 Measurement sessions for SDSA Surrey study



Only 6 of the 9 schools/colleges that had responded at T1 were eligible to progress in the trial (i.e., 3 schools/colleges returned <30 student responses at T1 and were excluded from the trial). Following survey matching across the study period (T1-T3, using surname and school/college attendance) valid data was collected for 398 participants (Control = 210, SDSA Surrey = 188) from 17 schools/colleges. A significant drop out rate for the Devon control schools/colleges is noted and has been explained by a lack of school/college level and student motivation to complete the surveys, remote delivery of the programmes, school timetable pressures and survey length (See Section 8.4.1, Paper 7). The same level of drop-out was not experienced by the SDSA Surrey schools, which may be due to greater motivation amongst a smaller number of highly engaged schools/colleges, who were receiving an intervention (when the control group was not), which some of the schools/colleges were familiar with

from previous years. The descriptive features of the sample are described in Table 9-3.

Table 9-3 Descriptive statistics of participants in SDSA Surrey comparison study

		Control group	SDSA Surrey
<i>N</i> schools		11	6
<i>N</i> participants		210	188
Age (<i>SD</i>)		16.24 (0.49)	16.51 (0.67)
Gender	Male (%)	99 (47.2)	92 (48.9)
	Female (%)	104 (49.5)	89 (47.3)
	Unknown (%)	7 (3.3)	7 (3.7)
Driving stage	Passed test or currently learning (%)	29 (13.8)	43 (22.9)
	Learning in the next 12 mnths–5 yrs (%)	163 (77.6)	120 (63.8)
	Maybe learning at some point or never learning (%)	18 (8.6)	25 (13.3)
No. household cars	Low (0-1 cars) (%)	51 (24.3)	50 (26.6)
	Medium (2-3 cars)(%)	146 (69.5)	125 (66.5)
	High (4-5+ cars) (%)	13 (6.2)	12 (6.4)
	Unknown (%)	0 (0.0)	1 (0.5)
Ethnicity	White (%)	194 (92.4)	124 (66.0)
	Non-white (%)	12 (5.7)	61 (32.4)
	Unknown (%)	4 (1.9)	3 (1.6)
Education type	College (%)	107 (51.0)	13 (6.9)
	School (%)	103 (49.0)	175 (93.1)
Disadvantage level	Below median (%)	147 (70.0)	171 (91.0)
	Above median (%)	63 (30.0)	17 (9.0)

The chi-square tests for association that were conducted to determine differences in the proportion of socio-demographic categorical variables for 1) control participants at T1 only and T3; 2) intervention participants at T1 only and T3; 3) T3 responses for control and intervention groups found some differences in group characteristics. The control group responses at T3, in comparison to the control group at baseline were not analysed, as they have been previously explored in Paper 7, Section 8.4.1, where it was found that control group responses at T3 included fewer respondents who had passed their driving test/learning to drive, greater ‘medium’ household car ownership, fewer college students, more below median level disadvantage responses and fewer above median level disadvantage responses than at baseline (T1).

The SDSA Surrey T1 responses were more likely than the control T1 responses to be male ($X^2 (1, 1066) = 10.54, p = .001$), non-white ($X^2 (1, 1100) = 116.74, p < .001$), below median disadvantage ($X^2 (1, 1118) = 3.95, p = .047$), school students ($X^2 (1, 1118) = 291.21, p < .001$) and from low car ownership households ($X^2 (2, 1091) = 12.39, p = .002$). The SDSA Surrey responses at T3 differed from the SDSA Surrey responses at T1 by there being fewer respondents with low and high household car ownership ($X^2 (2, 505) = 6.55, p = .038$) and fewer respondents from schools/colleges with above median disadvantage ($X^2 (1, 509) = 33.47, p < .001$). The T3 responses for SDSA Surrey differed from the T3 responses for the control group in the following ways: more non-white respondents ($X^2 (1, 391) = 47.31, p < .001$); fewer respondents from colleges ($X^2 (1, 398) = 91.34, p < .001$); more respondents who had passed or were learning to drive; fewer respondents planning to learn to drive in the next 12 months – 5 years; more respondents stating either that they may or never learn to drive ($X^2 (2, 398) = 9.21, p = .010$); and more above median disadvantage respondents ($X^2 (1, 398) = 27.13, p < .001$). Collectively, the chi-square goodness of fit tests shows that there are some differences in group characteristics that should be considered in the interpretation of the study findings, as some sub-groups are not as well represented within the final T3 data for analysis. The GEE analysis employed in this study controls for socio-demographic factors and considers any variation in sample characteristics, therefore these results do not present limitations for the interpretation of the GEE analysis. At T1, both intervention and control groups were largely road safety supportive (See Table 9-4).

Table 9-4 Reliability and mean scores for socio-cognitive behavioural variables drawn from the Theory of Planned Behaviour and other measures, at baseline for control and intervention groups

Variable	Cronbach's α T1	Control group (n = 209 ^a) Mean (SE) baseline	Intervention group (n = 185 ^a) Mean (SE) baseline
INT_ALL	0.79	1.80 (0.05)	1.95 (0.07)
INT_MOB	0.90	1.39 (0.09)	1.56 (0.07)
INT_ALCO	0.70	1.08 (0.07)	1.15 (0.05)
INT_FATIGUE	0.77	2.08 (0.14)	2.27 (0.09)
INT_SPEED	0.90	1.91 (0.13) ^b	2.03 (0.09)*
ATT_ALL	0.89	1.61 (0.04)	1.63 (0.05)
ATT_MOB	0.81	1.36 (0.04)	1.42 (0.05)
ATT_ALCO	0.66	1.11 (0.02)	1.14 (0.04)
ATT_FATIGUE	0.87	1.71 (0.05)	1.78 (0.06)
ATT_SPEED	0.89	1.77 (0.07) ^b	1.69 (0.07)*
PBC	-	1.98 (0.11) ^b	2.25 (0.12)*
SNORM	0.80	1.46 (0.06) ^b	1.59 (0.08)*
ADVS	0.64	17.77 (0.23) ^b	18.07 (0.27)*
P_RISK	0.66	17.78 (0.19) ^c	17.68 (0.22)**
DCQ	0.82	8.03 (0.29) ^c	8.37 (0.31)**
EFF	-	1.63 (0.08) ^d	1.79 (0.09)***

^a Unless otherwise specified ^b n = 206 ^c n = 204 ^d n = 199, * n = 180 ** n = 171 *** n = 166

A two-way ANOVA was conducted to examine the effects of condition (Intervention/control) and response (T1 only/T1-T3 responses) at T1 for all survey scales. The results show that for INT_MOB ($F(1,1448) = 5.196, p = .023, \eta_p^2 = .004$) there was a statistically significant difference between the survey responses received at T1 by those who completed the T1 only survey and those who completed the surveys for all measurement periods. This indicates that participants who completed the survey at all measurement periods, had safer views on mobile phone intentions, in comparison to those who discontinued involvement in the study at T1. There was also a statistically significant difference found between control and intervention responses at baseline for some measures (INT_ALL, $F(1, 1448) = 9.393, p = .002, \eta_p^2 = .006$; INT_SPEED, $F(1,1385) = 3.781, p = .052, \eta_p^2 = .003$; INT_MOB $F(1,1448) = 8.226, p = .004, \eta_p^2 = .006$; INT_FATIGUE, $F(1,1448) = 6.352, p = .012, \eta_p^2 = .004$; ATT_ALL, $F(1, 1448) = 3.736, p = .053, \eta_p^2 = .003$; ATT_MOB, $F(1, 1448) = 6.981, p = .008, \eta_p^2 = .005$; SNORM, $F(1,1385) = 6.320, p = .012, \eta_p^2 = .005$). This indicates that the control group was more road safety supportive than the intervention group at baseline.

As the GEE analysis employed in this study adjusts for baseline measures, this difference is not expected to bias the results.

One-Way ANOVAs were also conducted to establish whether there was any difference in the responses (for respondents providing data at all timepoints) at T1 by sub-groups. Across half of measures a main effect of gender was found, with females reporting safer responses. This was found for one intention measure (i.e., INT_ALL, $F(1,378) = 4.747$, $p = .030$, $\eta_p^2 = .012$), all attitude measures (e.g., ATT_SPEED, $F(1, 370) = 9.992$, $p = .002$, $\eta_p^2 = .026$) and two of the six other measures (i.e., SNORM, $F(1, 370) = 10.711$, $p = .001$, $\eta_p^2 = .028$; ADVS, $F(1, 370) = 10.377$, $p = .001$, $\eta_p^2 = .027$). For the other measures there was no statistical difference between the responses of males and females (INT_MOB, INT_ALCO, INT_FATIGUE, INT_SPEED, PBC, P_RISK, DCQ, EFF). There was no differential effect by age (e.g., ATT_SPEED, $F(2,383) = 2.265$, $p = .105$, $\eta_p^2 = .012$), ethnicity (e.g., INT_FATIGUE, $F(1,385) = .369$, $p = .544$, $\eta_p^2 = .001$) or education type (e.g., P_RISK, $F(1,373) = .009$, $p = .926$, $\eta_p^2 = .000$) at T1.

A differential effect by education institution disadvantage level was found for two of the measures (i.e., INT_SPEED, $F(1,384) = 4.675$, $p = .031$, $\eta_p^2 = .012$; SNORM, $F(1, 384) = 4.531$, $p = .034$, $\eta_p^2 = .012$), with the safest responses for these measures being provided by respondents from above median disadvantage educational institutions. A differential effect by driving stage was also found for two of the sixteen measures (i.e., ADVS, $F(2, 383) = 3.657$, $p = .027$, $\eta_p^2 = .019$; EFF, $F(2, 362) = 4.165$, $p = .016$, $\eta_p^2 = .022$). For the efficacy (EFF) measure, the safest responses were provided by respondents closer to licensure (i.e., having passed their test/learning to drive), whereas for the ADVS measure, those who were planning to learn to drive in the next 12 months – 5 years provided the safer response (i.e., safer attitudes to driving violations) than those that had already passed their driving test/were currently learning to drive or those that were maybe/never learning to drive.

A differential effect by the number of household cars was found for three measures (i.e., INT_ALCO, $F(2, 391) = 3.434$, $p = .033$, $\eta_p^2 = .017$; ATT_MOB, $F(2, 391) = 5.692$, $p = .004$, $\eta_p^2 = .028$; PBC, $F(2, 383) = 3.151$, $p = .044$, $\eta_p^2 = .028$).

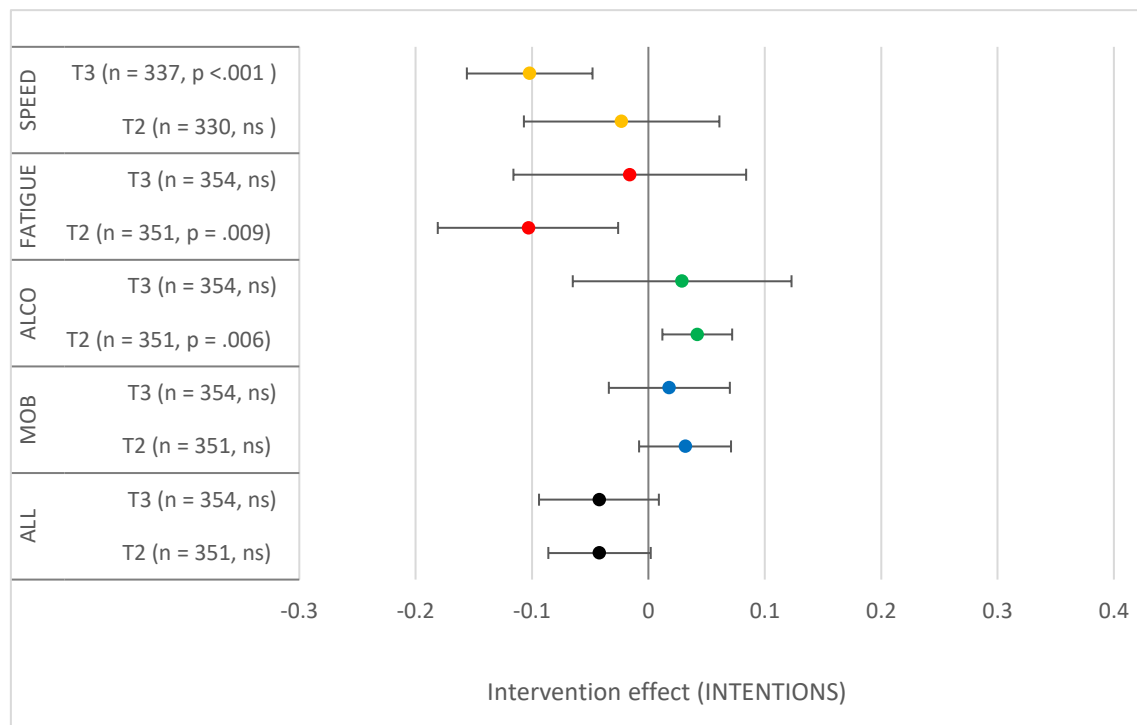
.016). For drink driving intentions, the more cars reported in a household, the safer the response. In contrast, the responses were safest for mobile phone attitudes from respondents reporting both low and high levels of car ownership. For perceived behavioural control, the safest responses came from respondents reporting medium car ownership levels. Given car ownership had been used in this study as a proxy for socioeconomic status (SES) and lower SES has been associated with increased relative crash risk (e.g., Chen et al., 2010), these findings contribute to the evidence base about the types of risk behaviours that certain sub-groups may be at greater risk from engaging in.

9.4.2 GEE results

9.4.2.1 Intentions

The GEE model outputs (See Figure 9-2) show that SDSA Surrey had a small beneficial effect on fatigue intentions at T2 and speed intentions at T3, when compared with the control condition. The intervention fatigue intention effect at T2 (Intervention vs control difference: $B = -.103$ with CI $-.181, -.026$, $p = .009$) equates to a 1/10th of a scale point improvement in fatigue intentions. Speed intention at T3, ($B = -.102$ with CI $-.156, -.048$, $p < .001$) also equates to a 1/10th of a scale point improvement in speed intentions. A non-beneficial intervention effect was also found for alcohol intentions at T2 ($B = .042$ with CI $.012, .072$, $p = .006$). As outlined in Table 9-3, it should be noted that for all measures, participants provided largely safe responses at T1, meaning that there was minimal room for improvement, which may in part explain the modest improvement in scores. Apart from fatigue intentions, there is a trend towards intentions becoming safer at T3 than at T2, although the results do not reach significance.

Figure 9-2 Intervention effect on intention outcomes presented as baseline-adjusted difference to control, with 95% Confidence Intervals

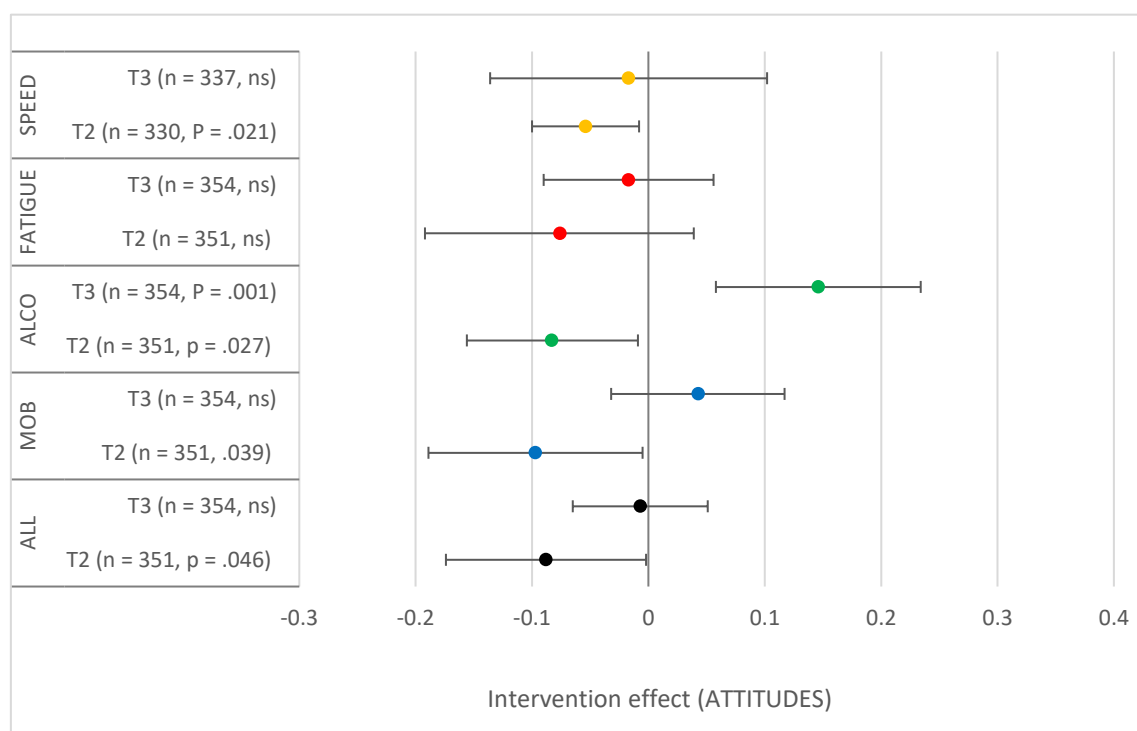


Post-hoc exploratory analyses were run to investigate sub-group differences (See Appendix H.6). The results show that there was a beneficial effect of SDSA Surrey on fatigue intentions at T2, for females ($B = -.184$ with CI $-.315, -.054$, $p = .006$), participants attending schools ($B = -.117$ with CI $-.164, -.070$, $p < .001$) which have below median disadvantage ($B = -.113$ with CI $-.185, -.042$, $p = .002$). At T3 there was a beneficial effect of the intervention on speed intentions for female participants and to a lesser extent male participants (Male: $B = -.051$ with CI $-.092, -.01$, $p = .014$, Female: $B = -.197$ with CI $-.365, -.029$, $p = .021$). There was also a beneficial effect of SDSA Surrey on the speed intentions of participants from above median and to a lesser extent below median disadvantage schools/colleges (Below median: $B = -.083$ with CI $-.157, -.008$, $p = .031$, Above median: $B = -.270$ with CI $-.349, -.191$, $p < .001$).

9.4.2.2 Attitudes

SDSA Surrey had an immediate effect on most attitudes measured, which reduced over time. Significant small beneficial effects were seen at T2 for all attitude measures apart from fatigue (SPEED: $B = -.054$ with CI $-.100, -.008$, $p = .021$; ALCO: $B = -.083$ with CI $-.156, -.009$, $p = .027$; MOB: $B = -.097$ with CI $-.189, -.005$, $p = .039$; ALL: $B = -.088$ with CI $-.174, -.002$, $p = .046$). These beneficial effects disappeared at T3 where there was also a non-beneficial effect for attitudes towards drink driving ($B = .146$ with CI $.058, .234$, $p = .001$) (See Figure 9-3). As was also the case for the intention measure, mean responses for respondents (See Table 9-3) illustrated that participants had broadly safe attitudes pre- and post- intervention, irrespective of condition.

Figure 9-3 Intervention effect on attitude outcomes presented as baseline-adjusted difference to control, with 95% Confidence Intervals



Post-hoc exploratory analyses (See Appendix H.7) run for these measures indicates that SDSA Surrey had a greater beneficial effect for females, than for males at T2 for some (e.g., T2_ATT_ALL – Male: $B = -.123$ with CI $-.225, -.020$, $p = .019$, Female: $B = -.188$ with CI $-.301, -.076$, $p < .001$), but not all measures (e.g., T2_ATT_MOB – Male: $B = -.164$ with CI $-.287, -.042$, $p = .008$, Female: $B =$

-.166 with CI -.329, -.003, $p = .046$). There were also some measures where there was greater beneficial effects for males (T2_ATT_ALCO - Male: $B = -.113$ with CI -.182, -.044, $p = .001$, Female: $B = .105$ with CI .013, .198, $p = .025$, T2_ATT_SPEED - Male: $B = -.083$ with CI -.139, -.028, $p = .003$), but the beneficial effect did not last at T3 (T3_ATT_ALCO – Male: $B = .255$ with CI -.180, .330, $p < .001$).

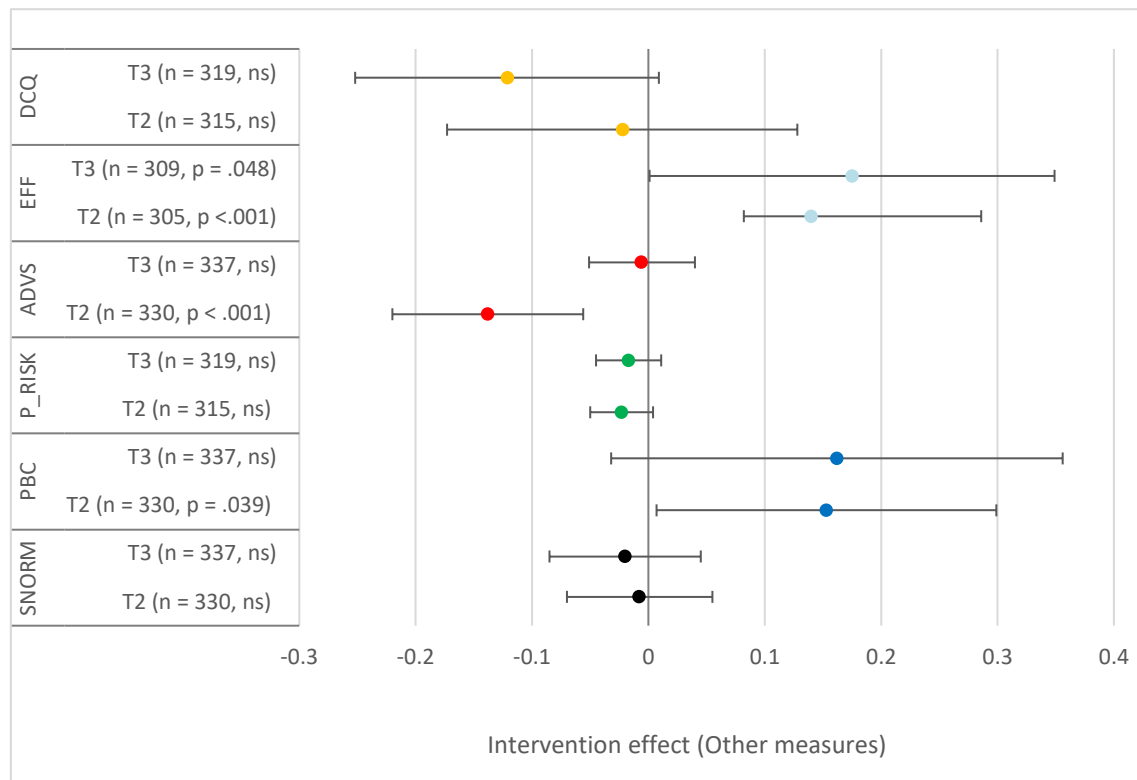
For school respondents there was an immediate beneficial effect of SDSA Surrey on mobile phone use (T2_ATT_MOB: $B = -.127$ with CI -.210, -.043, $p = .003$), drink driving (T2_ATT_ALCO: $B = -.104$ with CI -.150, -.058, $p < .001$), speeding (T2_ATT_SPEED: $B = -.038$ with CI -.076, .000, $p = .049$) and a composite assessment of all risk attitudes (T2_ATT_ALL: $B = -.138$ with CI -.185, -.090, $p < .001$). A disbenefit of the intervention for drink driving for school respondents was noted at T3 (T3_ATT_ALCO: $B = .169$ with CI .086, .252, $p < .001$).

For respondents attending schools/colleges with below median levels of disadvantage there was an immediate beneficial effect at T2 of the intervention on mobile phone use (T2_ATT_MOB: $B = -.150$ with CI -.254, -.046, $p = .005$) and drink driving attitudes (T2_ATT_ALCO: $B = -.131$ with CI -.220, -.042, $p = .004$), as well as on a composite assessment of all risk attitudes (T2_ATT_ALL: $B = -.139$ with CI -.207, -.071, $p < .001$). However, a negative effect of the intervention on drink driving attitudes was noted at T3 for participants attending schools/colleges with below median levels of disadvantage (T3_ATT_ALCO: $B = .227$ with CI .147, .307, $p < .001$). For participants from schools/colleges with above median levels of disadvantage there was an immediate disbenefit of the intervention on the composite assessment of all risk attitudes (T2_ATT_ALL: $B = .105$ with CI .013, .198, $p = .025$) and a benefit at T3 for drink drive attitudes (T3_ATT_ALCO: $B = -.176$ with CI -.260, -.092, $p < .001$).

9.4.2.3 Other measures

SDSA Surrey had some significant beneficial effects on other measures included within the survey. Immediately post-intervention (T2) there was a small beneficial effect on Attitudes to Driving Violations (ADVS) ($B = -.138$ with CI $-.220, -.056$, $p < .001$) and non-beneficial effects on Perceived Behavioural Control ($B = .153$ with CI $.007, .299$, $p = .039$) and efficacy ($B = .140$ with CI $.082, .286$, $p < .001$). No beneficial effects of SDSA Surrey were found 8–10 weeks post-intervention (T3), with a non-beneficial effect for efficacy ($B = .175$ with CI $.001, .349$, $p = .048$) (See Figure 9-4).

Figure 9-4 Intervention effect on other measure outcomes presented as baseline-adjusted difference to control, with 95% Confidence Intervals



Post-hoc exploratory analyses were run to establish whether there was any difference for significant condition results by sub-groups (See Appendix H.8). Some differences by gender were found. There was a beneficial effect of the intervention on Attitudes to Driving Violations (ADVS) at T2 for females ($B = -.201$ with CI $-.292, -.109$, $p < .001$) and to a lesser extent males ($B = -.072$ with CI $-.154, .010$, $p = .081$).

.109, -0.036 , $p < .001$). There was a negative effect of the intervention on Perceived Behavioural Control (PBC) for males at T2 ($B = .293$ with CI $.219, .367$, $p < .001$). In addition, there was a negative effect of the intervention on Efficacy (EFF) for males at T2 and T3 (T2: $B = .181$ with CI $.017, .345$, $p = .031$, T3: $B = .204$ with CI $.020, .387$, $p = .030$).

Differences were also noted for education type. A beneficial effect of the intervention at T2 on ADVS was found for schools ($B = -.219$ with CI $-.330, -.107$, $p < .001$) and there was a negative effect of the intervention at T2 and T3 on reported EFF for school participants (T2: $B = .266$ with CI $.159, .374$, $p < .001$, T3: $B = .327$ with CI $.215, .438$, $p < .001$). A negative effect of the intervention on PBC at T2 was also noted for college students ($B = .906$ with CI $.345, 1.467$, $p = .002$).

The intervention had a beneficial effect on ADVS at T2 for participants from an above median level disadvantage educational setting ($B = -.290$ with CI $-.397, -.183$, $p < .001$), which was also present to a lesser extent for participants from below median disadvantage educational settings ($B = -.135$ with CI $-.173, -.096$, $p < .001$). A disbenefit of the intervention on participant EFF scores was also found at T2 and T3 for participants from below median disadvantage educational institutions (T2: $B = .251$ with CI $.156, .345$, $p < .001$, T3: $B = .228$ with CI $.104, .351$, $p < .001$).

9.5 Discussion and conclusions

This study has examined the impact of SDSA Surrey on pre-driver intentions, attitudes and other measures immediately post-intervention and at 8–10 weeks post-intervention. The study found significant beneficial effects of the SDSA Surrey intervention on 6 out of 16 study measures at T2 (i.e., driving whilst fatigued intentions, speeding attitudes, drink driving attitudes, mobile phone use attitudes, a composite measure of all attitudes and attitudes to driving violations) and 1 out of 16 study measures at T3 (i.e., speeding intentions), with the largest beneficial effects on attitudes, which were not detectable at T3. There were also detrimental intervention effects for 3 out of 16 study measures at T2 (i.e., drink driving intentions, efficacy and perceived behavioural control associated with speeding) and 2 out of 16 study measures at T3 (i.e., drink driving attitudes and

efficacy). The study has shown, in line with existing research (See Paper 1), that the SDSA Surrey intervention had some very small positive, immediate effects, that disappeared over time, with some negative intervention effects also noted. Despite the lack of evidence for significantly large and lasting behavioural effects from pre-driver testimonial interventions (See Paper 1), interventions like SDSA Surrey remain popular with deliverers (See Paper 4), teachers and students (See Papers 6 and 9). Overall, this study strengthens understanding about the order of magnitude of effects that can be expected from interventions of this type and complements findings from earlier studies (e.g., Poulter & McKenna, 2010).

The study found that at baseline females responded more safely than males on half of the survey measurements (i.e., Intentions – speed, mobile phone use, fatigue, all; Attitudes – all, mobile phone use; and Other – speeding subjective norms). These findings add to the growing body of evidence that finds road safety intentions and attitudes can differ by sub-group (e.g., Cuenen et al., 2016; Cutello et al., 2020b).

The SDSA Surrey intervention had a small impact at T2 on two out of the ten intention measures: fatigue immediately after the intervention; and speeding 8–10 weeks post-intervention. The SDSA Surrey intervention also had a negative safety effect on alcohol intentions at T2. Post-hoc exploratory sub-group analysis found that the beneficial fatigue effect was found for females, school students and students from schools/colleges with below median levels of disadvantage. The beneficial effect on speed was found for a broader range of respondent characteristics, including positive effects for females and students from above median disadvantage schools/colleges and to a lesser extent for males and students from below median disadvantage schools/colleges. A negative intervention effect on drink driving intentions was found for males. These results are in line with those in previous studies, which finds minimal immediate intervention effects on intentions, which diminish over time (Poulter & McKenna, 2010) and have greater effects on typically lower risk sub-groups (e.g., females (Rhodes & Pivik, 2011); below median disadvantage and technical level education (Christie et al., 2008; Cuenen et al., 2016; Cutello et al., 2020b)). The

beneficial effect on speeding intentions at T3 may, in part, relate to the extent to which speeding behaviours are a key focus within interventions of this type (See Appendix B.3 and Poulter & McKenna, 2010). The longer-term effects of the intervention on speeding was beyond the scope of this study, but it should be noted that similar studies have found significant decreases in intentions to drive within the law at 5-months post-intervention (Poulter & McKenna, 2010), indicating that any positive interpretation of the intervention effecting speeding intentions should be considered within this wider context.

The study also found that the SDSA Surrey intervention had some small immediate positive effects on four out of the five T2 attitude measures (ATT_ALL, ATT_MOB, ATT_ALCO, ATT_SPEED). These effects disappeared at 8–10 weeks, apart from for drink driving, where a negative intervention effect was found. Whilst negative intervention effects, may represent real negative intervention effects, it is also probable that they could represent a statistical artefact related to floor effects associated with the questionnaire survey instrument. These short-term attitude effects have also been found previously in similar research (e.g., Cutello et al., 2020b) and therefore this research provides further evidence about the small, short-term effects of testimonial performances such as SDSA Surrey. Post-hoc exploratory sub-group analysis identified groups that were positively and negatively affected by the intervention. Whilst there were some minor variations in the results by risk type, overall, the intervention appeared to have the most positive effect on females, students from schools and students from educational institutions with below median disadvantage. There were also benefits found for males, but these were typically to a lesser extent than for females. As with the intention findings, these results match those observed in earlier studies.

Finally, the effect of SDSA Surrey on a set of other measures was tested. Of the 12 items measured (6 at T2, 6 at T3) there was only a significant effect of the intervention on 4. At T2 there was a small, positive effect on ADVS, which was not present at T3. ADVS has been identified as an indicator of collision liability which assists with identifying risky drivers (West & Hall, 1997) and therefore

SDSA Surrey only being able to effect outcomes in the short-term, indicates that the intervention did not have a lasting effect on this potentially important measure. There was also a negative intervention effect on perceived behavioural control (PBC) and efficacy (EFF) at T2, as well as at T3 for EFF. Both EFF and PBC were measured using a one-item measure. For PBC this was due to issues with scaling the two items asked from the survey, as the items did not have internal consistency (See Appendix H.5). The measure reported, was the one out of the two measured that appeared to have the greatest level of consistent respondent understanding. As both measures are composed of only one-item, the reliability of the measure is in doubt. Whilst it is feasible that the SDSA Surrey intervention resulted in detrimental PBC and EFF effects, this result should be treated with caution given the construction of these measures. Post-hoc sub-group analysis exploring the positive immediate intervention effect on ADVS, as with other measures, found a positive effect for females (and for a lesser extent males), for students from schools, from educational settings with above median levels of disadvantage (and to a lesser extent below median levels of disadvantage). The disbenefit of the intervention on EFF and PBC measures was found to principally relate to males, students from schools and students from below median levels of disadvantage education establishments. As already outlined in paper 7, which found similar results for EFF and PBC, if this finding could be replicated by future research, the results would provide an important contribution to theoretical understanding (i.e., changes to PBC can be beneficial for safety, but it depends on the sub-group targeted). Together the studies reported in Papers 7 and 8 provide early evidence of an effect worth exploring further in future research.

The methods used for this study, including the comparison study design and GEE analysis, could be applied to similar future studies. The findings will be of interest to academics working in the field of traffic and transport psychology as well as to policy makers and practitioners that are tasked with the delivery of ensuring effective intervention development. The findings make several contributions to the current literature (i.e., intervention and sub-group effects). The respondent sample used within this study, includes several biases. Several tests were run on the data ahead of the study outcomes analysis which show that there is a chance

that the valid sample at T3 used for this study was safer than those respondents at baseline who subsequently dropped out of the study. Even though this was only noted for one measure (INT_MOB), it is important to recognise that the results of this study are likely to be providing results about the effects of the intervention on a safer than average group of respondents. Whilst there were also differences noted between the baseline responses provided by SDSA Surrey and the Devon control groups (See Section 9.4.1), because the GEE analysis employed within this study adjusts for baseline measures, these differences are not considered to have biased the results. The chi-square tests run on the categorical variables (e.g., gender, education type etc.) also found that there were differences in the proportions of these groups in both the intervention and control group and in comparison, to the baseline only data. Control valid T3 responses, contained fewer college students and more below median level disadvantage respondents than at baseline only and SDSA Surrey valid T3 responses also contained fewer respondents from above median disadvantage schools/colleges than the SDSA Surrey baseline only responses, which provides some indication that the valid T3 data from both control and SDSA Surrey conditions included respondents that were likely to be safer than the broader cohort (See Christie et al., 2008) a finding that is important to consider when interpreting the results. Recruiting and delivering at the school/college level for this study has helped to minimise individual participant recruitment bias, but it was not possible to remove all bias from within the sample.

There were also some differences between the valid T3 data for both the control and SDSA Surrey conditions, with there being more non-white and above median level disadvantage respondents in the SDSA Surrey valid T3 condition. Given previous research indicates that ethnicity and disadvantage impacts on safety outcomes (Christie et al., 2008), there is a risk that the SDSA Surrey sample contained fewer safe respondents than the Devon control condition. The use of GEE analysis is particularly important given these sample variations, as socio-demographic factors were controlled for to ascertain the intervention effect.

The limitations expressed in Paper 7, Section 8.5 also apply to this study. In addition, conducting a comparison study, instead of a cluster randomised controlled trial (as adopted for Paper 7), is an important study limitation. A best available comparison group, which was not selected from the same population as the SDSA intervention group, was used instead of a more robust control group. Despite these limitations, a major strength of the study has been that it was conducted in parallel with the study reported in Paper 7, which has allowed for a comparative analysis of intervention effects (See Chapter 10), which consequently helps to inform the development and delivery of future pre-driver education interventions.

10 PAPER NINE – PROCESS EVALUATION OF DRIVEFIT AND SDSA SURREY

10.1 Abstract

Process evaluations seek to establish how an intervention is delivered and perceived by those involved (Sentinella, 2004). It also aims to understand what an intervention does to result in change and is important for understanding why an intervention does or does not work. Whilst increasing numbers of process evaluations are being published (e.g., Scott-Parker et al., 2018) they are still infrequently conducted for road safety interventions.

The purpose of this study has been to examine student, teacher, deliverer and facilitator experiences and perspectives of the DriveFit and SDSA Surrey interventions using a mixed method approach to provide insights for future intervention design. Student participants (DriveFit: $n = 186$; SDSA Surrey: $n = 161$) and teachers (DriveFit: $n = 27$; SDSA Surrey: $n = 26$) provided responses to questionnaires pre- and post-intervention. Student between-group differences were tested with two-way ANOVAs. Data from interviews with DriveFit facilitators ($n = 2$) and programme deliverers (SDSA Surrey: $n = 2$, DriveFit: $n = 2$) was also analysed.

The study found that, overall, the interventions were delivered as intended and that trial recruitment procedures were adhered to. Both interventions were rated as having a positive cognitive impact (i.e., credible, useful, interesting, important and informative) and good levels of face validity (e.g., I am now more aware of my responsibilities as a passenger). SDSA Surrey was rated as having a negative emotional effect (i.e., shocking, worrying and frightening). DriveFit was not rated as having a negative emotional effect. Some sub-group differences were noted for DriveFit. Females and college students rated the intervention as having a stronger positive cognitive and negative emotional effect than males and school students. Females also rated DriveFit as having greater face validity than males. Barriers and facilitators to intervention delivery included teacher engagement, student interest, delivery logistics and for DriveFit the workshop design. Trial

complexity, the lack of face-to-face delivery and provision for road safety education within the curriculum were also identified barriers. The paper concludes with recommendations for the design and delivery of future process evaluations and makes some recommendations for potential developments to the DriveFit intervention.

10.2 Introduction

Understanding recipients and deliverer perspectives is important for determining effective intervention components, which can provide insight to inform future intervention design. Process evaluations are *“used to monitor and document program implementation and can aid in understanding the relationship between specific program elements and program outcomes”* (Saunders et al., 2005, p.134). Process evaluations are important for measuring change mechanisms to better understand how intention-influencing interventions work, which subsequently supports the testing of psychological theory in practice (Abraham, 2015).

A limited, but growing number of pre-driver intervention process evaluations have been published in recent years (e.g., Scott-Parker et al., 2018). Where intervention process evaluations are available, they vary in the content covered and the level of detail provided. For example, the process evaluation conducted for the US Steering Teens Safe intervention (Ramirez et al., 2012), provided detailed information about the intervention implemented as well as outlining the programme’s acceptability amongst parents, whereas other studies provide less detail (e.g., RRISK programme, Zask et al., 2006), making it harder to understand intervention components and the use of process evaluation data in subsequent studies. Pre-driver interventions which report extensive process evaluation information include Teen Driving Plan (TDP) (Mirman et al., 2012), The Situational Awareness Fast-Tracking, including identifying Escape Routes (SAFER) intervention (Scott-Parker et al., 2018) and Talking with Teens about Traffic Safety (Mirman et al., 2018), all of which found support for interventions trialled, with the TDP and Talking With Teens about Traffic Safety interventions reporting that the interventions were implemented as intended.

The limitations of focusing solely on process evaluations, as opposed to observed behaviour change and crash outcome data has been well recognised (e.g., Lennon et al., 2016) and commonly process evaluations are described as out of study scope (e.g., Mayhew et al., 2014a; Road Safety Analysis, 2015) for those focusing on outcome evaluations, despite the recognised importance of conducting both study types, particularly before large-scale intervention roll out (Mirman et al., 2018).

This paper reports on the process evaluation of the two pre-driver interventions (SDSA Surrey and DriveFit), which have been found to have both positive and negative outcomes for 16–18 year old pre-drivers (See Papers 7 and 8). The conceptual framework described by Saunders et al. (2005), which covers multiple components of the interventions (i.e., fidelity, dose delivered, dose received, reach, recruitment, context, See Appendix I.1 for further details) has been used to frame the process evaluation conducted. Medical Research Council guidance (Moore et al., 2015) on process evaluations for complex medical intervention stresses the importance of assessing dose received in a broad sense (i.e., acceptability and satisfaction, not just passive dose received), which has been taken account of in this study. The SDSA Surrey and DriveFit experiences of adolescent participants, teachers, facilitators and deliverers are described. The specific objectives are:

1. To explore how participants (students and teachers) experienced the DriveFit and SDSA Surrey interventions and to analyse their satisfaction and emotional response to intervention components;
2. To explore how programme deliverers (facilitators and delivery agencies) experienced the DriveFit and SDSA Surrey interventions, to establish whether the interventions were delivered as intended; and
3. To analyse all collated qualitative data to establish learning for future intervention design.

10.3 Method

This process evaluation examines the action model for both the DriveFit and SDSA Surrey interventions. The process evaluation questions used within the study emulated those depicted in Saunders et al. (2005) process-evaluation plan to assess the implementation of a targeted health promotion intervention. They have also been developed with reference to Medical Research Council guidance for conducting process evaluations of complex interventions (Moore et al., 2015). Full details were included in the ISRCTN trial registration for the research (Box, 2021b). The process evaluation plan for the interventions can be seen in Appendix I.1.

The process evaluation has involved a mixed-method assessment of student, facilitator, teacher and deliverer experiences and perspectives of intervention delivery, feasibility, acceptance and barriers/facilitators to participation. Reach (e.g., number of students that participated in the intervention) and dose received (e.g., delivery of intervention) was established using Vimeo download information and facilitator records from the DriveFit intervention were also used to establish workshop attendance. DriveFit intervention facilitators were also provided with a logbook to record intervention delivery dates and any other descriptive notes at T2. Classroom observation for the workshops delivered as part of the DriveFit intervention were also conducted for a random sample ($n = 11$) of workshops delivered across several of the schools/colleges ($n = 7$) to complement other qualitative methods.

The quantitative component of the evaluation included process evaluation questions was embedded in the outcome questionnaires, which were completed by students and teachers at T2. The qualitative component of the process evaluation included individual interviews with facilitators and deliverers. Unfortunately, it was not possible to run all process evaluation elements as outlined in the trial protocol (Box, 2021b) as there was a lack of participants for the focus groups and interviews from schools/colleges post-intervention, even though several students agreed to take part in post-intervention focus groups (DriveFit: $n_{\text{student}} = 19$, $n_{\text{school/colleges}} = 7$; SDSA Surrey: $n_{\text{student}} = 8$, $n_{\text{school/colleges}} =$

4). Despite repeated attempts to book online focus group sessions with the participating schools/colleges, it was not possible to run these sessions as intended, which reduced the richness of data available. A brief description of the evaluated interventions followed by the design and procedure for the collation of quantitative and qualitative data is outlined in the sections that follow.

10.3.1 Evaluated interventions

10.3.1.1 DriveFit

The DriveFit intervention consisted of a 40-minute film delivered in the classroom followed by a 45-minute facilitated workshop within 2-weeks of watching the film. The intervention was developed following an evidence-based iterative approach (See Paper 6). The film was delivered in a talk show style, with expert guests providing demonstrations, information and tips. The 45-minute online workshop was delivered by a professional facilitator, using the ORID focused conversation framework (ICA-UK, 2014) and encouraged participants to commit 'if-then' implementation-intentions (Gollwitzer, 1999) to postcards for them to retain. Topics covered by the film and workshop included managing the learning to drive process and addressing risky driving behaviours associated with speeding, tiredness, mobile phone use and intoxicated driving (drink and drug driving). A full description of the DriveFit intervention is available in section 7.3.1, Paper 6. An evaluation of DriveFit (See Paper 7) found beneficial intervention effects for 9 out of the 16 study measures immediately post-intervention (T2) and for 8 out of the 16 measures at 8–10 weeks post-intervention (T3). Overall, the intervention was found to have small, but longer lasting attitude effects, which diminished over time. A trend towards improved intentions over time in comparison to the control condition was also seen.

10.3.1.2 Safe Drive Stay Alive (SDSA) Surrey

The SDSA Surrey intervention consisted of a 60-minute negatively framed testimonial film where contributions from emergency service personnel, bereaved family members and road traffic collision victims emphasised the consequences of unsafe road user actions, with the aim of encouraging participants to consider and change their road safety attitudes, intentions and behaviours. The

intervention has been running since March 2005 as a live testimonial intervention in theatres. The online film tested in this study (and Paper 8) was created in response to the Covid pandemic, which meant that students were not able to attend large gatherings. The online film takes the same approach as the live show, which has been developed based on professional experience. A full description of the SDSA Surrey intervention is available in Section 9.3.1, Paper 8 and in Appendix B.3. An evaluation of SDSA Surrey (See Paper 8) found significant beneficial effects for 6 out of the 16 study measures at T2 and 1 of the 16 study measures at T3. Overall, the intervention led to some small improvements in risk intentions, attitudes and other measures at T2, with minimal positive and some negative intervention effects at T3.

10.3.2 Design and procedure

10.3.2.1 Quantitative data

Process evaluation questionnaires were administered at T2 (i.e., immediately post-intervention) for students and teachers in intervention schools/colleges. Student participants were asked questions to assess their cognitive (COG_FILM and COG_WRKSH) and emotional (EMO_FILM and EMO_WRKSH) response to the interventions, using measures devised by Cuenen et al. (2016) (See Appendices I.2 and I.3), which were scaled so that lower values represented more supportive responses. Data on gender and education type were derived from self-reported questionnaires administered (See Appendices G.4 and H.4). Emotional response was evaluated to assess whether the interventions were received as intended (i.e., not evoking fear). The face validity of the interventions (FCVALD) was also tested through adapting six item measures previously used for the assessment of the Safe Drive Stay Alive testimonial programmes delivered in Surrey and Greater Manchester, UK (Road Safety Analysis, 2015). Participants were asked to provide any further comments about the interventions and select whether they would like to take part in a focus group to discuss their views and experiences of the interventions.

Teachers were also provided a feedback form to complete following the delivery of the interventions. Questions were asked about how easy the interventions were to access and deliver, whether the interventions maintained student attention, the extent to which the interventions had an emotional and/or cognitive impact on the class and whether teachers thought the interventions had any impact on their class's attitudes and feelings of control around learning to drive and driving when newly licensed. Space was also provided for teachers to suggest improvements and provide general comments about the interventions (See Appendices I.4 – I.6).

10.3.2.2 Qualitative data

Interviews with facilitators (DriveFit: $n = 2$) and deliverers (DriveFit: $n = 2$, SDSA Surrey: $n = 2$) took place during three online interviews following intervention delivery. These interviews were conducted using an interview guide which addressed four of the six process evaluation objectives (i.e., fidelity, dose received, recruitment and context) (See Appendix I.7), with relevant information also collated on reach and dose delivered. Participants were also encouraged to discuss other additional issues of relevance. These interviews were recorded and transcribed verbatim, with broad themes derived from the process evaluation questions, with example quotes selected to represent the data.

10.3.2.3 Analysis

Qualitative data was analysed using thematic analysis with transcripts coded using NVIVO release 1.6.1. Pre-defined categories were used to code the interview responses based on the process evaluation questions (i.e., fidelity, dose delivered, dose received, recruitment and context) and to reflect future intervention improvements suggested.

The quantitative survey results were analysed using SPSS version 28. To establish whether there were any significant between-group differences for student process evaluation responses, for DriveFit two-way ANOVAs were conducted to examine the effects of gender (male/female) and education type (school/college) on cognitive, emotional and face validity responses. Two-way ANOVAs were also planned to examine the effects of gender and education type

on these measures for the SDSA Surrey intervention. However, given there were no female students from colleges within the sample, one-way ANOVAs were conducted separately for gender and education type.

10.4 Results

10.4.1 DriveFit

10.4.1.1 Fidelity, reach and dose delivered

Overall, the intervention was implemented as intended, with facilitators reporting the consistent delivery of the interventions (See Appendix I.10). The facilitation team reported working well with schools/colleges and the DriveFit delivery team to book and organise the sessions (See Appendix I.10), with the use of only two facilitators increasing the consistency of the delivery. The Vimeo viewing analytics indicate that the DriveFit film was watched by the participating schools and colleges as set out in the trial protocol (i.e., up to 2 weeks before online workshop delivery) which was further confirmed by the facilitator logbook entries. Teachers who responded to the post-intervention surveys reported that a total of 865 students had watched the DriveFit film and 530 had taken part in the workshop (Film survey: $n_{Teacher} = 27$, $n_{School} = 9$; Workshop survey: $n_{Teacher} = 16$, $n_{School} = 9$). The online facilitators logbook showed that 31 workshops had been delivered to a total of 779 students. As a result of Covid absences, there were a few cases reported by students and teachers (via survey feedback) where the film had not been watched by some individual students ahead of the workshop and there was also a reduced number of students in workshops in some instances (See Appendix I.10). A random sample of workshops ($n = 11$) was observed by the researcher, all of which were delivered by the facilitators to protocol. A degree of variation of delivery, in terms of class sizes, level of discussion and session length was introduced through individual teacher preferences, participation and interest levels, which was noted as part of the workshop observations and through facilitator feedback (i.e., *“You know, when it’s your fourth session at the end of the day and kids are listening in, the teachers are doing nothing [the length of the session] can sometimes move more towards the 35 minute mark more than the 45 minute mark”* (FAC2)). The handing out of

hard copy materials was also described as inconsistent by the workshop facilitators (See Appendix I.10) and the availability of mobile phones to support the polling activities was a limitation for a handful of students (See Appendix I.10). The post-workshop survey was also reported to — in some instances — take longer to complete than expected and one of the facilitators reported that the way in which the survey was being completed differed by class (See Appendix I.10). Both the film and the workshops prompted students to review the www.drivefit.info website, to review further information discussed during the programme. The website analytics showed very low levels of traffic ($n = 254$) during and immediately after the delivery of the programme between Nov 21 and Jan 22, which indicates that this information source was not well used.

10.4.1.2 Recruitment

All school and participant recruitment procedures set out within the trial protocol (Box, 2021b) were adhered to as part of the study recruitment (See also Paper 7, Section 8.3.2). The main deliverer (DEL1) said they received typical responses from schools/colleges that they normally engage with and also received interest from some schools and colleges that they had not previously been in contact with. Recruitment to the trial was described as *“labour intensive because that is the nature of it”* (DEL1) and *“It was definitely a bit of a hard sell trying to persuade people who were on the fence”* (DEL1). With regard to the role of incentives in supporting recruitment the deliverer said, *“I think an incentive was being part of a national trial...I think there’s quite a lot of interest in being involved in research, which heartens me you know”* (DEL1). They also said that the motivation for schools/colleges to be involved with the study mainly related to teaching their students about road safety, as opposed to being motivated by financial participation incentives.

Uncertainty about what was being asked of them was a challenge for some schools and colleges (i.e., *“There were, I would say, a small percentage of teachers who needed further explanation, because they couldn’t be bothered to read the letter before being honest...I think it required teachers to be quite on the ball”* (DEL1)). The deliverer said that providing a step-by-step process for

schools/colleges to follow was important (i.e., “*What teachers need is an email, they don’t really like attachments*” (DEL1)), but they did not think that more could have been done regarding the trial, “*I think teacher workload means that they’re already in overload and you give them a load more stuff to do and it [their workload] just explodes*” (DEL 1).

10.4.1.3 Dose received

10.4.1.3.1 Student feedback

On average, the student participants agreed that there was a positive cognitive benefit of the DriveFit film and workshop (i.e., the intervention was credible, useful, interesting, important and informative), with slightly higher levels of agreement about the film (1 = strongly agree, 5 = strongly disagree, Film: $M = 2.05$, $SE = 0.06$, $n = 186$; Workshop: $M = 2.12$, $SE = 0.05$, $n = 186$) (See Figures I.11-1 and I.11-2, Appendix I.11). There was also disagreement that the intervention had a negative emotional effect (i.e., the intervention was shocking, worrying and frightening) (1 = strongly disagree, 5 = strongly agree, Film: $M = 2.89$, $SE = 0.06$, $n = 186$; Workshop: $M = 2.81$, $SE = 0.06$, $n = 186$) (See Figures I.11-3 and I.11-4, Appendix I.11). Students also agreed that the intervention was enjoyable (1 = strongly agree, 5 = strongly disagree, Film: $M = 2.72$, $SE = 0.08$, $n = 186$; Workshop: $M = 2.49$, $SE = 0.07$, $n = 186$) and neither agreed nor disagreed that the intervention was boring or surprising (See Figure I.11-5, Appendix I.11) In terms of the face validity (FCVALD) of the programme, on average participants agreed that the DriveFit programme was beneficial (e.g., I am now more aware of my responsibilities as a passenger) (1 = strongly agree, 5 = strongly disagree, $M = 2.21$, $SE = 0.05$, $n = 186$) (See Figure I.11-6, Appendix I.11).

Two-way ANOVAs conducted to examine the effects of gender and education type on all cognitive and emotional measures, found that there was a main effect of gender for the cognitive scores of the DriveFit film ($F(1,177) = 10.86$, $p = .002$, partial $\eta_p^2 = .054$) and workshop ($F(1,177) = 5.28$, $p = .023$, $\eta_p^2 = .029$), with females rating both the film and workshop as having greater positive cognitive value than males. A main effect of education type was also found for the cognitive

scores of the DriveFit film ($F(1,177) = 17.07, p < .001, \eta_p^2 = .074$) and workshop ($F(1,177) = 7.40, p = .007, \eta_p^2 = .040$) indicating that college students found the intervention to be slightly more useful, important, credible, interesting and informative than school participants (See Figures I.11-7 and I.11-8, Appendix I.11).

A main effect of gender was also found for the emotion scores for the DriveFit film (EMO_FILM) ($F(1,177) = 7.51, p < .001, \eta_p^2 = .066$) and workshop (EMO_WRKSH) ($F(1,177) = 5.21, p = .024, \eta_p^2 = .029$). A main effect of education was also found for the emotional scores of the film ($F(1,177) = 8.46, p = .004, \eta_p^2 = .046$) and the workshop ($F(1,177) = 20.75, p < .001, \eta_p^2 = .105$). These results indicate that males and school students found the intervention to be less shocking, worrying and frightening than females and college students (See Figures I.11-9 and I.11-10, Appendix I.11). A further two-way ANOVA was conducted to examine the effects of gender (male/female) and education (school/college) on face validity scores (FCVALD). A main effect of gender was found ($F(1, 177) = 10.385, p = .002, \eta_p^2 = .055$). This indicates that females agreed more strongly than males that the DriveFit programme had provided benefits and/or impacted on their driving behaviours (See Figure I.11-11, Appendix I.11).

Students were also asked about their expected use of the DriveFit website and their sharing of information from the DriveFit programme. Overall, they agreed that they expected to view and share the website, but they neither agreed nor disagreed that they would share information about/from the DriveFit programme (See Table I.11-1, Appendix I.11). Only a small number of open text comments ($n = 6$) were received from students providing their general view of the DriveFit programme. The main criticisms raised about the intervention in these comments was that it covered information students were already aware of and that it was not engaging enough (See Table I.11-2, Appendix I.11).

At T3, several comments were made about needing to complete a further survey (i.e., “*This is the same test we had to do last time*” and “*Why is there another survey*”) which potentially illustrates a level of frustration amongst the students about completing the surveys.

10.4.1.3.2 Teacher feedback

Twenty-seven teachers from 9 of the 11 participating schools/colleges provided feedback on the DriveFit film and 16 teachers from 9 schools/colleges provided feedback on the DriveFit workshop. Most teachers reported that their students had not received any other road safety education over the past 6 months ($n = 23$), with the remainder reporting that students had received some other road safety education over this time ($n = 1$) or that they did not know ($n = 2$). The teachers who responded to the question about what aspects of the curriculum the DriveFit film fulfilled for the age group, said it fulfilled the Personal, Social Health and Economic (PSHE)/Life Skills In Enrichment curriculum ($n = 5$). Other curriculums were also mentioned (i.e., Spiritual, Moral, Social and Cultural development (SMSC) and Personal Development Programmes (PDP)). Overall, the teachers described accessing the film and workshop to be very easy (1 = very easy, 5 = not at all easy, Film: $M = 1.40$, $SE = 0.16$, $n = 25$; Workshop: $M = 1.71$, $SE = 0.20$, $n = 14$) and strongly agreed that ‘The information provided ahead of the delivery of the DriveFit film was clear and easy to understand’ (1 = strongly agree, 5 = strongly disagree, $M = 1.60$, $SE = 0.15$, $n = 25$). The teachers also agreed with this statement when thinking about the workshop information provided ahead of delivery (1 = strongly agree, 5 = strongly disagree, $M = 1.71$, $SE = 0.16$, $n = 14$). In addition, the teachers agreed that the students were able to fill in their post-workshop online questionnaires without any difficulty (1, strongly agree, 5 = strongly disagree, $M = 2.00$, $SE = 0.31$, $n = 14$). The information, hints and tips provided by the film (1 = very much so, 7 = not at all, $M = 2.61$, $SE = 0.21$, $n = 23$) and workshop ($M = 2.17$, $SE = 0.27$, $n = 12$) were also reported as being pitched at the right level for students. However, teachers reported that the DriveFit film only maintained average levels of attention amongst the class (0 = did not hold the classes attention at all, 10 = maintained very high levels of attention, $M = 5.87$, $SE = 0.28$, MIN = 3, MAX = 8, $n = 23$). The

DriveFit workshop, in contrast, was rated slightly higher for maintaining attention amongst the class ($M = 6.08$, $SE = 0.62$, $MIN = 1$, $MAX = 9$, $n = 12$).

Teachers agreed that the DriveFit film and workshop had positive cognitive value (1 = strongly agree, 5 = strongly disagree, Film: $M = 2.10$, $SE = 0.08$, $n = 23$; Workshop: $M = 2.20$, $SE = 0.14$, $n = 12$) (See Figure I.12-1, Appendix I.12) and that it was beneficial for students (1 = strongly agree, 5 = strongly disagree, Film: $M = 2.17$, $SE = 0.09$, $n = 23$; Workshop: $M = 2.09$, $SE = 0.12$, $n = 12$) (See Figure I.12-1, Appendix I.12). On average, the teachers also disagreed that the DriveFit film and workshop had a negative emotional effect (1 = strongly disagree, 5 = strongly agree, Film: $M = 2.43$, $SE = 0.13$, $n = 23$; Workshop: $M = 2.11$, $SE = 0.29$, $n = 12$) (See Figure I.12-2, Appendix I.12). Finally, teachers were asked to rate the DriveFit intervention on a scale of 1-10 (1 = poor, 10 = excellent). All elements of the intervention were rated as average, or just above average, with the DriveFit workshop securing the highest average score ($M = 6.75$, $SE = 0.35$, $MIN: 5$, $MAX: 9$, $n = 12$) (See Figure I.12-3, Appendix I.12). Several teachers ($n = 9$) provided feedback on what they liked and disliked about the intervention overall. Teachers reported liking the resources provided alongside the programme ($n = 1$) and the active learning used in the workshop ($n = 2$). They also reported disliking the film not being engaging enough ($n = 3$) and too long ($n = 1$) as well as expressing a preference for interventions received in previous years which focused more heavily on fear appeal and shock ($n = 3$) (Figure I.12-4, Appendix I.12).

10.4.1.3.3 Facilitator and deliverer feedback

The facilitators and deliverers ($n = 4$) reported being satisfied with the delivery of the intervention, but two of them raised several reservations about the film (i.e., *"I wasn't particularly convinced about the film itself"* (FAC2) and *"I'm not sure, I'm still not 100 per cent sure I really liked it, I'm not sure it was quite pitched for the right audience. If I'm being really totally honest"* (DEL2)). The facilitator that held this view further elaborated saying *"I think it felt a little kind of expert heavy"*. They went onto describe the film as not being diverse enough in its cast, with the length of the film and lack of visual anchors seen as limitations. They also questioned

whether young people had been involved in the design of the film (See Table I.13-1, Appendix I.13). The aspects of the intervention that this group thought went well included the design and delivery of the workshops (i.e., *“I think it was great that it was like a human interaction, like, you know, we were there, we were asking them to do things”* (FAC1) and *“I was really impressed with Mentimeter...It clearly got people going”* (DEL1)). The difficulty of delivering the intervention online was also noted (i.e., *“It is hard to engage people online”* (DEL2) and *“I wouldn’t have liked to have been in that [facilitator] position...if you get a hard crowd, when if you’re not there in person, it’s difficult to manage”* (DEL1)).

The intervention facilitators and deliverers were also asked their perspectives on teacher and student satisfaction based on their interactions with these groups during delivery. No adverse responses from teachers were reported and the facilitators reported students being engaged with the if-then planning workshop exercises and online polling (See Table I.13-1, Appendix I.13). An above average engagement rating (1 = poor, 10 = excellent) was provided by the researcher for the workshops based on the sessions observed ($M = 6.2$, $SE = 0.30$, MIN: 5, MAX: 8, $n_{\text{workshops}} = 11$, $n_{\text{schools}} = 7$). The facilitators provided a similar, slightly higher rating for all of the workshops delivered ($M = 6.8$, $SE = 0.19$, MIN: 4, MAX: 9, $n_{\text{workshops}} = 31$). Recall of the film was described as mixed, *“I think people remembered the kind of highlight bits...I think trying to get them to think back to the film. I think some of them struggled with that”* (FAC2). Considering engagement levels one of the facilitators stated, *“I think overall engagement levels were fine. I think there's always a difficulty engaging online...I think at times it was quite hard to keep them on focus, on track”* (FAC2) (See Table I.13-1, Appendix I.13 for further details).

10.4.1.4 Context

Several barriers and facilitators to the DriveFit programme related to teacher engagement, student interest, delivery logistics and workshop design were highlighted by the facilitators and intervention deliverers (See Table 10-1 below and Table I.14-1, Appendix I.14 for further details).

Table 10-1 Barriers and facilitators to the DriveFit programme identified by facilitators and intervention deliverers

Theme	Barrier(s)	Facilitator(s)
Teachers	Scheduling sessions	Buy-in to deliver interventions
	Time constraints in considering intervention information	Having a 'point person' in schools/colleges to engage with
	Interference with intervention delivery	Engaged to support workshops
	Unsupportive of workshop session	
Students	Student interest and engagement	Student interest and engagement
	Student driving status	
Delivery logistics	Administration of the trial	Following up with schools/colleges to book sessions
	Time of day	Small number of facilitators delivering the programme
Theme	Barrier(s)	Facilitator(s)
	Technical issues	Existing deliverer relationships with schools/colleges
	Larger workshop groups	Online data collection
Workshop design	Online versus face-to-face delivery	Online workshop delivery
	Use of online resources	Workshop interactivity
	Task structuring	
	Repetition of sessions for facilitators	

Several suggestions were also made about how the intervention could be improved. Having 10-minutes of film interspersed with workshop elements, as well as having a mechanism for the facilitator to keep track of what is written by the students (when the intervention is delivered online) was proposed (FAC2). Having a virtual pre-recorded delivery format, with good quality teacher guidance was described as feasible (FAC1), although potential limitations were noted (i.e., *“Yeah, I mean, to be honest, I think it's really hard to do anything where it's pre-recorded or teacher led because it's just not going to get the same impact [as facilitator lead content]”* (FAC2)). Creating and providing local content within a national programme was described as *“not an insurmountable barrier”* (FAC1) and it was suggested that *“it would be great to get more young people involved in this, this part of it [the design of the intervention]”* (FAC2). Having intervention facilitators that were not road safety experts was not seen to limit the delivery of the intervention (i.e., *“I don't think it was that much of an issue...nine times out of 10, when we're delivering and running workshops, we don't know the content in that way anyway”* (FAC1)). Workshop groups including 20–30 students were described as optimal (FAC2) and having the students working as one group

rather than individually on computers was also thought to be preferable for online delivery when there is a teacher in the room to actively support the group. The alternative would have meant *“engaging with the students would have been much heavier on our side”* (FAC1). In addition, one of the facilitators highlighted that *“there is a mental health thing”* (FAC1) about people not wanting to be seen on screen, which meant addressing individuals within a group, rather than on individual screens might be more appropriate, particularly for this target audience. Several film improvements were suggested, as the film was described as *“all at one energy level...I think you need to alternate energy levels to keep young people involved”*, with the suggestion made to emphasise personal stories which *“focus more on making good decisions”* as well as *“adding in a quiz question every few minutes”* (FAC2) to help maintain attention and engagement levels.

In thinking about future provisions one of the deliverers stated that, *“I think we're all coming to the conclusion that what we need is a variety of tools in our toolbox, one of which would be a terrific film sort of thing. Maybe some modular stuff, maybe a large venue, maybe a small group, etc. And we just try and hit people with whatever they're willing to take...It's got to be a balance”* (DEL1). The need for virtual provisions post-pandemic was also presented, *“Going forward, I think it's essential that we have something virtual to offer classes, so being able to give them something where they press play and the students get educated regardless...I think that's a necessity”* (DEL1). Concerns were also expressed about the structural issues related to the ease of engaging with schools and colleges, *“What I'm really starting to think is that somebody needs to lobby government to make road safety a key part of key stage five learning”* (DEL1).

Several teachers ($n = 9$) also suggested some improvements for the delivery of the DriveFit film which fell into three main categories: Increasingly the level of interactivity with the film especially given the film length ($n = 4$); addressing technical sound related issues ($n = 3$); and improving pre-intervention organisation and delivery timing ($n = 2$) (See Table I.15-1, Appendix I.15). Several teachers ($n = 4$) also outlined some technical and organisational issues which they experienced with the workshop (e.g., *“Not all students had access to mobile*

phones”, See Table I.15-2, Appendix I.15 for further details). When asked whether there were any improvements that could be made to the DriveFit film to increase accessibility and inclusivity, particularly for SEN students, several suggestions were made. These included reducing the discussion and length of the film ($n = 4$), including more hard hitting content (e.g., focusing on collision scenarios) ($n = 2$), increasing the diversity within the film ($n = 1$), ensuring a greater complexity of information is available for those with prior knowledge ($n = 1$) and ensuring that subtitles were available ($n = 1$) (See Table I.15-3, Appendix I.15). The respondents to the workshop survey also highlighted the need for greater interaction ($n = 1$) and the problems associated with relying on mobile phones in the workshop as *“we live in an area of deprivation and many don’t have phones”*.

The free text comments provided within the teacher DriveFit film ($n = 5$) and workshop feedback ($n = 2$) raised several further issues. Some respondents ($n = 3$) suggested that hard-hitting and personal case study information would be more impactful (e.g., *“I don’t think this film is hard hitting enough, the students need to be shown the outcome of driving in a dangerous manner”*). A previous provision which included this element was described as preferable, *“Sadly it did not hold the students’ interest, could see them switching off. Having watched the Learn2Live ‘live’ and then the online video [of Learn2Live] last year I feel that this approach was more impactful. Listening to people and their experiences along with the info in the DriveFit film would be better.”* The DriveFit film was also described as not engaging because *“It relied heavily on students being engaged by the presenter”* ($n = 1$). It was also suggested that DriveFit should look to provide additional information about other transport modes ($n = 1$) (i.e., *“e.g., mopeds, as lots drive those before learning in a car”*). In addition, the fact that the workshop was a recap of the film was seen as a limitation, but *“it was more engaging with the use of Mentimeter and speaking to the students, asking them to share their ideas.”*

10.4.2 SDSA Surrey

10.4.2.1 Fidelity, reach and dose delivered

Overall, the intervention was implemented as intended, with both deliverers reporting that the SDSA Surrey film had been delivered as expected. The Vimeo viewing analytics show that the SDSA Surrey film was watched by the participating schools and colleges as set out in the trial protocol. Teachers who responded to the post-intervention surveys ($n = 26$, $n_{\text{school}} = 4$) reported a total of 540 students watching the SDSA Surrey film. As not all teachers and schools in the trial responded to the survey, this does not represent all teachers/students that took part in the trial (See Paper 8, Section 9.4.1). One of the SDSA Surrey deliverers reported that the film had been watched in schools/colleges in a group setting, which was flagged as important for safeguarding reasons (i.e., the students might need support with the topics addressed in the film, which would not have been possible if they had watched it individually online at home).

10.4.2.2 Recruitment

All school and participant recruitment procedures set out within the trial protocol were adhered to as part of the study recruitment (Box, 2021b). Not all schools that took part in the trial claimed the £200 contribution to school/college funds that was offered for the successful completion of the study, which may be indicative of either workload pressures experienced by schools/colleges in terms of issuing invoices or the fact that schools/colleges were content to take part in the intervention without the financial incentive.

Difficulties were experienced with recruiting for the trial, which led to the outcome evaluation being run as a comparison study, rather than a full cluster randomised controlled trial as had been originally intended. Several reasons were provided for this by the SDSA Surrey deliverers: the key deliverer being off work on sick leave (i.e., *“I’d been off the two or three months...so I was coming back to a backlog of work and a limited time to do that, some of the communication with the schools and colleges had sort of stopped”* (DEL1)); workload issues (i.e., *“there was an awful lot of work going on in terms of bringing on the new team...so just a busy, busy, busy year”* (DEL1)); and schools/colleges not understanding

the concept of signing up to the trial and not knowing *“whether they’re going to be part of the control group or part of the intervention group...I think that was the major stumbling block...I think they wanted some certainty”* (DEL1). It was also suggested that recruitment started too late, *“you ran out of time before the summer term...that essentially had an impact on the number of schools that we had wanted to get involved...I think there was a case of they needed a lot more lead time”*(DEL1). Other than the reasons already outlined, the deliverers did not have any further suggestions for why schools/colleges decided not to participate (i.e., *“there wasn’t really a lot coming back from them I think that was just a reflection of what’s going on in the schools with the curriculum”* (DEL1)). For the schools/colleges which did engage, it was suggested that *“some of them are longstanding [attendees of SDSA Surrey]”* (DEL1) and that developing a good working relationship with education providers *“just takes time and years of work”* (DEL1). The deliverers did not think any further action could have been taken to reduce school drop-out *“I just get the impression they were just too busy. Yeah, no specific reason comes to mind”* (DEL1). The deliverers also noted that they thought it would have been difficult to manage more schools/colleges through the trial, *“I’m just looking at the numbers in terms of survey responses now, but I think we sort of was on a knife edge at one point because of just having enough time and capacity to do that [follow up survey returns and communicate with schools/colleges] and do it really well”* (DEL1).

10.4.2.3 Dose received

10.4.2.3.1 Student feedback

On average respondents ‘strongly agreed’ that there was a positive cognitive benefit of the SDSA Surrey film (i.e., the intervention was credible, useful, interesting, important and informative) (1 = strongly agreed, 5 = strongly disagreed, $M = 1.62$, $SE = 0.05$, $n = 161$) (See Figures I.16-1 and I.16-2, Appendix I.16). Respondents, on average, also approached agreement that there was a negative emotional effect of the SDSA Surrey film (i.e., the intervention was shocking, worrying and frightening) (1 = strongly disagree, 5 = strongly agree, $M = 3.95$, $SE = 0.06$, $n = 161$) (See Figures I.16-3 and I.16-4, Appendix I.16). Students agreed that the intervention was enjoyable (1 = strongly agree, 5 =

strongly disagree, $M = 2.98$, $SE = 0.09$, $n = 161$) and boring ($M = 2.37$, $SE = 0.08$, $n = 161$). They neither agreed nor disagreed that the intervention was surprising ($M = 3.69$, $SE = 0.07$, $n = 161$) (See Figure I.16-5, Appendix I.16).

One-way ANOVAs were conducted separately for gender and education type. There was no significant difference between the cognitive film score by gender ($F(1, 152) = 1.24$, $p = .268$) or by education type ($F(1, 159) = 1.45$, $p = .231$). There also was no significant difference between the emotional film score by gender ($F(1, 152) = .394$, $p = .531$) or by education type ($F(1, 159) = .239$, $p = .626$). Regarding the Face Validity (FCVALD) of the intervention (e.g., I am now more aware of my responsibilities as a passenger), on average respondents 'strongly agreed' that they expected SDSA Surrey to have a beneficial impact on their driving behaviours (1 = Strongly agree, 5 = strongly disagree, $M = 1.81$, $SE = 0.05$, $n = 161$) (See Figure I.16-6, Appendix I.16). One-way ANOVAs were conducted to examine the effects of gender and education type on face validity. There was no statistical difference between the responses by gender ($F(1, 152) = 1.13$, $p = .289$) or by education type ($F(1, 159) = .603$, $p = .439$).

Several students ($n = 13$) provided views on the SDSA Surrey intervention in the free text response options provided in the survey. Whilst several responses indicated that the film "*was good and insightful*" with the video described as "*very helpful*" there were several concerns expressed about the film and its negative emotional impact. Some students described the film as "*too graphic*", which "*frightened a lot of us*" and was "*quite sad*". Several comments were made about the film having a negative impact on students' feelings about driving as it "*put a lot of the year group off of driving and those that were already anxious became more so after the video, which didn't help their confidence*". One respondent said, "*Thanks for making me not want to drive at all*". Two respondents wrote in length about their concerns about the film:

"I personally think the SDSA film was quite distressing. Although it is real life, showing 16-year-olds the extremity of unsafe driving is somewhat cruel. A better approach could be to show ways of how to avoid unsafe

driving and more regular incidents which occur...I did however find some parts of the SDSA film beneficial, yet not all."

"I understand the premise of the film and it was sad though important to know about what can happen, but it would also be more useful to provide methods of prevention so that we cannot make these mistakes. Very few of these were provided during the film. The scenes were quite shocking and are liable to make people my age less likely to want to drive at all which I don't believe is what you're trying to do. While I do understand the necessity of it, I believe there may be slightly less drastic ways (at least for my age bracket) to go about educating us on the dangers of driving and showing us how to be safer so we don't end up in the horrific situations we were presented with. The focus of it seemed far more on the horrible consequences than what we can actually do to stay safe on the roads."

The theme that runs through both contributions is an interest in exploring preventative actions that can be taken to avoid and/or manage risky driving situations, rather than focusing solely on the consequences of poor behaviours.

10.4.2.3.2 Teacher feedback

Twenty-six teachers from four schools responded to the feedback survey. Most teachers reported that their students had not received any road safety education over the past six months ($n = 15$) ($n = 7$ did not know, $n = 3$ said yes and $n = 1$ missing). For those that said students had received some education, they all responded that this included SDSA Surrey, which either means they have had further input from the programme at another time, or more likely that the question was misunderstood. The teachers who responded to the question about the aspects of the curriculum that the SDSA Surrey film fulfilled stated that it met the Personal Social, Health and Economic education (PSHE) requirements for this age group ($n = 3$). Overall, the teachers found it very easy to access and play the SDSA Surrey film to their class (1 = very easy, 5 = Not at all easy, $M = 1.39$, $SE = 0.24$, $n = 23$) and they strongly agreed or agreed that 'The information provided ahead of the delivery of the SDSA Surrey film was clear and easy to understand' (1 = Strongly agreed, 5 = Strongly disagreed, $M = 1.52$, $SE = 0.22$, $n = 23$).

Overall, the teachers reported that SDSA Surrey maintained very high levels of attention (0 = did not hold the classes attention at all, 10 = maintained very high levels of attention, $M = 9.30$, $SE = 0.32$, $n = 20$) and that the information, hints and tips provided by the film were pitched at the right level for their students (1 = very much so, 7 = not at all, $M = 1.45$, $SE = 0.18$, $n = 20$). They strongly agreed that SDSA Surrey had positive cognitive value (1 = strongly agree, 5 = strongly disagree, $M = 1.26$, $SE = 0.10$, $n = 20$) (See Figure I.17-1, Appendix I.17) and that SDSA Surrey was beneficial for students (1 = Strongly agree, 5 = strongly disagree, $M = 1.33$, $SE = 0.10$, $n = 20$) (See Figure I.17-1, Appendix I.17), with slightly more positive scores expressed in comparison to the student scores (See Figures I.16-1 and I.17-1, Appendices I.16 and I.17). On average, the teachers also agreed that SDSA Surrey had a negative emotional effect (1 = strongly disagree, 5 = strongly agree, $M = 4.17$, $SE = 0.13$, $n = 20$) (See Figure I.17-2, Appendix I.17), which again mirrored the student response, albeit with teachers reporting a stronger level of agreement.

The free text comments provided within the teacher feedback ($n = 12$) were overwhelmingly positive about SDSA Surrey. SDSA Surrey was described as a *“well produced and pitched film”* and that the team leading on SDSA Surrey should *“definitely send this film to parents!”* Teachers recognised the hard-hitting nature of the SDSA Surrey film, with one stating that they thought this approach was important because *“students who do not drive, do not understand the impact from their actions. That comes with experience.”* One teacher described SDSA Surrey as *“very hard hitting”* which *“made the students think as many of them left the class saying they didn't want to drive home or mentioning a specific part of the film that hit home to them.”* The content and its careful presentation were noted by one respondent who said that *“the participants approached what have been traumatic experiences with extreme sensitivity.”* One responded suggested that *“maybe a disclaimer should be made at the start for anyone who may find the content distressing (e.g., if they have been personally affected by a road traffic accident) to have the option to excuse themselves.”*

Despite this overall positive response, at least one teacher questioned whether the approach taken was the most appropriate one, commenting that with, *“My personal stories they were able to be more themselves.”* Several suggestions were made for improving the film. These ranged from small improvements to the administration of the intervention, subtitles and visual recaps to one respondent suggesting that some road safety questions, like those provided in the theory test questions, could be added to the film, along with students reviews and discussions. One respondent suggested that the SDSA Surrey intervention should lean further into crash scenarios, *“Could you show the results of a real-life car crash and then what all the different services (fire, ambulance and police) have to do to either help the casualty or deal with the implications of the crash.”*

10.4.2.3.3 Deliverer feedback

The deliverers of the SDSA Surrey intervention ($n = 2$) reported that they were satisfied with the SDSA Surrey film. They described how the SDSA Surrey film had been first created and shown in Autumn 2020, when live performances were not possible due to Covid and that several tweaks had been made to the programme for delivery in 2021. This included having a different presenter for the opening and closing sequence, *“It seemed a little bit clunky last year and we wanted to have somebody that was possibly more engaged and engaging to the audience”* (DEL1). They also reported reducing the time of the intervention to make it *“a bit more punchy and a bit less dragged out”* so that the intervention ran for *“just over an hour”* (DEL1). It was also noted that *“positive messaging”* (DEL1) was now included in the film, which was described as working *“really well because it was very reflective on what's been said about giving people positive messaging and things to consider and how they can influence themselves, rather than just some messages that focus on consequences”* (DEL1).

In terms of delivery format in comparison to previous live formats, it was noted that the online film *“doesn't quite create the atmosphere that you can with the live performance. There's nothing quite like the live performance and the shared experience with other schools and colleges sat in the same venue at the same time experiencing that together”* (DEL1). Consequently, the film was described

as “a good stopgap” which allowed the delivery to continue during Covid restrictions. The deliverers also reported that *“it’s been well received and we have feedback from schools and colleges that it’s invaluable and thanks for doing this and that’s really appreciated”* (DEL1).

10.4.2.4 Context

Having good relationships with schools and colleges was described as crucial for facilitating the delivery of SDSA Surrey intervention, despite the challenges associated with this (i.e., *“So you could be speaking to the person that makes the decisions, or you could be speaking to somebody that has to go off and have those discussions with the senior leader”* (DEL1) *“Somebody who’s on paper, not a senior person, but has the influence or the air of somebody that makes the decision, so it’s just finding that right person”* (DEL1)).

Covid and busy school/college timetables were seen as the key challenges associated with delivery (i.e., *“I mean, I think the biggest thing this year has been Covid, of course, with the students being off sick and catching up on because of sickness in the previous year”* (DEL1) and *“[schools are] all just very busy places”* (DEL2)). Ensuring the SDSA Surrey intervention was considered as a regular fixture within school/college timetables, was one way in which the deliverers reported overcoming the issue of tight school/college schedules, *“They’ve kind of they’ve got it into their routine”* (DEL2) as well as asking *“the schools when would be the least disruptive time of the year and the autumn term, I think, came back as that”* (DEL1). Consequently, the interventions usual delivery (Autumn, annually) was not necessarily timed to coincide with a time of year where more of the participants were learning to drive, or when evenings were darker as *“it was just a case of when we thought we’d have the best chance of getting schools to attend when they are the least busy”* (DEL1) with the rationale for focusing on year 12 students (i.e., 16–17 year olds as opposed to year 13 (17–18 year olds)) being that *“most were passengers so there was benefit in getting in early, as opposed to when they were already driving or after they had already learnt to drive. I don’t know there is benefit to both [delivering to year 12 or year 13]”* (DEL1).

In discussing the future of SDSA Surrey delivered via live performance as opposed to an online film, one of the deliverers stated, *“the teachers really understand the value of taking students out of the classroom and bringing them to [live performance location]”* (DEL2) and that some schools/colleges did not use the online version this year because they were waiting to bring their students to the live performance once it was running again post Covid (i.e., *“We certainly had one school who didn't take part this year and they said, well, we're looking forward to coming back in real life next year. So that was their preference is to do in-person as opposed to online”* (DEL2)). However, it was also noted that *“on the other hand, one of the schools has never been to SDSA Live but has engaged in the last two years online”* (DEL1), illustrating that schools and colleges have different perspectives on the value of live versus online provision. The deliverers reported considering the future timing of the intervention *“if we ever did try to have the capacity to run follow-up sessions and classroom based discussions”* (DEL1).

10.5 Discussion and conclusions

10.5.1 Fidelity, reach and dose delivered

The process evaluation findings from this study show that, overall, both interventions, DriveFit and SDSA Surrey, were implemented as intended. The DriveFit and SDSA Surrey films were delivered as intended with minimal variations (i.e., one teacher reported stopping the DriveFit film multiple times to support class discussions around topics and one teacher also reported splitting the SDSA Surrey film across two timetabled classes due to the length of the film). Some variation in delivery was identified in the delivery of the DriveFit workshop (i.e., some variation in class sizes and level of discussion within the workshops as well as inconsistency of handing out materials). The DriveFit facilitators also noted that in a small number of instances, the workshops ran for less than 45-minutes, either as a result of non-engagement from the participants or, by their own admission, because it was the end of a long day which effected how the workshop was delivered. Ensuring a small number of facilitators were working to a pre-defined protocol reduced the potential for variation in workshop implementation and therefore a lack of fidelity, but nonetheless some variation

did occur. Providing a description of intervention fidelity has been recognised to be a challenging task (Steckler & Linnan, 2002) and only a limited number of studies in the field of pre-driver education to date have assessed this important process evaluation component (i.e., Mirman et al., 2018). Future pre-driver intervention evaluations should ensure that they are capturing and accurately reporting intervention fidelity, to ensure that effectiveness outcomes can be fully understood in the context of delivery.

10.5.2 Recruitment

All recruitment procedures were adhered to for both the DriveFit and SDSA Surrey studies. Deliverers having pre-existing relationships with the schools/colleges approached for trial recruitment was important for securing trial involvement, as the trial added to school/college workload burdens (i.e., specific timed delivery and data collection), so trust in the deliverers as service providers contributed to recruitment success. The SDSA Surrey study, was not run as a cRCT due to several specific issues related to recruitment (i.e., staff off sick, delayed school/college invitations, other workload pressures, schools/colleges not understanding the trial concept and schools/colleges needing more time to include the trial within their timetables).

Several learning points for the delivery of cRCTs in a school/college environment have emerged from this study. Firstly, deliverers for both interventions noted the labour-intensive nature of both study recruitment and delivery. Future studies should attempt to reduce the delivery burden for deliverers by instigating good trial management processes and reducing the data collection required. The surveys run as part of this study were long (i.e., took over 10-minutes to complete at each of the three timepoints) and in hindsight could have been shortened (i.e., through the focus on a smaller number of measured risk factors). Future trials should also carefully consider the most appropriate incentive structure to encourage target audience study participation, as financial incentives were not an effective mechanism for securing school/college engagement and support for the DriveFit and SDSA Surrey studies. Ultimately, one of the key challenges for trial recruitment was securing engagement in a complicated trial from busy

teachers with existing large and significant workloads. Engaging with a 'point-person' in the schools/colleges was, for both interventions important for securing trial sign-up and engagement. Very little information is currently provided by pre-driver intervention studies about the detail of recruitment procedures followed. In the only other known randomised controlled trial that has been conducted for pre-driver education, Bojesen and Rayce (2020) only state that "*Participating schools were recruited in the summer of 2016 among Danish schools who contacted The Danish Road Safety Council requesting a LIVE visit*". Whilst a lack of recruitment information is not a universal problem (e.g., Shope et al., 2016) in providing additional information (i.e., about types of school, number in recruitment pool etc.) future studies can better adjust recruitment procedures to reflect the recruitment experiences of previous, similar studies.

10.5.3 Dose received

Participants rated the DriveFit and SDSA Surrey interventions as being cognitively engaging (i.e., credible, useful, interesting, important and informative), with the SDSA Surrey intervention rated the most favourably of the two. Participants also disagreed that the DriveFit programme had a negative emotional effect (i.e., shocking, worrying and frightening), whereas participants were approaching agreement that the SDSA Surrey intervention had a negative emotional effect. The teachers provided similar responses of these measures to the students. Comparing these results to Cuenen et al. (2016) who used the same scale to evaluate the cognitive and emotional response of students to a victim testimonial intervention (Traffic Informers) delivered in high schools in Belgium, some differences and similarities arise. In their study, students rated the testimonial intervention as delivering strong cognitive value and negative emotional effect, which is similar to the findings for SDSA Surrey. DriveFit in comparison did not have the same strength of negative emotional or positive cognitive effect, a variance which may be accounted for by the different delivery styles of DriveFit and testimonial performances. However, it is interesting to note that both the DriveFit (See Paper 7) and Traffic Informers (See Paper 1) interventions found females rated the cognitive and negative emotional effects of

the interventions higher than males. Unlike the findings of Cuenen et al. (2016), a differential impact of DriveFit by education type was noted, with college students rating the value of DriveFit as higher than school students (See Paper 7). No sub-group effects by gender or education type were found for SDSA Surrey (See Paper 8), which is at odds with the findings of Cuenen et al. (2016). Cuenen et al. (2016) note that previous research (e.g., Carey et al., 2013) has found that too high levels of cognitive/emotional arousal can result in counterproductive effects, but also, too low levels of arousal should also be avoided, as less aroused participants were found to be less road safety supportive in their study than those that were more aroused. Cuenen et al. (2016) concludes, in line with previous research (e.g., Janis, 1967) that moderate levels of arousal lead to the best outcomes.

For DriveFit, female students responded more strongly in favour of intervention face validity than males, but there was no difference by education type. There was no gender or education type difference found for SDSA Surrey, confirming the findings reported by Road Safety Analysis (2015) for the SDSA (Surrey and Great Manchester) interventions. The teachers responded in a similar way to students for both interventions. Regardless of intervention type, participants expected the interventions to be beneficial. Rowe et al. (2016) state that road safety education interventions are likely to have high face validity as strengthening behavioural beliefs that risky behaviour increases the risk of crash or injury are likely to lead to this outcome. They stress that face validity on its own is insufficient for large-scale adoption of interventions, compared with evidence of effectiveness. Whilst SDSA Surrey showed higher face validity ratings than DriveFit, it did not achieve the same level of effect (See Papers 7 and 8) confirming findings of Rowe et al. (2016) that face validity ratings alone are not sufficient for informing decisions about intervention roll out.

For the SDSA Surrey intervention there were also some concerns expressed about the intervention being too graphic and frightening without providing coping mechanisms, with it even putting some students off driving. Given the significant value and benefits offered by driving to young people, such as independence,

personal space, social world extension and career opportunities (Fylan & Caveney, 2018) it is problematic if an intervention promotes fear about take-up of motorised mobility. This thesis confirms the work of previous review studies and meta-analyses (e.g., Ruiter et al., 2001; Witte & Allen, 2000) showing that fear appeal interventions are less effective than is often assumed and that future intervention designers should focus on positively framed approaches as an alternative (Lewis 2007b).

Whilst co-design of interventions for young people is not commonly practiced (Swist et al., 2022) multi-agency collaborative research and intervention endeavours have achieved positive outcomes (i.e., Scott-Parker et al., 2019) and should be considered in the development of interventions for this target audience. The DriveFit film and workshop achieved average and just above average ratings for keeping student attention, whereas the SDSA Surrey film achieved a very high rating. Previous research has found that messages that are neither excessively arousing (e.g., fear appeal) or disengaging (e.g., purely factual presentation) have been found to support optimal message processing (Rhodes, 2017), which may explain why, despite lower engagement ratings, the DriveFit intervention secured greater outcome effects than SDSA Surrey (See Paper 7 and 8). It is however also important to recognise that DriveFit was a two-part intervention (i.e., film and workshop), as opposed to a one-part intervention (i.e., film only), which may also have contributed to the differential effectiveness noted. The DriveFit website was not well used. Future interventions should be designed with a clear remit for website resources that are designed in a way that maximises engagement potential, as this may be an opportunity to extend the effect of an intervention, for example by providing e-learning opportunities.

10.5.4 Context

Several barriers and facilitators of the interventions were identified by this study. Delivering interventions online was described as difficult for both DriveFit and SDSA Surrey. For the DriveFit workshop, not being able to engage with students in the same way as would have been possible face-to-face was a limiting factor and for SDSA Surrey, the shared experience of attending a live testimonial

performance was felt to be missing. Both of these observations are in line with media naturalness theory which argues that face-to-face communication is the most effective mechanism for exchanging information (Kock, 2001), indicating that mode of delivery is an important consideration for future intervention designs. However, the value of having a virtual format offer, which teachers could use without significant effort, was also recognised by deliverers. The fact that road safety education is not formally part of the Key Stage 5 education curriculum was also seen as a structural issue that created challenges for securing road safety education, an issue that has also been recognised previously in other areas of public health (e.g., Jong et al., 2020). Engaged schools and teachers were seen as crucial facilitators for both interventions and the interactivity within the DriveFit workshop was appreciated by respondents, which corresponds with previous research about the value offered by active learning approaches (Lewis et al., 2007b).

The study is not without its limitations. Given the SDSA study was run in Surrey and the DriveFit study in Devon, the generalisability of the findings to a broader pre-driver audience may be limited due to the geography in which the studies were conducted. A further potential source of bias within the studies was that the final participant samples achieved contained more safe respondents in comparison to baseline only respondents (See Papers 7 and 8). This study contributes to knowledge by providing a comparative evaluation of the action models of two different pre-driver educational interventions and provides a level of detail not typically seen in the reporting of interventions. The study adds to a limited body of literature about how educational interventions are received by the target audience, which assists with understanding intervention evaluation results and informs the development and design of future interventions.

11 OVERALL DISCUSSION: STUDY IMPLICATIONS

Pre-driver education is an under researched field of activity despite it being commonly delivered throughout the world. The limited number of studies which have been conducted have typically found small, short-term effects (See Paper 1). The interpretation of these results is complicated by the varying and different outcome measures used and the differential study designs, making a meta-analysis of studies in this field challenging, although potentially possible (See Poom & Af Wåhlberg, 2022). About half of previously evaluated studies reviewed in this research (See Paper 1) were methodologically weak with no control or comparison groups used. The reasons for the lack of rigorous evaluation applied to pre-driver education is unknown, but it may relate to difficulties experienced with accessing participants, particularly in school and college settings, as well as a lack of funding and/or collaboration amongst researchers and practitioners to support the delivery and evaluation of interventions.

The Theory of Planned Behaviour (TPB) (Ajzen, 1991) was used for both the design (See Paper 6) and evaluation (See Paper 7) of the DriveFit intervention in this thesis research. Unlike some other behavioural models (i.e., COM-B) (Michie et al., 2014) the TPB does not prescribe a specific application of the model within intervention design. Consequently, the work required to apply the TPB to the design of behavioural interventions is not always well understood (Ajzen, 2015). In line with previous studies (e.g., Elliott et al., 2005; Fishbein, 1997; Gauld et al., 2016a; Stead et al., 2005) the research for this thesis conducted a target audience belief elicitation study (See Paper 5) to establish accessible behavioural, normative and control beliefs. This is an important part of the intervention development process as it enables the establishment of the beliefs that underlie behaviours, which supports the development of messages used within public health campaigns (Fishbein, 1997). This study elicited the beliefs of several different behaviours during two time-limited qualitative focus groups with the target audience, where there was limited opportunity to discuss all relevant behaviours in-depth. Future studies should ensure that the number of behavioural outcomes addressed during the belief elicitation stage of intervention

development are limited to just one or two. Rowe et al. (2016) employed a quantitative questionnaire survey, split between two separate groups, to study four behavioural outcomes, which is another way in which future studies could ensure securing manageable input as part of the intervention design process. Being able to design an intervention to influence antecedents to behaviour, which can then be evaluated directly, is another advantage of using the TPB as a framework for intervention design. Despite the fact that the TPB is not a defined and specified intervention design process, the research conducted for this thesis indicates that there is utility in employing the TPB to inform intervention design, as recommended by previous research (Poulter & McKenna, 2010).

In comparison to using the TPB as an intervention design tool, the process by which the TPB is used to inform evaluation design is more straightforward, with validated survey instruments available to support this process (i.e., Conner & Sparks, 2005). However, several problems were experienced during this thesis research in using the TPB as an evaluation tool. Whilst the evaluations conducted in Papers 7 and 8, used previously validated survey items (Conner & Sparks, 2005; Rowe et al., 2016) the two items selected to measure perceived behavioural control (PBC) were not well understood by the respondents and were not internally consistent. Rowe et al. (2016) also reported a high level of scale variability for PBC across the four target behaviours measured ($\alpha = .48 - .78$), which is indicative that some of the respondents in this study also experienced difficulties with this measure. However, as multiple studies have previously used these measures (and ones like them) to measure PBC within this target audience (See Appendix A.4.3), this does not appear to be a universal problem. It is recommended that future studies ensure that survey instruments are piloted fully in advance of full roll-out, which was not conducted for the research reported in this thesis, as previously validated survey instruments were being used. Both of the studies evaluated using TPB measures in this thesis (See Papers 7 and 8), found small changes in behavioural antecedents post-intervention. This may be related to survey instrument floor effects (i.e., self-reported survey responses indicated quite safe or very safe behaviours at baseline), which meant that there was minimal room for improvement for some of the scales used, an issue which

has been noted within previous research (e.g., Elliott & Armitage, 2009). Consequently, the studies conducted for this thesis are not unique in experiencing survey item floor effects. Whilst the items used provided a valid measure of outcomes of interest, future studies could seek to employ self-report measures which encourage a more normally distributed response (i.e., less response skew), to reduce the chances of survey results being effected by floor effects.

The research reported in this thesis was also not able to collect data for all components of the TPB. As outlined in the scope of the research programme (See Chapter 1, Section 1.3) objective behavioural data was not collated because the target audience were pre-drivers and therefore only responses for antecedents to behaviour were collated. Whilst it would have been advantageous to have behavioural data, understanding how antecedents to behaviour, change in response to interventions tested, is still valuable for informing future intervention development and research. Structural equation modelling to establish to what extent antecedents to speeding behaviours (i.e., attitudes, subjective norms and PBC) explained a variance in intentions, before and after the intervention, was not conducted due to the unreliability of the PBC measure, but this could be explored in future and would be particularly valuable if meaningful behavioural data could also be collated. A meta-analytic review of 185 studies by Armitage and Conner (2001) found that the TPB accounted for 27% of variance in behaviour and 39% of the variance in intentions. The pre-driver intervention reviews outlined in Paper 1 showed similar (and in some cases slightly greater) levels of variance accounted for by the TPB (See Appendix A.4), which illustrates the limitations of TPB being able to explain all contributions to intentions and behaviours. Despite the limitations in the use of the TPB in evaluating interventions, the research reported in this thesis evidences the utility of the TPB for designing and evaluating intervention effects, which allows for comparisons to be made between road safety and broader public health studies.

In evaluating two different interventions (DriveFit and SDSA Surrey) (See Papers 7 and 8) using the same TPB and other outcome measures, the research conducted for this thesis provides unique insights into the comparative effects of a theoretically grounded, positively framed intervention (DriveFit) in comparison to a negatively framed fear appeal intervention (SDSA Surrey). This comparison, which has not been conducted previously, found that the SDSA Surrey intervention effects (small and short-term, See Paper 8) confirmed previous research (See Paper 1), whereas small, but longer lasting and more significant effects were found for DriveFit, which differed by sub-group (See Paper 7). A more formal comparison was not conducted because the SDSA Surrey intervention was evaluated using a comparison study, as opposed to a cluster randomised controlled trial and therefore the comparison of the two study results are only indicative of differences in intervention effects.

The study assessing the impact of the DriveFit intervention (See Paper 7) found significant beneficial effects for 9 out of 16 study measures at T2 (i.e., speeding intentions, a composite measure of all attitudes (excluding alcohol), mobile phone use attitudes, driving whilst fatigued attitudes, speeding attitudes, subjective norms associated with speeding, perceptions of risk, attitudes to driving violations and driver coping). There were also significant beneficial effects for 8 out of 16 study measures at T3 (i.e., mobile phone use intentions, composite measures of all intentions and attitudes (excluding alcohol), mobile phone use attitudes, drink driving attitudes, speeding attitudes, perceptions of risk and attitudes to driving violations), with the largest beneficial effects on attitudes. Where significant attitude effects were still detectable at T3 (i.e., for the composite measure of all attitudes (excluding alcohol), mobile phone use attitudes and speeding attitudes), these were reduced in magnitude. In contrast, for study intention measures (apart from speeding intentions) there was a trend towards intentions becoming safer at T3 than at T2, with the mobile phone use and composite intention measure showing beneficial effects of the intervention, over and above control at T3.

The study assessing the effect of the SDSA Surrey intervention (See Paper 8), in contrast, only found significant beneficial effects for 6 out of 16 study measures

at T2 (i.e., driving whilst fatigued intentions, speeding attitudes, drink driving attitudes, mobile phone use attitudes, a composite measure of all attitudes and attitudes to driving violations) and 1 out of 16 study measures at T3 (i.e., speeding intentions). The largest beneficial effects were for attitudes, which were not detectable at T3. There were also detrimental effects of the intervention for 3 out of 16 study measures at T2 (i.e., drink driving intentions, efficacy and perceived behavioural control associated with speeding) and 2 out of 16 study measures at T3 (i.e., drink driving attitudes and efficacy). Figures 11-1 to 11-3 provide the results for both studies for ease of reference. Results which were non-significant are denoted in grey in the figures.

Figure 11-1 Intervention effect on intention outcomes, for DriveFit and SDSA Surrey, presented as baseline-adjusted difference to control, with 95% Confidence Intervals

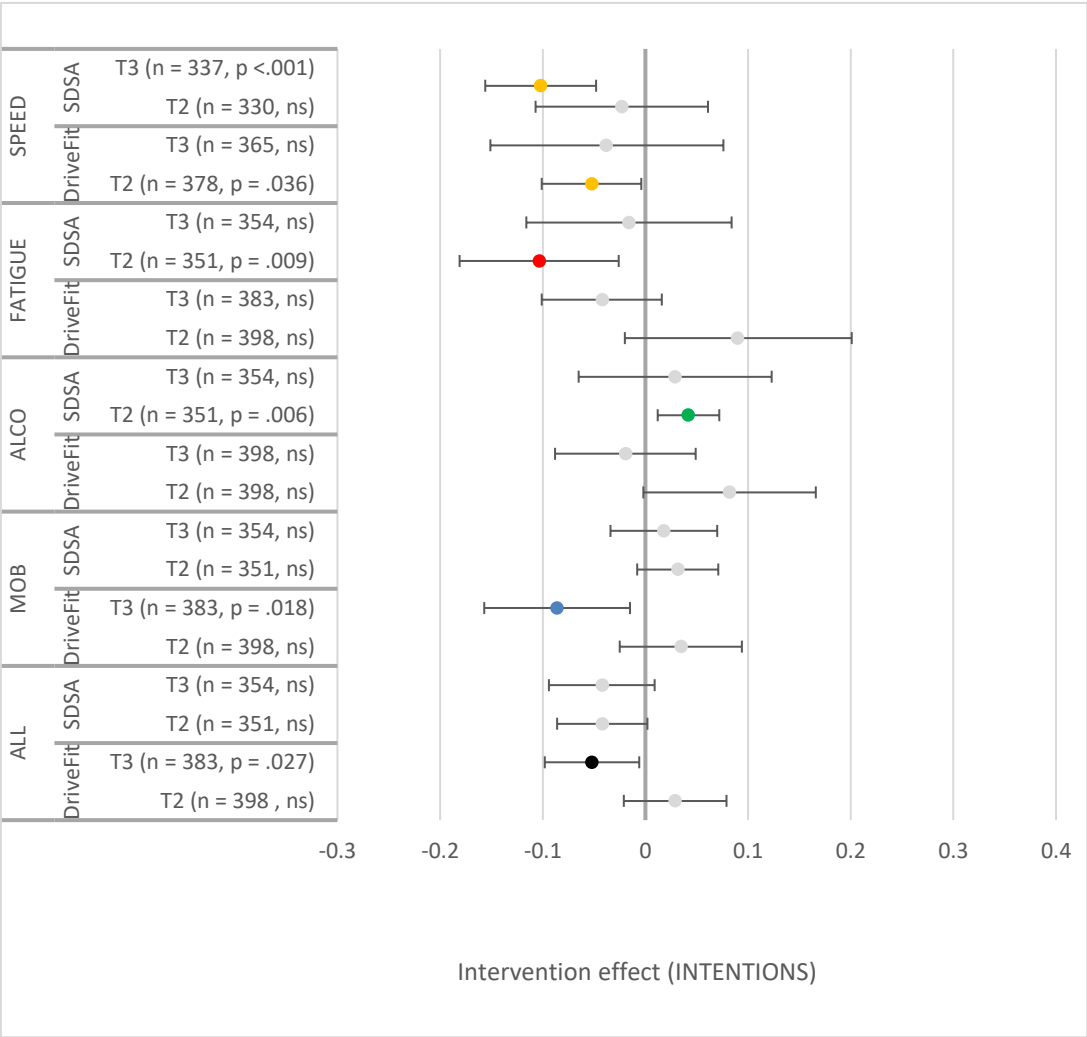


Figure 11-2 Intervention effect on attitude outcomes, for DriveFit and SDSA Surrey, presented as baseline-adjusted difference to control, with 95% Confidence Intervals

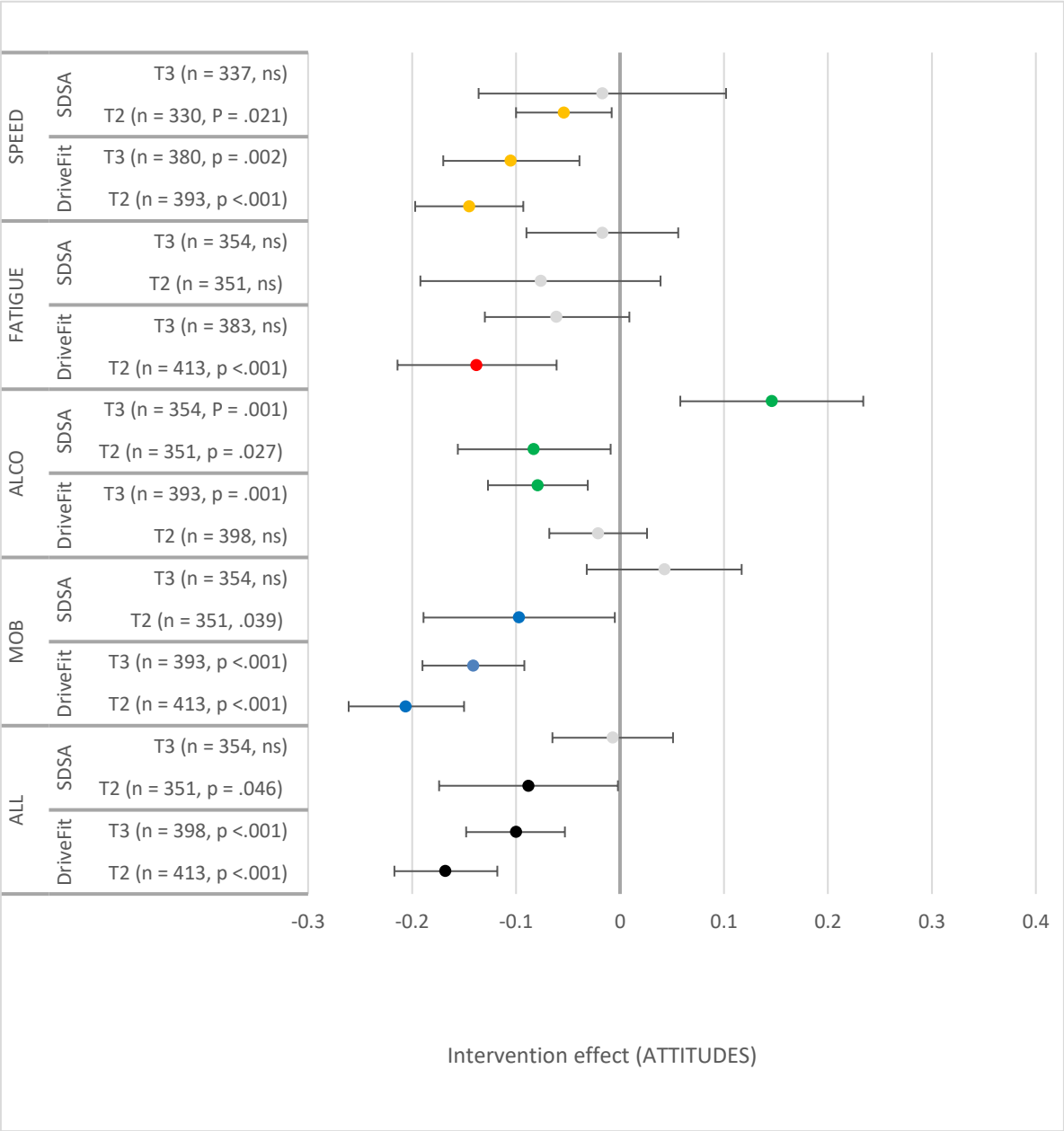
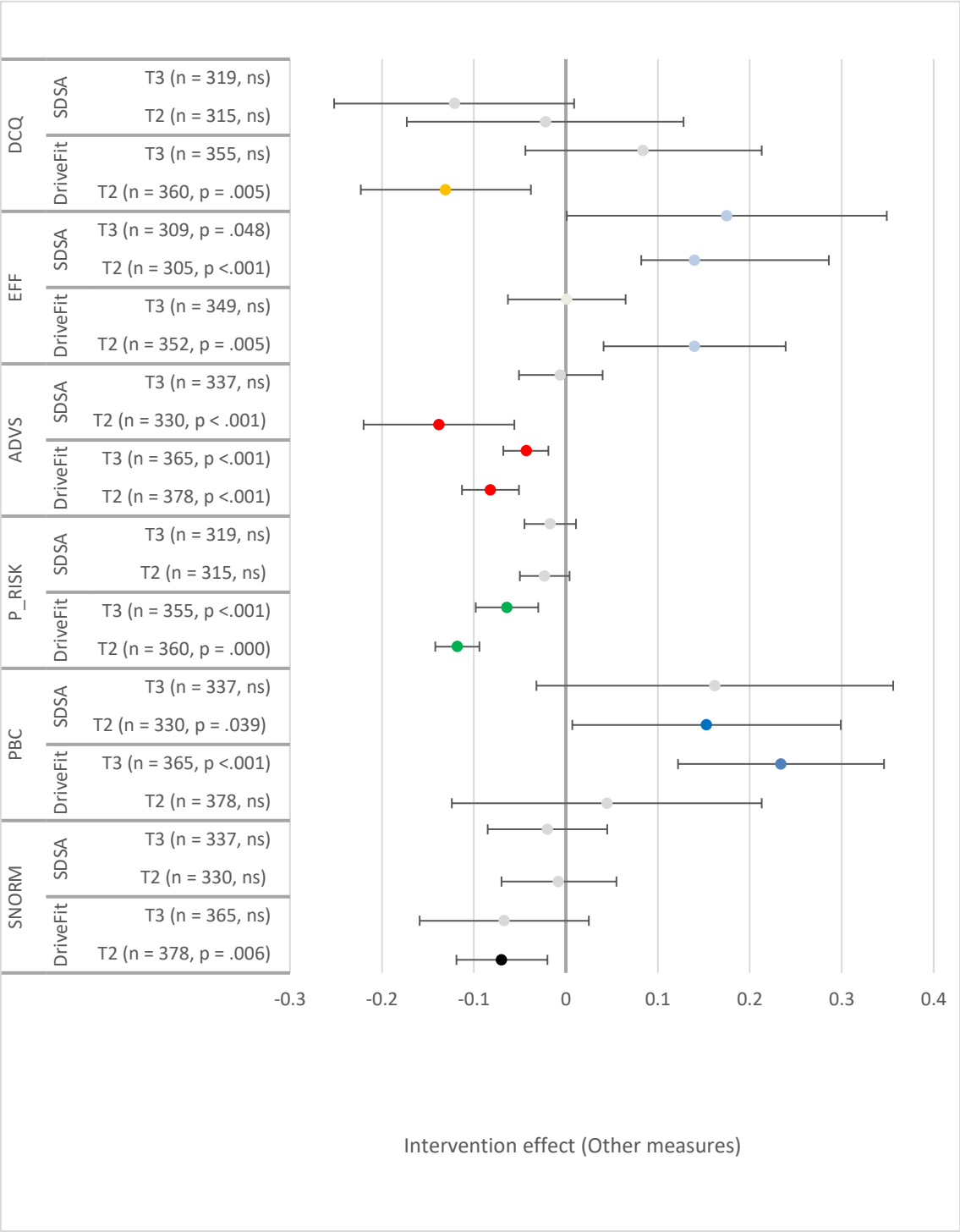


Figure 11-3 Intervention effect on other measure outcomes, for DriveFit and SDSA Surrey, presented as baseline-adjusted difference to control, with 95% Confidence Intervals



Both DriveFit and SDSA Surrey interventions had greater effects for females, which has also been seen in previous studies (e.g., Cutello et al., 2020a; Laapotti et al., 2003). This may be explained by females being more likely than males to consider safety messages as relevant and effective (Glendon & Walker, 2013). However, some beneficial DriveFit intervention effects were also seen for males (e.g., mobile phone attitudes at T2 and T3), which indicates that this type of provision might be more effective than fear appeals, which previous research has found males are less likely to respond to (Lewis et al., 2007a), a finding which has been further confirmed by the SDSA Surrey study in this thesis (See Paper 8).

It is hypothesised that there are several reasons for the difference in intervention effects for DriveFit and SDSA Surrey. Previous research has found that threat appeals do not reliably effect road safety behaviours (Carey et al., 2013), whereas positively framed approaches have demonstrated promise (Lewis 2007b), with a recent study (and only other study of this type) by Cutello et al. (2020a) finding that a positively framed film significantly reduced risky driving behaviours, when the fear appeal film did not. The DriveFit intervention, unlike SDSA Surrey, also included active learning components (i.e., workshop, discussion and peer interaction), which have been found to help with maintaining and managing attention (Markl, 2016), increasing engagement and enhancing cognitive ability (Michel et al., 2009; Riaz et al., 2019) within participants. Road safety interventions which include active learning components have also been found to lead to reductions in collisions (Senserrick et al., 2009) and improvements to road safety knowledge and attitudes (Treviño-Siller et al., 2017). DriveFit also had two (film and workshop) rather than just one (film) component as was the case for SDSA Surrey. Extending the duration and dosage of the intervention may have had beneficial effects (Kinnear et al., 2013b) over and above SDSA Surrey and future research could explore follow-up messages to test for effects on attitudes, intentions and behaviour.

Implementation intentions (Gollwitzer, 1999) and Behaviour Change Techniques (Michie et al., 2013), were also included in the design of DriveFit, which is likely

to have supported the development and remembering of specific safe driving plans. Further, DriveFit is a theoretically grounded intervention informed by the elicited beliefs of the target audience (See Paper 5), which contrasts with SDSA Surrey which was designed by practitioners without reference to research evidence. Previous research has recommended the inclusion of these active ingredients in pre-driver interventions (Cuenen et al., 2016; Fylan & Stradling, 2014; Poulter & McKenna, 2010), with positive outcomes previously reported for the inclusion of implementation intentions within road safety interventions (Brewster et al., 2015; Elliott & Armitage, 2006; Gwyther & Holland, 2015; Tekeş & Özkan, 2021). The inclusion of these active ingredients within DriveFit, which were not present within SDSA Surrey, may explain the differences in effects found. DriveFit also comprises the only known positively framed pre-driver education intervention, which has been designed using these active ingredients and further research to evaluate its impact is required. Overall, the evaluation of these studies has facilitated a comparative assessment of positively and negatively framed pre-driver education interventions. A more robust comparison would have been possible if, as originally planned, a cluster randomised controlled trial had been conducted for the SDSA Surrey intervention evaluation. Whilst both studies controlled for an array of socio-demographic parameters (i.e., age, gender etc.), the studies differed in their delivery components (film only versus film and workshop), their geographical settings and their study designs, all of which add to study variability. Therefore, it is not possible to say, from these studies alone, that the variability in outcomes relates to positive and negative intervention framing alone.

In addition to comparing the effects of two different pre-driver interventions, this programme of research makes several further contributions to knowledge. The research provides an indication of the magnitude and duration of the expected effects of pre-driver education interventions (See Paper 1) and provides clarity about the type of content, themes and BCTs included within pre-driver testimonial interventions (See Paper 2). Paper 2 confirms the findings of previous research which has found that road safety interventions typically use a limited range of negatively framed BCTs (Dale et al., 2017; Fylan & Stradling, 2014). For the

testimonial provision evaluated by Dale et al. (2017) this is likely to be due to there being less opportunity to incorporate BCTs such as goal setting, action planning and identification of self as a role model into testimonial interventions which typically focus on crash scenarios. By providing additional details about the content of several pre-driver interventions, the findings from Paper 2 also highlight key improvements to be made within future interventions (e.g., increasing diversity of BCTs used, reducing fear-appeal content etc.).

The research in this thesis has also demonstrated an iterative, evidence-based and theoretically grounded approach to developing a positively framed intervention with the aim of improving attitudes and intentions towards road safety behaviours (See Papers 3-6). This adds to the limited number of studies that have taken this approach to road safety intervention design (e.g., Elliott & Armitage, 2009; Elliott et al., 2005). Given there is no lack of expertise within the research community about how to design and evaluate road safety interventions, the lack of high-quality studies in this area may be due to a lack of opportunity for researchers to engage with practitioners and/or a lack of funding to support studies. In addition, as already outlined in Paper 9, conducting randomised trials is a time consuming and resource intensive process. Schools and colleges are busy environments, which researchers and practitioners might not have ready access to, which may also be limiting the number of studies in this field.

Outlining the intervention development and evaluation process in the level of detail that has been provided in this thesis also allows for study scrutiny, replication and further development (Abraham & Michie, 2008). Further, the evaluation of DriveFit reported in Study 7, demonstrates the relevant use of a robust research design (i.e., cluster randomised controlled trial (cRCT)) and the application of an appropriate analytical method for clustered data (i.e., GEE). The study also raises several interesting questions which may have implications for theory. Within the DriveFit intervention a temporal attitude-intention gap was found (i.e., changes in attitudes at T2 were followed by changes in intentions at T3). Whilst it is feasible that there may be a lag in the impact of attitudes on intentions, this has not been found in previous studies assessing intervention

effects on TPB components. It would be interesting, therefore, to see if the delayed impact of attitudes on intentions found in this study (which the study was not specifically set up to measure), could be replicated in future studies and whether mediators of this relationship could be established. If found, this would provide an important theoretical contribution related to the impact of interventions on the relationship between Theory of Planned Behaviour components over time. Further, responses to two variables (perceived behavioural control (PBC) and efficacy (EFF)) measured in the DriveFit study, became less safe over time, for certain sub-groups (i.e., males and students from above median disadvantage educational institutions). Whilst the composition of the measure has been flagged as a potential reason for this anomaly (See 8.5, Paper 7), it is also possible that the intervention provided participants with a more realistic assessment of their confidence and control, which could potentially have a beneficial effect within over-confident young drivers. If this finding were replicated by future research, the results would provide an important contribution to theoretical understanding (i.e., changes to PBC can be beneficial for safety in both directions, depending on the sub-group targeted). The findings from the SDSA Surrey intervention (See Paper 8) in addition to providing comparator outcome effects to the DriveFit intervention also extend the findings of previous research (e.g., Poulter & McKenna, 2010) by measuring a broader set of outcome measures, beyond speeding behaviours.

Finally, the process evaluation results, reported in Paper 9, outline the value ascribed by DriveFit intervention participants on being able to engage in active learning within the workshop. As already outlined, the benefits of active learning for maintaining and managing attention and engagement are well recognised (Cuenen et al., 2016; Markl, 2016; Michel et al., 2009; Riaz et al., 2019) and it appears that students and teachers appreciated students taking an active role in their learning. The DriveFit film was, in contrast, passive in its delivery despite added elements (i.e., teacher facilitated discussion and note taking encouraged), which could be improved in future through sectioning up interviews within the film and interspersing them with active learning activities for the students. The research conducted for this thesis adds to the limited number of process

evaluations which have been conducted on pre-driver education to date (i.e., Mirman et al., 2018) and provides transparency about the delivery of the DriveFit intervention. In future, it is important that pre-driver education intervention designers adopt an appropriate framework (e.g., BCT taxonomy, Michie et al., 2013) for reporting intervention components. In addition, process evaluations should be conducted to measure intervention fidelity, reach, dose, recruitment and context (Saunders et al., 2005) to further understanding and interpretation of intervention effects. Overall, the major contribution of this thesis research has been the design and demonstration of a blueprint for the development and evaluation of road safety education interventions.

12 CONCLUSIONS

This programme of research has comprehensively evaluated the role and potential of pre-driver education to support young and novice driver safety. Overall, the research concludes that negatively framed fear appeal interventions only achieve small, short-term effects on antecedents to behaviour. The theoretically grounded, positively framed intervention called DriveFit which was designed, piloted and trialled as part of this research also achieved small, but longer lasting and more significant effects, which differed by sub-group. The longer lasting effects achieved by DriveFit indicate that the messages provided by the intervention may have been processed at a deeper level. This is possibly due to the use of BCTs and implementation intentions within the intervention design, which may have supported the development of plans and increased the likelihood of them being committed to memory. The lasting impact of DriveFit on attitudes at 8–10 weeks post-intervention, in the context of the powerful effect of extrinsic influences (i.e., social networks, wider social environment etc.) on antecedents to behaviour, implies that interventions of this type may have beneficial impacts for road safety, with further research needed to evaluate longer-term effects. DriveFit also had a greater beneficial effect for females than males and consequently further research is needed to design and evaluate interventions which can have a greater influence on young males. This research has added further weight to the rationale for intervening at the pre-driver stage (Waylen & McKenna, 2008) with positively framed messages appearing to be more advantageous than fear appeal messages.

The current lack of rigorous evaluation of pre-driver interventions is having implications for the development of appropriate policy advice for the delivery of pre-driver education. Whilst there was no specific mention of education within the six recommended road safety actions outlined in the recent WHO preventing injuries and violence advisory note (World Health Organisation, 2022), several European guidance notes have been issued on the role of evidence-based road safety education (ETSC, 2019, 2021; Mütze et al., 2022). Internationally, road safety policy has increasingly focused on taking a safe systems approach (i.e.,

focusing on a broader set of counter measures beyond the road user, such road design and regulation) (Larsson & Tingvall, 2013). It has been argued that there remains a valuable role for road safety education within road safety plans and approaches, not as a stand-alone approach (Scott-Parker et al., 2015; Twisk et al., 2015), but as a contributor and support of the broader safe system (Kinnear et al., 2017). Having high-quality research available to inform ground-level action on road safety education is an important task for the research community to engage with, at pace.

There are several limitations associated with this programme of research which should be noted. As already outlined, the research reported in this thesis has heavily relied on self-reported data, which presents several limitations based on previous studies. For instance, attitudes and subjective norms have been found to be misrepresented where there are self-presentation concerns (Hessing et al., 1988) and the collection of objective data has being described as preferable to overcome data reliability concerns (Af Wåhlberg & Dorn, 2015). In addition, as a result of social desirable responding and common method variance, it has been recommended that data from a single source, unless it is corrected by other measures, should not be used (Af Wåhlberg et al., 2010). Despite these limitations, self-report survey data provides important information about precursors to behaviour, which has been found, in certain conditions (i.e., anonymity, no response consequences) to provide acceptable levels of validity (Zhao et al., 2006) as well as data which can be corroborated with other sources (Taubman - Ben-Ari, 2010). However, given the legitimate concerns that have been raised within the literature about the use of self-reported survey measures, it is important that the findings of this programme of research are viewed in the context of these limitations. In addition, despite a purposive sampling of schools and colleges with varied socioeconomic status within the studies, participants may not have been entirely representative of the wider population in the UK. The final sample size for the DriveFit cRCT was also somewhat small and the statistical power of the analysis to detect an effect was consequently reduced with an increased risk of a Type II error. Participant drop out was in part a result of school and college timetable pressures, which were impacted by Covid student

absences and curriculum catch up. This participant drop out may also have been reduced with a shorter survey. The study design of the critical literature review of pre-driver education interventions (Paper 1) and the literature review of young driver risks (Paper 3), would also have benefited being conducted as a meta-analysis and systematic literature review respectively, which would have produced more robust results. However, this was not possible due to research time and resource limitations.

This programme of research has several strengths. The design and evaluation of an iteratively designed, theoretically-based intervention, evaluated with a robust cluster randomised controlled trial design, alongside the comparative evaluation of a negatively and positively framed pre-driver intervention, provides a unique contribution to the literature. This thesis also demonstrates and makes use of a wide variety of qualitative and quantitative techniques. The process evaluations conducted alongside the intervention outcome evaluations also adds to the comprehensive evaluation conducted. This research has also benefited from being conducted as a high profile national-level trial, which has attracted both funding and delivery support from key stakeholders. Importantly, this research provides a blueprint for the development and evaluation of road safety education interventions, which can be applied by other researchers and practitioners.

13 FUTURE WORK

From the review of the current evidence conducted for this thesis, it is clear that more high-quality research trials are needed. Additional studies which compare the effects of positively and negatively framed interventions on pre-driver risks, which use randomised controlled trials to measure behavioural outcomes, are needed to improve knowledge about effective pre-driver intervention framing approaches and components. It is also important that data collected from studies is evaluated appropriately (i.e., longitudinal school/college data is analysed using analytical approaches for clustered data such as GEE). Where possible, future studies in this field should also seek to register trials (e.g., ISRCTN registry), as doing so reduces the selective reporting of results and increases the transparency of research, which supports the development of an unbiased evidence base. Whilst learning can be taken from how public health and medical research trials apply high-quality trial standards, studies in the field of transport psychology should also ensure that they focus on using objective outcomes to measure the effects interventions.

The effects of negatively framed interventions should be further explored using high-quality research designs by researchers as a matter of urgency. Without this concentrated research effort, at best, small effect, short-term effect interventions will continue. In the worst case scenario null or negative intervention effects, as demonstrated in Paper 1, will continue to be delivered to an at-risk target audience, which is not an acceptable public health outcome. Whilst the research conducted for this thesis suggests that there is value in future interventions being positively framed, designed with reference to behavioural theory as well as designed and delivered using implementation intentions, BCTs and active learning approaches, further research is required. This thesis research alone is not sufficient for implementing major changes to pre-driver education considering the study limitations. Investigating the effect of DriveFit and SDSA Surrey on post-test driving behaviours using telematics would provide an understanding of the potential impact on road safety in the early months of licensure. Future research to assess the effect of an extended or varied DriveFit intervention on behavioural

outcome measures could also include an evaluation of the effects of follow-up messages, comparing in-person and online delivery as well as understanding the comparative impacts of the different intervention components (i.e., film and workshop). There is also a need to evaluate the effects of DriveFit over a longer period of time and to design interventions to improve the safety of young males specifically, whose antecedents to behaviour, in this research and other studies, have been harder to influence than females. Finally, this research has reported results (i.e., temporal lag between attitude and intention improvements and discrepancy related to the beneficial direction of perceived behavioural control and efficacy measure changes, dependent on sub-group characteristics) which are potentially of relevance to the development of the Theory of Planned Behaviour, if they can be replicated within future research.

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APPENDICES

Appendix A – Paper 1 appendices

A.1 Summary of interventions included within the pre-driver critical review

No.	Intervention (Country)	Programme description
Negatively framed		
School-based interventions		
1	BStreetsmart (Australia)	This programme seeks to encourage safer road-user behaviours amongst young people in New South Wales. The programme includes crash re-enactments, interactive displays and personal testimonies from young drivers who have been injured in road traffic collisions. The programme takes place over a 3-day period and includes discussions about prevention strategies.
2	RRISK (Australia)	This one-day peer facilitated seminar covers numerous topics, including evidence on adolescent risk taking and impairment from drink and drugs. Issues related to buying and maintaining a safe car are also discussed. A simulated crash with details of the risky decisions made by young people resulting in the collision is also included within the intervention, followed by a personal testimonial from a road traffic collision victim. Following the delivery of the seminar, schools decide how to implement further activities.
3	Learn2Live (UK)	This testimonial theatre performance for 16-18 year old pre-drivers highlights the consequences of road user behaviours. This is achieved through providing case study examples of collisions which are presented by emergency service workers, road traffic collision victims and bereaved family members. The performance adopts a fear-appeal approach with the aim of improving the risk-taking behaviours of attendees. A Peer2Peer information session (delivered by peer leaders employing an interactive approach to discuss the four greatest dangers for young drivers – drink driving, negative peer influence, distraction and speeding) or a Question Time follow-up session (delivered by emergency services who present their experiences of attending a collision and the road related dangers for young drivers, with the aim of reinforcing Learn2Live messages) is included in the programme.
4	Road Safety Live (Denmark)	This program consists of personal testimonials being provided by road traffic injury survivor ambassadors to 13-17 year old students. The intervention aims to improve road related attitudes and risk-taking behaviours by promoting safe road safety behaviours. Whilst the main part of the intervention focuses on testimonial provision, teachers guides and student handouts are also provided to supplement the visit and support reflection.
5	SPIKS Intervention (Serbia)	This intervention is run by members of the Association of Paraplegics and Quadriplegics of Serbia (SPIKS) and was designed to inform young driver risk perceptions, challenge beliefs about personal invulnerabilities and address social norms. The intervention was delivered in classrooms as a first person narrative presented by individuals who have been impacted by road collisions and their adverse effects. The content of the intervention focuses on the gender specific behaviours that put young drivers and passengers at risk.

No.	Intervention (Country)	Programme description
6	SAFE (USA)	The Seatbelts Are For Everyone (SAFE) programme takes a peer learning approach, with the exact activities created and promoted by participating schools. The programme is based on the concept that understanding consequences of behaviour enables better decision making, especially when delivered by peers. The intervention materials provided are used in different ways by participating schools, which range from information leaflets, police and other guest talk, quizzes and a mock crash demonstration (See: https://www.ktsro.org/safe-educational-activities).
7	RACQ Docudrama Program (Australia)	This program aims to improve young people's decision making capabilities should they find themselves in a risky situation whilst travelling on the road. The intervention is delivered as a one-off session over a three hour period. The first part of the programme includes a mock car crash scene, which selects school students to participate alongside emergency service workers who carry out the roles they would in a live scene. This is followed by a classroom based 'debrief' session, where a video is shown illustrating the fictional events leading up to the collision, to inform a discussion amongst students about the risk factors identified. The final session includes exploring what strategies the students could employ to manage road risks and avoid being presented with similar situations discussed as part of the programme.
8	Safe Drive Stay Alive (UK)	This programme includes a live theatre performance with a film reconstruction of a fatal collision involving young people, which focuses on some of the key risk factors for young people such as peer pressure, speeding, driving at night and over-taking behaviours. Testimonials from emergency service workers, bereaved family members and road traffic collision victims intersperse the film, who describe their personal experiences related to road traffic collisions. The performance is designed to raise awareness of the consequences of poor road behaviours using a fear and threat appeal approach.
9	Pre-driver DUI program (Slovenia)	This programme aims to improve young pre-driver drink driving intentions and attitudes. The intervention is 90-minutes long and delivered by trained students through active, peer-based learning, which includes the promotion of developing coping strategies. Information is provided during the session about the problems associated with drink driving for road safety. Case studies of collisions are used to highlight the consequences of poor road safety behaviours and the session ends with a peer-to-peer discussion about how best to secure safer behaviours.
10	Traffic Informers (Belgium)	This intervention is a large-scale programme that was first delivered in 2012. The session takes two hours, the first of which includes a personal testimonial from a victim of a road traffic collision covering the collision itself and the immediate and ongoing implications. The second hour includes a group discussion with the testimonial presenter.
11	Pre-driver intervention (Australia)	This intervention has been delivered to over a quarter of a million attendees since it was first developed in the early 2000s. The programme aims to influence attitudes, awareness and areas for useful preparation to eliminate road risks. The importance of anticipating hazards and minimising distractions is also covered. The course includes 6 sessions, each 30 minutes in length for groups of 30 students. The intervention includes discussions with a seriously injured crash survivor, stopping distance demonstrations and interactive workshops on the impacts of driving impaired by fatigue, drugs and alcohol as well as the importance of regular vehicle maintenance and overall vehicle safety. The health, social and economic consequences of road collisions are also covered by a local police presentation.

No.	Intervention (Country)	Programme description
12	You Hold the Keys (YHTK) (USA)	This is a 10-week long programme delivered in schools which focuses on several young driver risk behaviours (e.g., distractions, passengers, seatbelt use, drinking and driving) and how these can be addressed through risk reduction strategies. The programme includes student directed active learning including student led role plays, prevention films and talks from crash victims, emergency services and bereaved family members. The intervention graphically depicts the consequences of road traffic collisions and outlines the legal and other consequences of incident involvement, with the programme concluding with discussions and activities to support safe decisions amongst the target audience.
Hospital-based interventions		
13	P.A.R.T.Y Program (Australia)	The Prevent Alcohol and Risk-Related Trauma in Youth (P.A.R.T.Y) intervention is a one-day, in-hospital program which provides young people with education about road based trauma through outlining the different injury phases (i.e., risk-taking behaviours leading to trauma, injury mechanisms, treatment and rehabilitation – both short and longer term). The program is provided by healthcare professionals, emergency service workers and road traffic collision victims. Facilitators trained in health education support the program.
14	BITZ programme (USA)	The 'Be In The Zone' (BITZ) programme includes a hospital and in-school component. The hospital programme element aims to raise awareness amongst participants about the dangers of texting whilst driving through emphasising the consequences of unsafe driving behaviours and promoting positive alternatives. A series of lectures, videos, interactive demonstrations, testimonials from physicians as well as an ER simulation role play plus group discussions are used during this part of the program. In the second part of the programme, the student leaders who attended part one of the programme, lead a whole school campaign targeting texting whilst driving, with the aim of increasing awareness and reducing text messaging behaviours.
15	IMPACT (Canada)	The Impaired Minds Produce Actions Causing Trauma (IMPACT) intervention focuses on preventing injuries amongst adolescents from driving impaired by drink and drugs. The intervention includes showing students the stages of a road trauma patient in a hospital emergency department, which is delivered by medical professionals as well as emergency service professions who retell their personal experiences related to road traffic collisions. The sessions are made up of several teaching approaches including a mock resuscitation, bedside visits with a trauma patient and their family in intensive care, guest speakers, activities to review facts presented as well as group discussions.
16	Loewenstein Hospital Rehabilitation Centre Workshops (Israel)	This intervention aims to expose young and pre-drivers to an impactful experience with the aim that this exposure will promote safety messages and improve attitudes. During the 4-5 hour workshop, students are shown a film which documents the circumstances that proceed and follow a traffic collision involving a young driver. The film is followed by a talk provided by road traffic collision survivors or bereaved family members, which is followed with a Q&A and discussion session. Students are then introduced to a disability simulator to provide them with experience of how routine activities become more challenging when suffering a disability.

No.	Intervention (Country)	Programme description
17	Traffic Weeks (Belgium)	This program aims to increase knowledge of traffic situations and rules as well as reinforce positive attitudes towards road safety. The workshops take 50 minutes to run with the students and is delivered by the Flemish Foundation for Traffic Knowledge. The programme focuses on drink driving as well as on speeding, fatigue and distraction risks. Key facts about risk factors are provided with relevant assignments and precautionary measures are discussed.
Positively framed		
School-based intervention		
18	Interactive presentation on distracted driving (USA)	This educational intervention aims to improve distracted driving perspectives. The presentation is designed so that participants, with different learning styles, are exposed to examples of different types of in-vehicle distractions. The presentation includes data and research, naturalistic driving examples, active learning demonstrations as well as Q&A sessions.
19	Road safety programme for high school students (Lithuania)	This 4-hour long intervention has been designed using the Theory of Planned Behaviour with the aim of addressing students' beliefs about road traffic risks (i.e., speeding, seatbelt wearing, mobile phone use and speeding) and peer influence. Active learning approaches such as peer discussions, roleplay and games are employed to discuss risk scenarios.
20	Workshop education – resilience and driving focused (Australia)	The first 'driving focused' programme is a daylong workshop, including six separate sessions, which focuses on driving related issues, supported by emergency services, driving instructors, collision victims and other community members. The programme aims to increase awareness of road safety issues and foster positive attitudes related to key topics (i.e., speed, fatigue, alcohol and seatbelts). The responsibility and privileges associated with owning and using a vehicle are also covered. Risk-taking and peer-to-peer relationships are a particular focus of the programme, with safe passenger strategies discussed. The second 'resilience focused' programme is more broadly focused on building resilience and reducing risk-taking amongst young people. This one-day programme, also supported by individuals and organisations from the community, aims to support young people to develop the attitudes, knowledge and skills to make appropriate driving related decisions. Safe substance use (i.e., drink and drugs) is also covered more generally (i.e., discussions about safe celebrating with friends). The programme includes the following learning approaches: factual presentations; drama; peer education; and real-life experiences that resonated with the developmental stage and interests of attendees. Broader activities also support the programme (i.e., training of peer facilitators, parental communication, local media engagement and professional development for the delivering community).
21	Life Skills Training (USA)	This program focuses on developing drug and alcohol resistance/refusal skills and positive social norms against substance use through supporting the development of appropriate social and personal skills. The intervention introduces skills for managing anxiety, effective communication, assertiveness, personal relationships and building self-esteem to manage and resist temptations and peer pressure. The intervention uses group discussions, feedback, behavioural practice, demonstrations and modelling, as well as post-intervention activities.

No.	Intervention (Country)	Programme description
Other centres		
22	ACT Road Ready (Australia)	This programme, which has been compulsory in schools since 2000, is delivered in a variety of formats (i.e., a weekly one-hour session, 3-hour sessions over a 4-week period or an intensive 2-3 day programme). The sessions focus on raising awareness of young driver crash involvement and employ group discussions to focus on problem solving and decision making options when faced with driving challenges. Several interactive activities such as beer googles and using a speed radar gun are used within the session.

A.2 Interventions with negatively framed testimonial content (with and without follow-up activities)

No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/ comparison group	Analysis approach	Outcomes assessed
School-based interventions											
1	BStreetsmart (Australia)	(Sharwood et al., 2022)	2,360	37%	15.7 (0.68)	Crash reconstruction and other interactive activities	3 days	Pre and Post survey evaluation	N	Mixed method linear regression & paired sample t-test	1a
2	RRISK (Australia)	(Senserrick et al., 2021)	20,806	46%	17-19 yrs (n.a.)	Personal testimonials with simulated crash scenarios, information and peer facilitated discussions	1 day	Prospective study	Y	Univariate and multivariate binomial regression modelling	18
		(Zask et al., 2006)	2705	44%	15-17 yrs (n.a.)			Pre and post survey evaluation	Y	Multi-level regression modelling	1b, 14
3	Learn2Live (UK)	(Cutello et al., 2020b)	800	44%	16.64 (1.01)	Personal testimonial and follow-up activities	n.a. Est. 3 hours incl. follow-up session 3- months post-intervention	Pre, post and 3 month follow up survey evaluation	Y	Mixed model ANOVA	1a, 1b, 1c, 1d, 1e, 2
		(Burgess, 2011)	127	48%	16.27 (n.a.)	Personal testimonial	n.a. Est. 2 hours	Pre and post survey evaluation	N	Paired samples t-test & regression	1a, 1b, 1c, 1d, 1e

No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/ comparison group	Analysis approach	Outcomes assessed*
4	Road Safety Live (Denmark)	(Bojesen & Rayce, 2020)	1,007	48% - 49%	13-18 yrs	Personal testimonial with follow-up information	1.5 hours	Pre and post survey evaluation	Y	Linear regression	14
5	SPIKS Intervention (Serbia)	(Rimal et al., 2019)	1449	49%	17.92 (0.73) – 17.95 (0.75)	Personal testimonial	n.a. Est. 2-3 hours	Pre, post and 6-month survey evaluation	Y	One tailed T-test Zero-order Pearson correlation	1a, 1f, 1g, 5, 8,
6	SAFE (USA)	(Freund et al., 2019)	4,151	n.a.	14-19 (n.a.)	School led activities including crash demonstrations and guest talks	n.a. Est. 2-4 weeks	Quasi-experimental observation	Y	Paired sample t-test	1h
7	RACQ Docudrama Program (Australia)	(Kennedy et al., 2018)	260	22% - 45%	16.34 (0.67)	Crash reconstruction with follow-up discussions	3 hours	Pre and post survey evaluation	Y	MANOVA & Hierarchical multiple regression Paired samples t-test	1a, 2, 16
8	Safe Drive Stay Alive (UK)	(Dale et al., 2017)	89	44%	16.98 (n.a.)	Personal testimonial	n.a. Est. 2 hours	Pre and post survey evaluation	N	Hierarchical multiple regression & Wilcoxon signed ranks test	1a, 5, 6, 7
		(Poulter & McKenna, 2010)	730	53% – 64%	15.61 (0.53)			Pre, post and 5-month follow-up survey evaluation	Y	MANOVA & ANOVA	1a, 1b, 1c, 1d, 3, 5, 6
		(Symons et al., 2008)	291	54% - 66%	15-16			Pre and post survey evaluation	N	MANOVA	1a, 1b, 1c, 1d

No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/ comparison group	Analysis approach	Outcomes assessed*
9	Pre-driver DUI program (Slovenia)	(Markl, 2016)	269	57%	16.99 (0.80)	Collision consequences & case studies and peer discussions	1.5 hours	Pre, post and 1-month follow-up survey evaluation	Y	Repeated measures MANOVA	1a, 1b, 1c, 1d, 1h, 5, 17
10	Traffic Informers (Belgium)	(Cuenen et al., 2016)	277	45% - 52%	16.9 (n.a.) – 16.8 (n.a.)	Personal testimonial and follow-up discussion	2 hours	Pre and post survey evaluation	N	MANCOVA & paired samples t-test & ANCOVA	1a, 1b, 1c, 1d, 1h, 9, 10
		(Feenstra et al., 2014)	1,128	47%	15.0 (0.84)			pre and post survey evaluation	Y	Mixed regression & ANCOVA	1a, 1b, 1d, 7, 11, 12, 13
11	Pre-driver intervention (Australia)	(Glendon et al., 2014)	305	55% - 60%	16-17	Personal testimonial with follow-up activities and information	3 hours	Pre, post and 6-week follow-up survey evaluation	Y	ANOVA	1b, 5
12	You Hold the Keys (YHTK) (USA)	(King et al., 2008)	814	51%	15-19	Personal testimonial with school directed activities	10 weeks	Pre, post and 6-month follow-up survey evaluation	N	Paired sample t-tests	1a, 1c, 1h
Hospital-based interventions											
13	P.A.R.T.Y Program (Australia)	(Francis et al., 2022)	2,414	49%	15.81 (0.88)	Personal testimonials with demonstrations, activities and discussions	1 day	Pre, post and 3–6-month follow-up survey evaluation	N	Conditional logistic regression	1a, 14, 17
		(Cameron et al., 2022)	3,397	36%	16 (median) (n.a.)				N	Mann-Whitney U	1b
		(Gunn et al., 2018)	1,315	44%	16.2 (0.80)				N	Chi-Square test	1b, 14
No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/	Analysis approach	Outcomes assessed*

									comparison group		
14	BITZ programme (USA)	(Unni et al., 2017)	137	n.a.	16.6 (n.a.)	Personal testimonials with demonstrations, activities and discussions, plus follow-up school campaign	4 hours	Pre, post and 5-month follow-up survey evaluation	N	Chi-square test & ANOVA	1a, 1e, 1h, 14
15	IMPACT (Canada)	(Stewart et al., 2009)	269	34% - 49%	16.1 (n.a.) – 16.2 (n.a.)	Personal testimonial with demonstrations and activities	One day	RCT with 1 wks, 1 - month and 6-month post survey evaluation	Y	Hierarchical linear models & multiple logistic model	1h, 14, 15
16	Loewenstein Hospital Rehabilitation Centre Workshops (Israel)	(Rosenbloom et al., 2009)	640	48%	18.5 (n.a.)	Personal testimonial with demonstrations and activities	4 hours	Survey evaluation	Y	ANOVA	1a

* Outcomes assessed: 1 = Theory of Planned Behaviour (TPB) components – 1a = Behavioural Intentions (BI), 1b = Attitudes (ATT), 1c = Perceived Behavioural Control (PBC), 1d = Subjective norms (SN), 1e = Behavioural Beliefs (BB), 1f = descriptive norms (DesN), 1g = Injunctive norm (InjN), 1h = Behaviour (BEH), 2 = Regret (REG), 3 = Accident Likelihood (ACC_LIK), 4 = Drive ability (DRVE_AB) 5 = Risk perception/Perceived risk (RISK_PER), 6 = Outcome expectancies (OUT_EXP), 7 = Self-efficacy (EFF), 8 = Over confidence (OV_CONF), 9 = cognitive impact, 10 = emotional impact, 11 = Risk comparison, 12 = Accident experience (ACC_EXP), 13 = Near accidents (NEAR_ACC), 14 = Knowledge (KNOW), 15 = Influence friends and family to improving behaviours (FAM_FRD_INFL), 16 = Extended Parallel Process Model (EPPM) measures, 17 = Program effects (PROG_EFF), 18 = Crash outcomes (CRSH_OUT), 19 = Offences (OFF), 20 = Sensation seeking (SENS), 21 = Optimism bias (OP_BIAS), 22 = Illusionary invulnerability (ILL_INV), 23 = Differential association (DIFF_ASS), 24 = Perceived threat (PER_THRT)

A.3 Interventions with positively framed content

No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/ comparison group	Analysis approach	Outcomes assessed*
School-based interventions											
17	Traffic Weeks (Belgium)	(Riaz et al., 2019)	175	41%	16-19 (n.a.)	Classroom based assignments discussing coping mechanisms	n.a. Est. 2 hours for several workshops	Pre and post survey evaluation	N	MANCOVA & ANOVA	1a, 1b, 1c, 1d, 1h
18	Interactive presentation on distracted driving (USA)	(Hurwitz et al., 2016)	1,006	47%	16.17 (1.13)	Classroom workshops and active learning demonstrations	n.a. Est 2 hours	Pre and post survey evaluation	N	Paired t-test	14
19	Road safety programme for high school students (Lithuania)	(Floreskul et al., 2016)	302	35% - 44%	16.82 (0.52)	Classroom discussions and active learning approaches	4 hours	Pre and post survey evaluation	Y	Mann-Whitney U & Wilcoxon	1a, 1b, 1c, 1d, 24
20	Workshop education – resilience and driving focused (Australia)	(Senserrick et al., 2009)	20822	45%	17.0 (n.a.)	Classroom based workshops discussing driving and resilience approaches	1 day	Prospective cohort study	Y	Poisson regression model	18, 19
21	Life Skills Training (USA)	(Griffin et al., 2004)	2,042	53%	18.1 (n.a.)	Classroom based workshop training social and personal skills	n.a. Est. 3 hours	Prospective cohort study	Y	Logistic regression analysis	19

No.	Intervention (Country)	Citation	Sample size	Males (%)	Av. Age (SD)	Approach	Duration	Study design	Control/ comparison group	Analysis approach	Outcomes assessed*
Other centre interventions											
22	ACT Road Ready (Australia)	(Bates et al., 2020)	119	46%	16.41 (1.61)	Classroom based workshops with activities discussing coping mechanisms	2-3 days	Pre, post and 1-, 4- and 9-12-month follow-up survey evaluation	N	ANOVA	5, 20, 21, 22, 23

* Outcomes assessed: The same as outlined in Appendix A.2.

A.4 Study outcome detailed results

A.4.1 Intentions

Thirteen interventions, evaluated by seventeen studies, included an intentions outcome measure. Six interventions in this review were found to lead to improvements in road safety intentions. The *BStreetsmart* intervention, evaluated by Sharwood et al (2022), found that intentions to engage in risky driving behaviours, as measured by the Behaviour of Young Novice Drivers Scale (Bridie Scott-Parker & Proffitt, 2015), reduced post-intervention (-2.99, 95% CI - 3.418 to -2.466). Similarly, the *Learn2Live* intervention evaluated by Burgess (2011) and Cutello et al. (2020b) demonstrated improvements in participant behavioural intentions. An improvement in behavioural intentions was found post- intervention ($t(125) = [4.71]$, $p < .001$; T1: $M = 15.25$, $SD = 4.55$; T2: $M = 13.37$, $SD = 4.81$) by Burgess (2011). A subsequent study by Cutello et al. (2020b) found a significant time and group effect for the composite measure of attitudes (including behavioural intentions) ($F(1, 1512) = 373.696$, $p < .001$) which improved over and above the control post-intervention measure. However, the effect was found to wane at follow-up (Behavioural intentions: INT: pre: $M = 34.2$, $SD = 3.4$, post: $M = 23.7$, $SD = 2.8$, follow-up: $M = 24.6$, $SD = 2.9$; CONT: pre: $M = 33.8$, $SD = 3.1$, follow-up: $M = 28.4$, $SD = 2.2$). In an evaluation of the P.A.R.T.Y Intervention, Francis et al. (2022) found positive impacts for intention measures relating to driving whilst over the legal limit (would definitely not risk driving if you were over the legal limit, OR 6.06 (2.95-5.59), $p < .001$, Pre: $M = 87.8$, Post: $M = 94.3$) and designating a safe driver (would designate safe driver if you or your friend had too much to drink at a party, OR 3.55, 95% CI (1.82-6.92), $p < .001$, Pre: $M = 97.6$, Post: $M = 98.9$) . The evaluation of a road safety intervention for high school students by Floreskul et al. (2016) found that the experimental group was less willing to engage in risk taking behaviours (i.e., speeding, DUI, mobile phone use, risk during peer influence and seatbelt wearing), in comparison to the control ($p < .001$, $d = .256$).

Several studies found partial intention effects for the interventions evaluated. Three studies evaluating the impact of the Safe Drive Stay Alive intervention (Dale et al., 2017; Poulter & McKenna, 2010; Symons et al., 2008) found that the intervention had a limited impact on behavioural intentions. The earliest study on intervention effects on intentions by Symons et al. (2008) found a small but significant improvement in future intentions post-intervention ($p = .009$, $\eta_p^2 = .016$), with female intentions being safer, but unaffected (as were male intentions) by the intervention ($p = .001$, $\eta_p^2 = .030$; T1: Male: $M = 4.35$, $SD = 1.10$, Female: $M = 4.67$, $SD = 1.00$; T2: Male: $M = 3.84$, $SD = 1.10$, Female: $M = 4.49$, $SD = 1.10$). A subsequent study by Poulter and McKenna (2010) found improvements in all four speeding intention measures (e.g., I would like to ensure that I always drive within the law, $F(2, 396) = 10.54$, $p < .01$, $\omega^2 = .02$), which diminished over time, with only one measure maintained at 5-months post-intervention (e.g., I expect that it is inevitable that I will drive over the speed limit sometimes, $p < .01$). A further between-participant analysis conducted by the authors found significant effects of the intervention for one of the four intentions measures (I want to drive within the speed limit at all times, $F(1, 454) = 10.66$, $p < .01$, $d = 0.31$). Poulter and McKenna (2010) suggest, given intentions to conform with the highway code and traffic law got significantly worse 5-month post-intervention, that this result provides cause for concern about young driver intentions ahead of driving and also raises the possibility that road safety education can have counterproductive effects. Dale et al. (2017) found no impact of the intervention on speeding intentions with risk perception, efficacy and outcome expectancies describing 47% of the total variance in intentions ($F(4, 289) = 20.57$, $p < .001$).

The evaluation of the 'You Hold the Key intervention' by King et al. (2008) found some immediate beneficial effects on intentions, with significant effects on two out of five intention measures (i.e., reporting being less likely to drink alcohol in the next 30 days, $p = .006$ and more like to wear seatbelts when driving or riding a vehicle in the next 30 days, $p < .001$). Six months post-intervention significant negative effects on intentions, in comparison to pre-test, were found for two out of the five measures (i.e., reporting being more likely to drink alcohol in the next 30 days, $p = .004$ and more likely to binge drink in the next 30 days, $p = .001$).

One significant positive effect on intentions was also found (i.e., more likely to plan to always wear a seatbelt in the next 30 days, $p = .001$). Whilst some sub-group effects by gender were found for the intervention, no difference was seen for the intention measures. Similar mixed results were found in the evaluation of the BITZ intervention by Unni et al. (2017), where the intervention improved intentions to speak up to a driver who is texting whilst driving ($X^2 = 14.80$, $df=2$, $p = 0.001$; T1 = 40%, T2 = 62%) and to avoid riding with texting drivers in the future ($X^2 = 10.516$, $df=2$, $p = 0.005$; T1 = 11%, T2 = 22%). However, the intervention did not increase intentions to offer to text on a driver's behalf or participant's willingness to designate someone to text for them when driving.

For two interventions, no impacts on behavioural intentions were found. A pre-driver DUI intervention assessed by Markl (2016) found that DUI intentions changed over time ($F(2,422) = 13.706$, $p < 0.01$), but in the unwanted direction for both the intervention and control groups. Feenstra et al. (2014) also found no significant effects of the Traffic Informers intervention on risky cycling intentions.

Several studies focused on intervention sub-group impacts, particularly where study design was not conducive to measuring more general intervention effects (i.e., due to the lack of a control or comparison group). Cuenen et al. (2016) found in their evaluation of sub-group effects for the Traffic Informers intervention that there was an immediate beneficial effect ($F(10,2416) = 2.21$, $p = 0.02$) on intentions (and several other measures) for students within general and occupational education. At two-months post-intervention there was an effect of the intervention on intentions amongst males, but not amongst females. In the evaluation of the Loewenstein Hospital Rehabilitation Centre workshops by Rosenbloom et al. (2009) an effect of gender was also found for predicted behavioural intentions ($F(1,617) = 13.32$, $p < 0.001$), with males reporting fewer safe intentions than females. Participation in the workshop also only led to more beneficial predicted behavioural intentions for vocational school students. Finally, an evaluation of Traffic Weeks by Riaz et al. (2019) found no immediate effects of the intervention on DUI intentions for males in different educational settings, but a significant positive effect for female students in general education was found

($F(1,72) = 9.25$, $p = 0.003$, $d = .445$). For the broader TPB measures, no immediate effects on intentions were found for males or females. The evaluation by Rimal et al. (2019) of the SPIKS Intervention, which sought to establish the effect of the intervention on high-risk driving intentions (e.g., reading and sending a text), found no effect of the intervention for males or females. The authors suggest that this might be because overconfidence bias and descriptive norms were not affected by the intervention, which were found to be important for influencing behavioural intentions.

Given the central relevance of intention within the TPB, three of the studies within the present review assessed the extent to which other components of the TPB explained the variance in intentions using regression analysis. Regression analysis, conducted by Burgess (2011) in the evaluation of the Learn2Live intervention, found that attitudes and perceived behavioural control described 37.2% of the variance in behavioural intention ($R^2_{\text{adj}} = 35.3\%$, $F(3,102) = 19.57$, $p < .001$). The evaluation of the SPIKS Intervention by Rimal et al. (2019) found that overconfidence bias and descriptive norms influenced behavioural intentions. An analysis of the RACQ Docudrama intervention by Kennedy et al. (2018) sought to understand how TPB and EPPM components predicted intentions to speak up as a passenger about driver mobile phone use. Their analysis found that the TPB constructs, plus anticipated regret, explained a significant 52.4% of the variance in intentions to speak up in the intervention group ($R^2_{\text{adj}} = 51.2\%$, $R^2 = 0.524$, $F(4, 162) = 44.56$, $p < .001$). Attitudes, subjective norms, PBC and anticipated regret all significantly increased the variance in explained intentions. For the control group TPB constructs and anticipated regret explained 60.3% ($R^2_{\text{adj}} = 58.2\%$, $R^2 = 0.603$, $F(4, 76) = 28.84$, $p < .001$), with only anticipated regret and attitudes being positive predictors of intentions to speak up. The authors suggest that the differences between the intervention and control groups may be explained through the intervention group being introduced to more relevant concepts that influence intentions.

A.4.2 Attitudes

Seven interventions, evaluated by eleven studies, were assessed for their impact on participant attitudes. Beneficial intervention effects on attitudes were found in four of the interventions reviewed. The RRISK intervention evaluated by Zask et al. (2006) found a positive relative change, over and above the comparison groups, for three attitude measures asked of seminar attendees, (e.g., Everyone who parties should know CPR first aid, 15-16 year old, +6%, $p < .05$). The two studies assessing the impact of the Learn2Live intervention (Burgess, 2011; Cutello et al., 2020b) also found beneficial intervention impacts. In the study by Burgess (2011) attitudes improved post-intervention ($t(119) = [5.91]$, $p < .001$; Pre: $M = 28.00$, $SD = 5.08$; Post: $M = 24.78$, $SD = 6.11$) and in the regression analysis conducted, 32.2% of the variance in change of attitude was explained by behavioural beliefs and subjective norms (friends and family) ($R^2_{adj} = 29\%$, $F(4, 90) = 10.21$, $p < .001$). The subsequent controlled study by Cutello et al. (2020b) also found an effect of the intervention on attitudes, which diminished in magnitude at follow-up ($F(1,1512) = 373.696$, $p < .001$; INT: T1: $M = 238.70$, $SD = 14.00$; T2: $M = 147.60$, $SD = 23.20$; T3: $M = 156.70$, $SD = 26.30$; CONT: T1: $M = 244.80$, $SD = 13.80$; T3: $M = 231.60$, $SD = 11.60$). In addition, gender differences were found post-intervention ($p < .001$). Females reported greater improvements in attitudes than males and male attitudes worsened to a greater extent than female attitudes between post-intervention and follow-up ($p < .001$). Positive effects that waned over time were also found in an evaluation of the P.A.R.T.Y intervention assessed by Cameron et al. (2022), who found that whilst there were some positive changes in attitudes post-intervention, these largely reduced at the 4-month follow-up stage, a finding which is also in line with the attitudinal measures assessed in an earlier intervention effect study by Gunn et al. (2018). Beneficial changes in attitudes towards traffic violations was also found post-intervention for participants in the Traffic Informers intervention, in comparison to the control, as assessed by Feenstra et al. (2014) ($F(1, 1099) = 10.49$, $p < .01$, $d = .26$).

Two interventions in the review did not deliver improvements in participant attitudes. Both studies assessing the impact of Safe Drive Stay Alive (Poulter & McKenna, 2010; Symons et al., 2008), found no, or limited impacts on speeding related attitudes, with Symons et al. (2008) finding that whilst females reported better attitudes than males, this difference did not differ before or after the performance. An assessment of the pre-driver DUI intervention by Markl (2016) also found that whilst general DUI attitudes changed over time ($F(6, 208) = 13.051, p < 0.01$), these changes were not associated with taking part in the intervention. The same was found for the TPB attitude measure used within the study ($F(2,422) = 7.447, p < 0.01$).

One pre-driver intervention evaluation by Glendon et al. (2014) found negative effects of the intervention on attitudes. From the outset, males were found to have riskier attitudes to unsafe driving than females ($F(1, 214) = 14.26, p < .001, n^2 = .06$, Males: $M = 100.29, SE = 0.89$, Females: $M = 94.92, SE = 1.11$) and the intervention group in the study had overall attitudes that became less safe post-intervention ($t(214) = 2.32, p = .02$, T1: $M = 98.10, SE = 1.13$, T3: $M = 101.07, SE = 1.17$) which was maintained at the 6-week follow-up stage.

Sub-group intervention effects on attitudes were also explored in an evaluation of the Traffic informers intervention by Cuenen et al. (2016), which found that there was a small but immediate effect on attitudes (as well as subjective norms, perceived behavioural control and intentions) for general education ($F(5, 381) = 3.26, p = .01$) and occupational educational students ($F(5,330) = 3.96, p = .00$), but not technical students. At two-months post-intervention there was a beneficial effect of the intervention on attitudes for males only ($F(5, 27) = 8.42, p = .00$).

A.4.3 Perceived Behavioural Control

Seven interventions identified by this review have been evaluated by nine studies for their impacts on perceived behavioural control (PBC). Positive impacts on PBC were found in three of the interventions reviewed. Learn2Live had a beneficial effect on PBC in both the evaluation conducted by Burgess (2011) ($t(124) = [5.01], p < .001$; Pre: T1: $M = 19.10, SD = 4.84$; T2: $M = 17.15, SD = 5.32$) and Cutello et al. (2020b) (ALL: time*group: $F(1, 1512) = 373.696, p < .001$; INT:

Pre: $M = 30.6$, $SD = 3.7$; Post: $M = 20.9$, $SD = 4.4$; Follow-up: $M = 22.4$, $SD = 4.4$; CONT: Pre: $M = 33.3$, $SD = 2.5$; Follow-up: $M = 33.3$, $SD = 3.3$). However, the positive effect found by Cutello et al. (2020b) reduced in magnitude at follow-up.

Safe Drive Stay Alive was also found to have beneficial effects on PBC in the evaluation by Symons et al. (2008) ($p = .001$, $\eta^2 = .047$; T1: $M = 4.30$, $SD = 1.2$; T2: $M = 4.81$, $SD = 1.20$) as well as in all four measures assessed by Poulter and McKenna (2010) (e.g., are you confident that you can resist your friends' persuasion to drive faster, ($F(2, 396) = 9.09$, $p = <.01$, $\omega^2 = .02$; Pre: $M = 4.69$, $SD = 1.66$; Post: $M = 5.23$, $SD = 1.61$, Follow-up: $M = 4.98$, $SD = 1.62$). However, the effects found by Poulter and McKenna (2010) either diminished or disappeared at the 5-month follow-up measurement. There were also beneficial PBC outcomes reported for the 'You Hold the Key' intervention by King et al. (2008), where immediate benefits post-test were found, for example, for student confidence to say no to a friend who asked them to drive after they had been drinking ($p <.001$). Some beneficial PBC outcomes were also noted at 6-months follow-up, such as improvements in students saying no to riding with a friend who had been drinking and was planning to drive ($p = .001$).

In contrast, two of the interventions in the review were found to have no effect on PBC. The evaluation of the pre-driver DUI intervention by Markl (2016) found that whilst PBC worsened over time ($F(2,422) = 7.188$, $p < 0.01$), there was no significant difference between the control and intervention groups. The road safety intervention for high school students assessed by Floreskul et al. (2016) also found no significant intervention effects on PBC.

Finally, the specific effect on individual sub-groups was assessed for two interventions. The Traffic Informers intervention evaluated by Cuenen et al. (2016) found that there was a beneficial effect on PBC for different education groups (beneficial PBC effect for general education, but not occupational education groups) and genders (beneficial PBC effect for males, but not for females). The evaluation of the Traffic Weeks intervention by Riaz et al. (2019) did not find differential effects of the intervention on PBC DUI items by gender

immediately post-intervention, but for the broader behavioural variables, there was a significant effect for females for one of the PBC items (“To what extent do you have an influence on whether you get involved in a road traffic accident” $F(1,99) = 12.17, p = 0.001$; Pre: $M = 3.64, SD = 0.19$; Post: $M = 4.48, SD = 0.17$; $p < 0.001, d = 0.441$).

A.4.4 Subjective norms

Six interventions, evaluated by nine studies, have been reviewed for their impact on participant subjective norms. Only one of the interventions included in this review were found to have consistent beneficial impacts on subjective norms. The Learn2Live intervention led to improvements in self-reported subjective norms for family (SNFA) and friends (SNFR) as assessed by Burgess (2011) (SNFA: $t(121) = [3.11], p < .001$, T1: $M = 13.15, SD = 3.81$, T2: $M = 12.23, SD = 4.16$; SNFR: $t(120) = [5.50], p < .001$, T1: $M = 18.12, SD = 4.45$, T2: $M = 15.93, SD = 5.10$). This was also found in a later controlled survey evaluation by Cutello et al. (2020b) (Time & groups: $F(1, 1512) = 373.696, p < .001$; SNFA: INT: Pre: $M = 39.2, SD = 5.80$, Post: $M = 15.8, SD = 5.00$, Follow-up: $M = 17.4, SD = 5.50$; CONT: Pre: $M = 40.70, SD = 5.40$, Follow-up: $M = 33.40, SD = 3.90$; SNFR: INT: Pre: $M = 31.00, SD = 3.00$; Post: $M = 24.50, SD = 3.50$, Follow-up: $M = 25.60, SD = 3.99$; CONT: Pre: $M = 31.40, SD = 2.40$, Post: $M = 35.90, SD = 3.30$). This study confirmed beneficial changes that lasted over time but reduced slightly at follow-up.

In contrast, the Safe Drive Stay Alive intervention was found to have a beneficial impact on some, but not all subjective norm measures. Whilst Symons et al. (2008) found an overall beneficial effect of the intervention on subjective norms (i.e., perceptions of parents’, close friends’ and partners’ approval of safe driving behaviour) immediately post-intervention ($p = .012, \eta_p^2 = .015$; T1: $M = 4.74, SD = 1.10$; T2: $M = 5.01, SD = 1.20$) a more varied response was found in the study by Poulter and McKenna (2010). Whilst an improvement in safe responses to the question ‘Partner approves/disapproves of me driving too fast’ ($F(2, 396) = 12.15, p < .01, \omega^2 = .03$), was found in within-participant study designed by Poulter and McKenna (2010), this effect diminished in magnitude at 5-month post-

intervention, with no significant effects found for the other subjective norm measures (e.g., Parents/people who are important think I should/shouldn't exceed the speed limit). In a follow-up between-participant study design, a significant effect was found for the measure just outlined ($F(1, 454) = 6.65, p < .01, d = .24$; CONT: $M = 5.44, SD = 1.78$; INT: $M = 5.84, SD = 1.48$), but not for the question related to partner approval/disapproval about driving fast (as was the case in the within-subjects evaluation) and the other subjective norm measures recorded. Poulter and McKenna (2010) describe the intervention as having an overall null effect on subjective norms and suggest that future interventions should seek to raise perceptions of the social pressures to adhere to road traffic rules.

Three interventions in this review were found to have no impact on subjective norms. Whilst the pre-driver DUI intervention, evaluated by Markl (2016), found a reduction in safety promoting subjective norms across the measurement period ($F(2,422) = 13.706, p < 0.01$), this was for both intervention and control groups (intervention*time $\lambda = 0.995$; $F(6,208) = 0.158, p > 0.05$), indicating that the intervention itself was not effective at influencing subjective norms. In an evaluation of a road safety intervention for high school students conducted by Floreskul et al. (2016), a significant effect of the intervention on perceived norms occurred within the experimental group ($p < 0.001$). Subsequent regression analysis found that group assignment (i.e., control or experimental) was not a significant predictor of subjective norms ($\beta = -0.099; p < 0.158$) and therefore the intervention could not be determined as being effective for changing student perceptions that their peers were less tolerant of their risk taking. In addition, the Traffic Informers intervention did not have significant effect on the personal norm questions posed in the study by Feenstra et al. (2014) (e.g., everyone knows that riding or driving in traffic is risk).

Where control or comparison data was not available, the effect of the intervention on subjective norm measures for individual sub-groups was assessed for two interventions in this review. In the analysis of Traffic Informers by Cuenen et al. (2016) a small, but positive beneficial effect of the intervention on subjective

norms (and several other socio-cognitive measures) was found immediately post-intervention for general (ALL: $F(5, 381) = 3.26, p = .01$; Subjective norm: Pre: $M = 2.63, SD = 0.03$; Post: $M = 2.54, SD = 0.03, p = 0.02, d = 0.25$) and occupational ($F(5,330) = 3.96, p = .00$; Subjective norm: Pre: $M = 2.68, SD = 0.04$; Post: $M = 2.53, SD = 0.04, p = 0.00, d = 0.14$) educational students, but not for those in technical education. At two-months post-intervention, whilst a significant overall intervention effect was established for both male ($F(5,27) = 8.42, p = 0.00$) and female students ($F(5,62) = 2.32, p = 0.05$), the intervention was only found to have an impact on male subjective norms (Pre: $M = 2.84, SD = 0.08$; Post: $M = 2.55, SD = 0.07, p = 0.00, d = 0.56$). The evaluation of the Traffic Weeks by Riaz et al. (2019) also assessed how socio-cognitive and behavioural variables changed pre- and post-intervention for participants, by gender and education type. The study found that female students from general education had improved subjective norms (friends) post-intervention ($F(1,72) = 13.16, p = 0.001$; Pre: $M = 4.61, SD = 0.14$, Post: $M = 5.08, SD = 0.14, p = 0.001, d = 0.380$).

A.4.5 Behaviour

Six interventions within this review have been assessed for their impacts on road user behaviour. Whilst it is important to understand the effects interventions have on behaviours, it is often not possible for many studies of pre-driver interventions to measure behavioural impacts. Two of the interventions in this review were found to have a beneficial road safety effect on behaviours. The observational study by Freund et al. (2019) on the effect of the SAFE intervention found that SAFE schools on average had higher seatbelt use ($t(4,051.4) = -5.33, p < .001, d = 0.19$), non-distracted drivers ($t(4,056.3) = -2.44, p = .015, d = .06$) and seatbelt use for passengers ($t(1,771.9) = -3.67, p < .001, d = 0.16$) than non-safe schools. The regression analysis conducted found that participation in SAFE was a significant predictor of whether drivers were belted, but it did not explain much of the variance ($R^2 = 0.007, F(1,4285) = 28.17, p < .001; \beta = 0.081, p < .001$). The evaluation of the You Hold the Key intervention by King et al. (2008) also found that post-test participants were significantly more likely to report wearing seatbelt as a driver ($p < .001$), to require their passengers to wear seatbelts ($p < .001$) and

to limit the number of passengers to the number of seatbelts within the vehicle ($p < .001$).

The BITZ intervention, evaluated by Unni et al. (2017), had both significant and non-significant effects on the behavioural outcomes measured. Post-intervention, the number of respondents reporting being with a teen texting whilst driving over the past 7 days reduced ($X^2, 3.14; df = 1, p = 0.08, T1 = 90\%, T2 = 83\%$). Reports of not texting in the last 7 days increased ($X^2 = 4.630, df = 1, p = 0.031, T1 = 42\%, T2 = 56\%$). Observed texting whilst driving also reduced ($T1 = 13\%, T2 = 9\%, p < .0001$). However, there was no significant difference in the percentage of respondents who said they never switched the phone off, used a mobile phone app to prevent texting whilst driving or frequently/always kept the phone on silent. In contrast, the IMPACT intervention evaluated by Stewart et al. (2009) had no significant effects on the negative driving behaviours measured.

One of the interventions assessed was found to have no effect on behaviours. The pre-driver DUI intervention assessed by Markl (2016), sought to understand how past behaviours changed over time. As with the other measures assessed within the study, past behaviour was reported as being less safe over time for both the intervention and control groups (used Greenhouse-Geisser correction, $F(1.8, 383.7) = 11.166, p < 0.01$; INT: $T1: M = 4.74, SD = 0.47; T2: M = 4.52, SD = 0.81, T3: M = 4.50, SD = 0.80$; CON: $T1: M = 4.68, SD = 0.51; T2: M = 4.56, SD = 0.74; T3: M = 4.54, SD = 0.74$).

Finally, the evaluation of Traffic Informers intervention by Cuenen et al. (2016) did not include a control group and therefore the intervention behavioural effects for participants over and above a comparison group were not available. The evaluation did however show that there was a differential behavioural effect of the intervention by education type ($F(10, 2416) = 2.21, p = .02$). Immediately post-intervention there was a behavioural (as well as an attitude, subjective norm and intention) effect for those in occupational education ($F(5,330) = 3.96, p = .00$), but no significant effect for technical or general level education. Two-months post-intervention there was a intervention effect for male ($F(5,27) = 8.42, p = 0.00$) and female students ($F(5,62) = 2.32, p = 0.05$) for all socio-cognitive

measures, including behaviour. The intervention, however, had marginally significant effects for females and larger effects for males.

A.4.6 Knowledge

Six of the interventions evaluated by seven studies have been assessed for their effects on knowledge acquisition. All six interventions were found to lead to changes in knowledge acquisition. The evaluation of the RRISK intervention by Zask et al. (2006), found a positive relative change in the knowledge acquisition of seminar attendees, over and above the comparison groups (e.g., used car safety, 15-16 year old, +19%, $p < .01$). Similarly, Road Safety Live improved knowledge of the key traffic risk factors in traffic ($\beta = 0.18$, 95% CI: 0.08-0.28), but did not have a significant effect on knowledge about the most at risk age group (Bojesen & Rayce, 2020). In reviewing the effects of the intervention Bojesen and Rayce (2020) concluded that whilst interventions such as Road Safety Live may improve knowledge of road safety risks, there remains a significant challenge associated with how to translate this knowledge into safe road behaviours.

The P.A.R.T.Y intervention evaluated by Francis et al. (2022) and Gunn et al. (2018) also found significant changes to knowledge post-intervention. Francis et al. (2022) found a positive change in the number of intervention participants that thought they would definitely get injured in a car crash (52.6% changed their response to 'definite', OR 2.47, 95% CI 2.01 –3.04, $p < 0.001$), get injured when engaging in physically risk-taking activities (43% changed response to 'definite', OR 14.5, 95% CI 10.90 –19.33, $p < 0.001$) and sustain a central nervous system related injury when taking part in risk-taking activities (47.5% changed response to 'definite', OR 4.31, 95% CI 3.55 –5.24, $p < 0.001$). An earlier study by Gunn et al. (2018) also found positive changes within intervention participants with regard to perceptions of sustaining a definite injury in a collision without a seatbelt (Pre: 60%, Post: 80%, Follow-up: 69%, $p < .0.01$) and definitely sustaining an injury after risk-taking activities (Pre: 12%, Post: 36%, Follow-up: 23%, $p < 0.01$).

The BITZ intervention evaluated by Unni et al. (2017) also delivered knowledge improvements in participants related to mobile phone (e.g., not legal to talk on a

mobile phone under the age of 18, $\chi^2 = 7.549$, $df=1$, $p = 0.006$, $T1 = 72\%$, $T2 = 87\%$) and graduated driver licensing laws (i.e., awareness of GDL laws, $X^2 = 65.787$, $df = 1$, $p < 0.001$, $T1 = 37\%$, $T2 = 87\%$). Further evidence of the impact that pre-driver education interventions can have on knowledge acquisition is demonstrated in the evaluation of the IMPACT intervention by Stewart et al. (2009), which found, after controlling for gender and school difference, being in the intervention group increased the expected number of correct answers at one-week ($\beta = 1.59$ with a 95% CI = 1.25, 1.92), one-month ($\beta = 1.08$ with a 95% CI = 0.74, 1.42) and six-months post-intervention ($\beta = 1.19$ with a 95% CI = 0.84, 1.52). The interactive presentation on distracted driving reported by Hurwitz et al. (2016) also found that participants were more likely to be able to identify different types of distracted driving post-intervention, in comparison to pre-scores for 13 out of 14 examples provided (i.e., Talking on a mobile phone, -0.453 , $p < .001$).

A.4.7 Risk perception/Perceived risk

Perceived risk has been described as important for understanding crash causation (Deery, 1999; Markl, 2016), with previous research finding perceived risk (i.e., subjective probability of collisions and anticipated severity of collision consequences) to be related to self-reported unsafe driving behaviours (Hatfield & Fernandes, 2009). Five interventions, assessed by six studies in this review have been evaluated for their effects on risk perception/perceived risk. Two of these interventions demonstrated a positive effect on risk perception/perceived risk. Rimal et al. (2019) found a difference in risk perception between the treatment and control schools for males and females (Males: $t = 1.87$, $p < .05$ and Females: $t = 2.0$, $p < .01$), but subsequent regression modelling found that these improvements were not associated with intentions to engage in risky intentions. Bates et al. (2020) found a significant main effect for risk perception ($F(3,294) = 3.54$, $p = .02$, $\eta_p^2 = .04$), but the Bonferroni adjusted post-hoc analysis did not reveal any differences over time although the means at 12-months ($M = 3.29$, $SE = 1.13$) showed that participants perceived driving as riskier than at T1 ($M = 3.02$, $SE = 1.04$). A subsequent paired samples t-test confirmed a statistically

significant difference between young driver's perceptions of risk 12-months post-intervention (Time 1: $M = 3.04$, $SE = .11$) ($t(103) = 3.78$, $p < .001$).

In contrast, the other three interventions did not demonstrate significant nor positive effects on risk perceptions/perceived risk. The SDSA intervention assessed by Dale et al. (2017) found that the intervention had no significant effect on participants risk of collision related to driving more than 60mph or not slowing down enough for bends or other changes in the road. Similar outcomes were also found in the earlier assessment of SDSA by Poulter and McKenna (2010), where no significant changes were found for speed perceptions (i.e., Liking being a passenger when the car is driven fast and driving fast is exciting). The pre-driver DUI intervention evaluated by Markl (2016) found no significant effect of the intervention on risk perception and Glendon et al. (2014) in their assessment of a pre-driver intervention also found no difference in perceived risks towards unsafe driving between T1 and T3 in either intervention or control groups.

A.4.8 Behavioural belief

The impact of interventions on behavioural beliefs (the precursor to attitudes as modelled within the TPB) was assessed for two interventions by two studies. Cutello et al. (2020b) found a beneficial effect of Learn2Live on behavioural beliefs within the intervention group, in comparison to the control ($p < .001$). The positive effect was strongest post-intervention, reducing slightly at follow-up (INT: Pre: $M = 37.1$, $SD = 3.8$; Post: $M = 21.9$, $SD = 4.0$; Follow-up: $M = 22.7$, $SD = 4.0$; CONT: Pre: $M = 36.0$, $SD = 3.3$; Follow-up: $M = 31.0$, $SD = 2.3$). In contrast, Unni et al. (2017) found that the BITZ intervention did not have a significant effect on participants belief that they could get into a crash whilst texting and driving.

A.4.9 Regret

For negatively framed interventions, regret or anticipated regret is often induced by the intervention. For two such interventions, the effects of the interventions on regret was measured by two studies. Cutello et al. (2020b) found the Learn2Live intervention increased feelings of regret post-intervention over and above control ($p < .001$), an effect which reduced slightly at follow-up (INT: Pre: $M = 35.3$, $SD =$

4.6, Post: $M = 18.3$, $SD = 5.7$, Follow-up: $M = 20.1$, $SD = 6.2$; CONT: Pre: $M = 37.3$, $SD = 5.0$; Follow-up: $M = 37.3$, $SD = 3.0$).

Kennedy et al. (2018) assessed the impact of anticipated regret, in study control and intervention groups, on intentions to speak up to a friend using their mobile phone whilst driving. For the intervention group, the addition of anticipated regret within the hierarchical multiple regression increased the variance in intentions explained by the model (including TPB items: attitudes, subjective norms and perceived behavioural control) by 4.4%, ($\Delta R^2 = 0.044$, $\Delta F(1,162) = 14.82$, $p < .001$) to 52.4% ($R^2_{adj} = 51.2\%$, $R^2 = 0.524$, $F(4,162) = 44.56$, $p < .001$). Alongside the other modelled measures, anticipated regret was a significant predictor of passenger intentions to speak up to a friend using a mobile phone whilst driving ($\beta = 0.20$, $p < .001$, $sr^2 = 0.043$). In the control group, anticipated regret explained a further 12.6% ($\Delta R^2 = 0.126$, $\Delta F(1,76) = 24.16$, $p < .001$) of the variance in intentions, in addition to the standard TPB items already described ($R^2_{adj} = 58.2\%$, $R^2 = 0.603$, $F(4,76) = 28.84$, $p < .001$). Only anticipated regret ($B = 0.43$, $p < .001$, $sr^2 = 0.126$) and attitudes were significant predictors of intentions to speak up when a driver is using a mobile phone. These findings are in line with previous research, which indicates that the addition of anticipated regret increases the predictive utility of the TPB. The authors state that the influential effect of anticipated regret on intentions in both the control and intervention groups is illustrative of the fact that guilt and remorse features within young people's decision-making processes and that if the intervention had emphasised issues related to anticipated regret further, it could have had a more persuasive effect.

A.4.10 Self-efficacy

Self-efficacy effects were not commonly assessed within the interventions identified for this review. Two interventions, reviewed by two studies, included an assessment of effects on self-efficacy. An evaluation of SDSA by Dale et al. 2017 assessed participant self-efficacy for managing speeds (e.g., how confident do you feel that if you wanted to, you could avoid speeding?) pre- and post-intervention and found no significant effect of the intervention on speeding self-

efficacy. The Traffic Informers intervention also found no significant intervention effect on safe cycling self-efficacy (Feenstra et al., 2014).

A.4.11 Intervention effects

Broader intervention effects, such as participation satisfaction and expected effects, were measured for two Interventions in this review. The DUI intervention evaluation (Markl, 2016) found a significant effect of the intervention, ($\lambda = 0,796$; $F(3,227) = 19.339$, $p < 0.01$), a significant time effect for the specific effects of the intervention ($F(1,229) = 3.790$, $p < 0.05$) and an interaction effect between intervention*time for student satisfaction ($F(1,229) = 3.676$, $p < 0.05$). Immediately post- and one-month post-intervention, students who had participated in the intervention assessed satisfaction higher than the control (INT: $M = 3.45$, $SD = 0.78$; CONT: $M = 2.43$, $SD = 1.08$), with similar effects seen for the specific and general effects of the intervention, with decreases beyond one-month. For the P.A.R.T.Y intervention evaluation, only one (Francis et al., 2022) out of the three studies assessing the effect of this intervention evaluated broader intervention effects. The results of the conditional logistic regression analysis conducted found that post-intervention participants were more likely to agree that the P.A.R.T.Y intervention would make a difference to the way they think about future actions (OR: 26.30, 95% CI: 18.67, 37.03, $p < .001$; Pre: $M = 36.2$, Post: $M = 78.9$) in comparison to pre-intervention responses.

A.4.12 Crash outcomes

The measurement of crash outcomes following the delivery of pre-driver interventions remains rare, despite the value offered by this objective measure for understanding intervention effectiveness. Two interventions identified within this review assessed crash outcomes: the RRISK intervention (Senserrick et al., 2021) (an in-school session, followed by in-school activities) and a workshop education intervention (Senserrick et al., 2009) (with two arms – one focused on driving and the other on general resilience). Both interventions were assessed using a prospective cohort study design. The RRISK intervention, analysed using adjusted univariate and multivariate binomial regression models, found that participants in the intervention were 24% less likely to have any type of crash

(Adjusted RR: 0.76, 95% CI: 0.60, 0.96) and 42% less likely to crash in the dark (Adjusted RR: 0.58, 95% CI: 0.35, 0.96). The workshop education intervention, analysed using Poisson regression models, found that whilst the driver-focused intervention was not associated with a reduced relative crash rate (Adjusted RR: 1.00, 95% CI: 0.81, 1.23) the resilience focused intervention led to participants being 44% less likely to be involved in a collision (Adjusted RR: 0.56, 95% CI: 0.34, 0.93).

A.4.13 Offences

Offence rate intervention effects were assessed for two of the interventions within the review: a workshop education intervention (Senserrick et al., 2009) and a drug prevention life skills training intervention (Griffin et al., 2004). Both studies were longitudinal prospective cohort studies analysed using regression analysis. Senserrick et al. (2009) found that whilst the intervention did have demonstratable effects (i.e., on the number of crashes) the number of offences committed by the two different groups (i.e., driving and risk-focused) did not differ (adjusted RR: 1.10, 95% CI = 0.99, 1.19). In contrast, Griffin et al. (2004) found that life skills training intervention had a positive effect on reducing the number of driving violations (OR: 0.75, 95% CI: 0.61, 0.94, $p = .012$) and driving licence penalty points (OR: 0.75, 95% CI: 0.60, 0.94, $p = .024$) after controlling for gender and alcohol use. Being male or a regular drinker was associated with an increase in the likelihood of driver's licence penalty points (Male: OR: 2.72, 95% CI: 2.17, 3.41, $p < .001$, Alcohol use: OR: 1.75, 95% CI: 1.39, 2.19, $p < .001$). Griffin et al. (2004) concluded that prevention interventions that focus on building competencies (i.e., resistance/refusal skills and positive social norms) had the potential to influence other behavioural outcomes, such as driving behaviours.

Appendix B – Paper 2 appendices

B.1 Performance descriptions

Learn to Live (Cornwall, Dorset, Devon & Somerset)
Delivered by a fire and rescue services facilitator, interspersed with live testimony from an air ambulance paramedic, two police officers, two firefighters and a mother, all of which told their own personal stories about the impacts and consequences of road traffic collisions. Fictional videos depicting both positive and negative safety situations were also shown as part of the performance. The performance, alongside its follow-up materials, seeks to provide road safety messages to the audience and provide advice to enable the audience to keep themselves safe.
Safe Drive Stay Alive (Surrey)
Delivered by a fire and rescue service host, with guest in-person testimony talks provided by a police collision investigator, firefighter, paramedic, nurse, road traffic collision victim and their father as well as a driver who had been previously involved in a road traffic collision. The performance was also interspersed with recorded films given by road traffic collision victims and family members, as well as two road safety advertisements. The performance stated aim is 'to make young people aware of their responsibilities as drivers and passengers whilst travelling and to positively influence their attitudes'. Several road safety risks for young drivers and passengers are discussed during the performance (speeding, mobile phone use, inattention, inexperience, non-seatbelt wearing, drink and drug driving, fatigue, emotional responses, passenger distraction, safe system issues and peer pressure).
Safe Drive Stay Alive (East Sussex)
Delivered by a fire and rescue service host, with guest in-person testimony talks provided by a firefighter, paramedic, doctor, road traffic police officer, a road traffic collision victim and a road traffic collision offender. The performance was also interspersed with three road safety advertisements and a fictional collision film. The performance stated objective is 'To reduce the number of people killed and seriously injured on the roads of East Sussex and Brighton and Hove'. Several road safety risks for young drivers and passengers are discussed during the performance (mobile phone use, passenger distraction, speeding, non-seatbelt wearing, drink and drug driving, emotional response, impulsivity, driver experience and weather).
Safe Drive Stay Alive (Lancashire)
Delivered by a fire and rescue services facilitator, with a guest talk also provided by a local police officer, a paramedic and a bereaved father. Videos were also shown during the performance, including testimony for a road collision victim and a bereaved mother, as well as a recreated collision scene. The performance stated aim is to encourage students to improve their attitudes towards risk taking behaviour on the roads. At the beginning of the performance attendees are informed <i>"Today isn't about putting you off driving. It's not about upsetting you. It's about giving you an insight. It's like reality. It's about stopping you appearing on that board in our office."</i> Several road safety risks for young drivers and passengers are discussed during the performance (drink driving, speeding, mobile phone use, non-seatbelt wearing, drug driving and distraction).

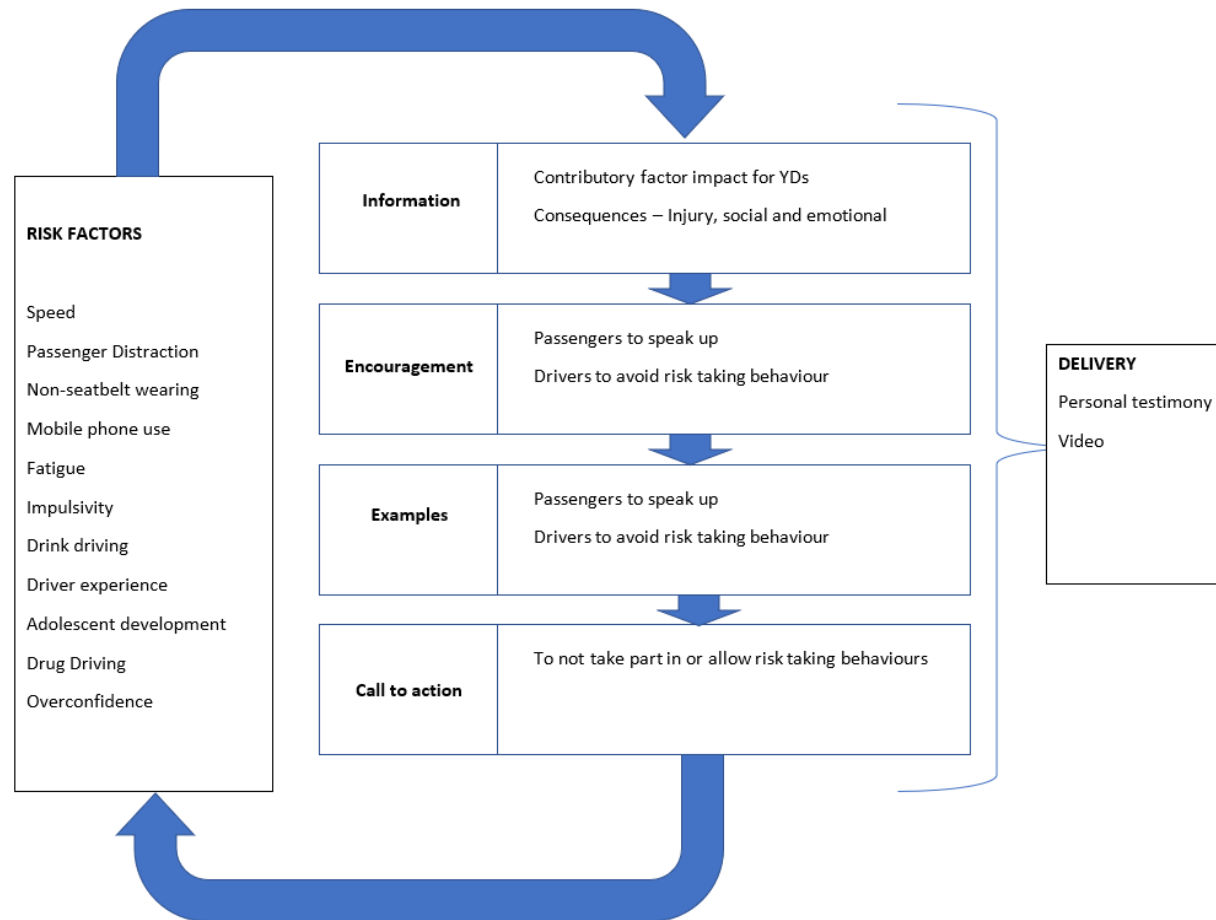
No Turning Back (Kent)

Delivered primarily by a fire and rescue services facilitator, with guest talks also provided by a local police collision investigator and firefighter. Videos were also shown during the performance, including testimony from a road collision victim as well as a recreated collision scene. The performance does not have an accompanying website and therefore it is difficult to establish the stated aim of No Turning Back. On Kent Fire and Rescue Services website, under the Road Safety section a general aim 'to reduce the number of crashes, deaths and serious injuries on Kent and Medway's roads' is provided. Several road safety risks for young drivers and passengers are discussed during the performance (drink driving, non-seatbelt wearing, peer pressure, inattention, driving inexperience, mobile phone use, speeding, impulsivity, drug driving and overconfidence). The No Turning Back performance is a newly developed performance format that seeks to provide a facilitated active learning experience for attendees.

Learn&Live (Cleveland)

The performance was delivered primarily by a fire and rescue services facilitator, with a guest talk also provided by a local police collision investigator. The performance stated aim is to provide road safety messages to the audience and provide advice to enable the audience to keep themselves safe. Several road safety risks for young drivers and passengers are discussed during the performance (drink driving, drug driving, mobile phone use, non-seatbelt wearing, speeding, passengers and pedestrian distraction). The importance of driving experience, vehicle roadworthiness, vehicle choice, vehicle technology, use of telematics and passenger safety were also discussed to support improving safety outcomes.

B.2 Learn2Live: Content and process of delivery



B.3 Safe Drive Stay Alive Surrey: Content and delivery process

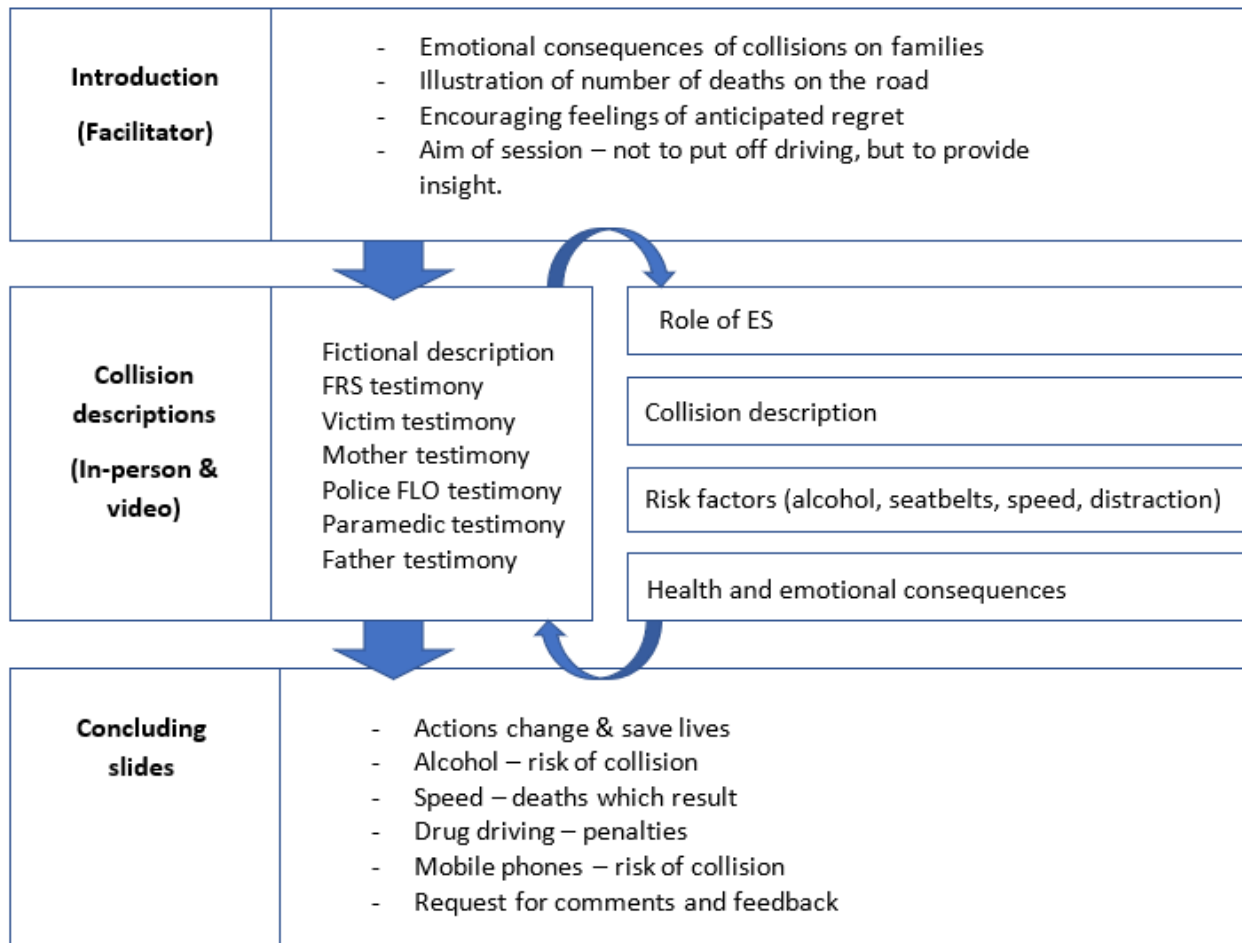
Delivery format	Content
FRS Host (Intro 1)	<ul style="list-style-type: none"> - Welcome & introduction to session format. - Why invited: Concern about YD KSIs. - Aim: Safe Drive Stay Alive. - Risk factors introduced (speed, distraction, mobile phone use, peer distraction, vehicle tech, non-seatbelt wearing, tiredness & emotional vulnerability).
YouTuber - Short film 1 (Competition)	<ul style="list-style-type: none"> - Text details for competition.
Short film 2	<ul style="list-style-type: none"> - School & college names, with newspaper articles/headlines featuring fatal RTCs.
FRS Host (Intro 2)	<ul style="list-style-type: none"> - Request to turn phones off. - Mobile phone use in cars discussed. - Illustration using audience, of YD safety issue in Surrey.
Father RTC victim (Short film 3)	<ul style="list-style-type: none"> - Emotional consequences of a collision. - Brief description of collision circumstances.
Testimony – in-person (Police)	<ul style="list-style-type: none"> - Personal experience of RTC from childhood & teenage years. - RTC description, motorcyclist & cyclist – inattention & speed.
RTC survivor 1 (Short film 4)	<ul style="list-style-type: none"> - Description of aftermath of collision.
Testimony – in-person (FRS)	<ul style="list-style-type: none"> - FRS role. - RTC description – involving distraction & mobile phone use.
Testimony – in-person (Paramedic)	<ul style="list-style-type: none"> - RTC description – involving driver inexperience.
RTC survivor 2 (Short-film 5)	<ul style="list-style-type: none"> - Emotional impacts post-collision. - Health consequences.
Testimony – in-person (Nurse)	<ul style="list-style-type: none"> - RTC description. - Involved texting, distraction, child death. - Emotional consequences.
Daughter RTC victim (Short film 6)	<ul style="list-style-type: none"> - RTC description & emotional consequence. - Drink driving.
Testimony – in-person (RTC driver)	<ul style="list-style-type: none"> - RTC description & emotional consequences. - Inexperience & speed.
Montage (Short film 7)	<ul style="list-style-type: none"> - Emotional consequences for all involved. - Fatigue, drink driving and passenger actions.
Testimony – in-person (RTC victim & father)	<ul style="list-style-type: none"> - RCT description. - Health & emotional consequences. - Speed & inattention.
RS ad film (Short film 8)	<ul style="list-style-type: none"> - Mobile phone safety ad including collision.
Speed demonstration (Short film 9)	<ul style="list-style-type: none"> - Demonstrated effect of speed on stopping distances.
Testimony – in-person (ALL)	<ul style="list-style-type: none"> - All in-person speakers come back on stage.
Host (Concluding remarks)	<ul style="list-style-type: none"> - Narrative/energy of performance arch. - Ripple effect & overview of info provided by speakers. - Invitation to audience to chat after performance. - Highlighting – keyring, young drivers guide, follow-up resource. - Thanks & close.

B.4 Safe Drive Stay Alive East Sussex: Content and delivery process

Delivery format	Content
Short RS ad (Short film 1)	- Daily decision making and impacts of decisions on the road.
FRS Host (Intro 1)	<ul style="list-style-type: none"> - Welcome and intros to schools. - No. fatalities – generally & in age group. - Fatal 4: - Speed (penalties, reasons for speed limits, impacts of non-compliance, call to action). - Seatbelts (penalties, excuses for speeding, purpose of seatbelts, impacts of not wearing, call to action). - Drink & drugs (legal position and danger, impact of drugs and alcohol on driving ability, detection & penalties, strategies for reducing risk).
Short RS ad (Short film 2)	- Drug driving fictional collision.
FRS Host (Intro 2)	<ul style="list-style-type: none"> - Fatal 4 cont. - Mobile phones (Incidence of mobile phone use, excuses given, impact of mobile phone use on driving, fines and penalties, strategies for managing risk, anticipated regret). - Motorcycles (Drivers to be mindful of motorcycles).
Short film (Short film 3)	- Helmet cam footage of motorcycle collision with bereaved mother speaking.
FRS Host (Intro 3)	<ul style="list-style-type: none"> - Call to action – Think Bike, Think Biker, reduce speed, PPE for riders. - Many young drivers do not have collisions. - Ripple effect of collisions. - Intro to video and testimonials.
Main fictional film 1	<ul style="list-style-type: none"> - Court room – sentencing of death by careless driving. - Young people meeting, going out, background to relationships. - Passenger distraction and effects of emotion in vehicle. - Collision occurs.
Testimony – in-person (FRS)	<ul style="list-style-type: none"> - Description of RTC – non-seatbelt wearing / speed. - Graphic description of collisions. - Call to action – consider consequences.
Main fiction film 2	- Collision scenes and work of FRS, ambulance and police.
Testimony – in-person (Paramedic)	<ul style="list-style-type: none"> - Description of RTC – Alcohol. - Graphic description of collisions. - Call to action.
Main fiction film 3	- Paramedics role on scene.
Testimony – in-person (Doctor)	<ul style="list-style-type: none"> - Description of RTC – Seatbelts. - Graphic description of collisions. - Call to action.
Main fiction film 4	- Police role on scene.
Testimony – in-person (Police)	<ul style="list-style-type: none"> - Description of RTC – Seatbelts. - Graphic description of collisions & FLO role. - Call to action.
Main fiction film 5	- Court room where sentencing is occurring.
FRS Host (Intro 4)	- Introducing non-emergency service guest speakers.

Delivery format	Content
Testimony – in-person (RTC victim & mother)	<ul style="list-style-type: none"> - Description of RTC – emotion/anger, speed, seatbelts. - Collision consequences – health & emotional. - Call to action.
Testimony – in-person (RTC offender)	<ul style="list-style-type: none"> - Description of RTC – mobile phone use, speeding. - Collision consequences – health & emotional. - Call to action.
Host (Concluding remarks)	<ul style="list-style-type: none"> - Thanks and close. - Emphasis on value of driving & safety calls to action.

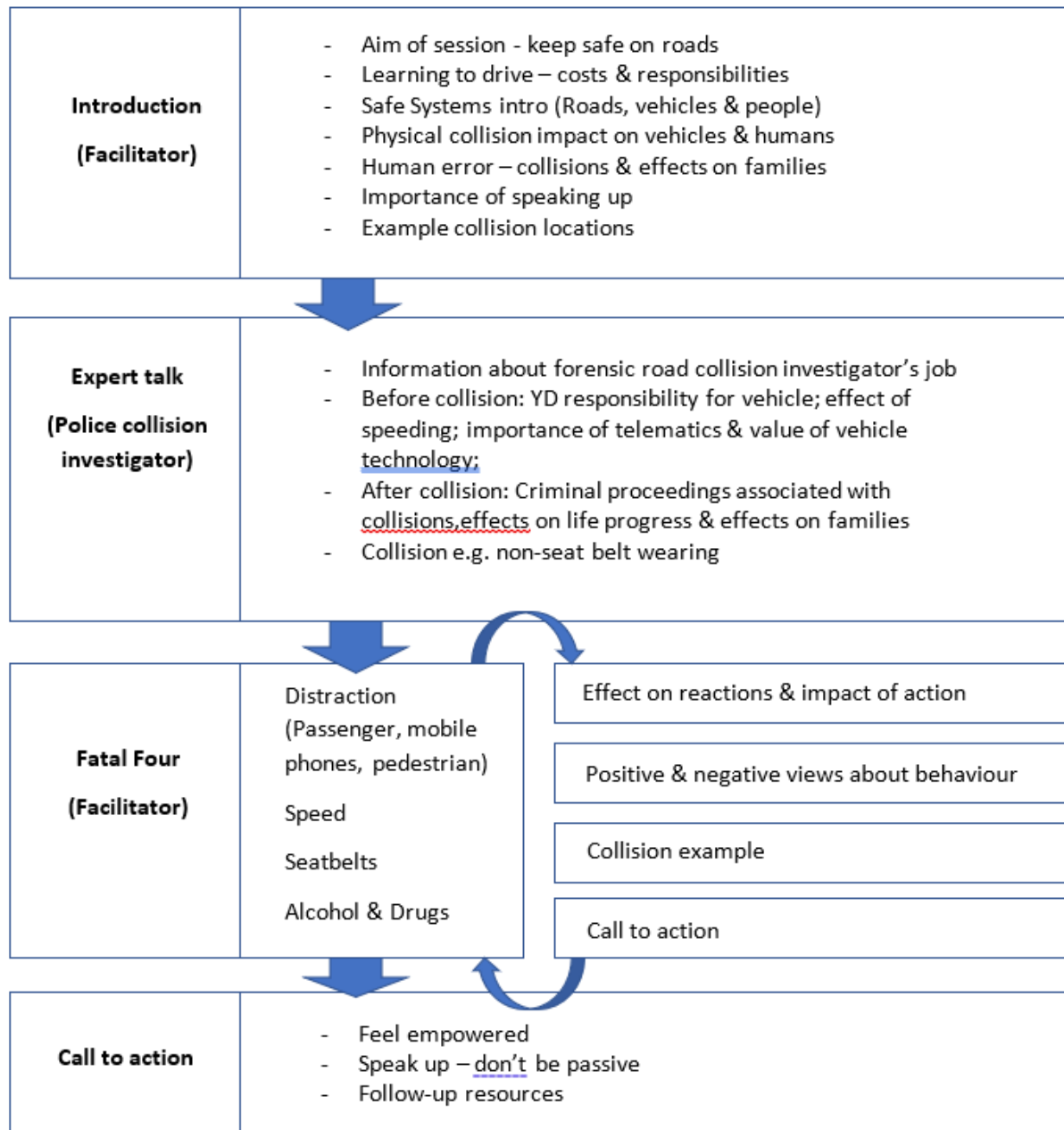
B.5 Safe Drive Stay Alive Lancashire: Content and delivery process



B.6 No Turning Back Kent: Content and delivery process

Delivery format	Content
Facilitator (Intro)	<ul style="list-style-type: none"> - Welcome & introduction to session format (active participation). - Aim: To convey driving safety messages. - Importance of driving experience for ensuring safety. - Ice breakers: Optical illusions (linked to visual attention) & demonstration of following visual vs verbal instructions (impulses).
Main film	<ul style="list-style-type: none"> - Intro to YD & passenger journey.
Facilitator (Discussion 1)	<ul style="list-style-type: none"> - Q1) Driver thoughts at the point of overtake. - Q2) Motivations for the decision (e.g., mood in the car). - Audience feedback & facilitator discusses points raised.
Main film	<ul style="list-style-type: none"> - Collision occurs.
Facilitator (Discussion 2)	<ul style="list-style-type: none"> - Q1) What will the driver be feeling. - Q2) Who will be hurt & affected by the collision. - Audience feedback & facilitator discusses points raised.
Main film	<ul style="list-style-type: none"> - Collision scenes – paramedics & police at work.
RS ad film	<ul style="list-style-type: none"> - Mobile phone safety ad.
Main film	<ul style="list-style-type: none"> - Collision scenes – police & drink driving assessment.
Facilitator (Discussion 3)	<ul style="list-style-type: none"> - Q1) Types of drugs & effects on drivers. - Q2) Alcohol effects on novice vs experienced drivers. - Audience feedback & facilitator discusses points raised.
Testimony – in-person (Police)	<ul style="list-style-type: none"> - Collision description – alcohol & ripple effect.
Facilitator (Discussion 4)	<ul style="list-style-type: none"> - Q1) Reasons for not wearing a seatbelt. - Audience feedback & facilitator discusses points raised.
Main film	<ul style="list-style-type: none"> - Collision scenes – injuries & non-seatbelt wearing.
Testimony - in-person (FRS)	<ul style="list-style-type: none"> - Collision description – non-seatbelt wearing, speed, injuries, ongoing emotional consequences.
Main film	<ul style="list-style-type: none"> - Pre-collision scenes – personal life info & planned proposal - Couple interacting at collision scene. - Police describing how the collision occurred.
Testimony film (Survivor)	<ul style="list-style-type: none"> - Collision story from survivor's perspective. - Information about effect on life.
Facilitator (Concluding remarks)	<ul style="list-style-type: none"> - Summary of session. - Verbal persuasion about capabilities. - Next steps – post event feedback & post event session.

B.7 Learn&Live Cleveland: Content and delivery process



B.8 Potential application of BCTS in theatre and workshop provision

Details	No. performances present in (+ & ++)	Appropriate application	
		Theatre	Workshop
1. Goals and planning			
1.1 Goal setting (behaviour) *	4		
1.2 Problem solving *	4		
1.3 Goal setting (outcome) *	0		
1.4 Action planning *	5		
1.5 Review behaviour (goals) *	0		
1.6 Discrepancy between current behaviour and goal *	0		
1.7 Review outcome goal(s)	0		
1.8 Behavioural contract	0		
1.9 Commitment	0		
2. Feedback and monitoring			
2.1 Monitoring the behaviour of others without feedback	0		
2.2 Feedback on behaviour*	0		
2.3 Self-monitoring of behaviour*	0		
2.4 Self-monitoring of outcome(s) of behaviour*	0		
2.5 Monitoring outcome(s) of behaviour by others without feedback	0		
2.6 Biofeedback	0		
2.7 Feedback on outcome(s) of behaviour*	0		
3. Social support			
3.1 Social support (unspecified)*	1		
3.2 Social support (practical)*	2		
3.3 Social support (emotional)	0		
4. Shaping knowledge			
4.1 Instruction on how to perform a behaviour*	1		
4.2 Information about antecedents*	6		
4.3 Re-attribution	0		
4.4 Behavioural experiments	0		
5. Natural consequences			
5.1 Information about health consequences*	6		
5.2 Salience of consequences	6		
5.3 Information about social and environmental consequences	6		
5.4 Monitoring of emotional consequences	0		
5.5 Anticipated regret*	5		
5.6 Information about emotional consequences	6		
6. Comparison of behaviour			
6.1 Demonstration of behaviour	4		
6.2 Social comparison	2		
6.3 Information about others' approval	0		
7. Associations			
7.1 Prompts/cues*	2		
7.2 Cue signalling reward	0		
7.3 Reduce prompts/cues	0		
7.4 Remove access to the reward	0		
7.5 Remove aversive stimulus	1		
7.6 Satiation	0		

Details	No. performances present in (+ & ++)	Appropriate application	
		Theatre	Workshop
7.7 Exposure	0		
7.8 Associative learning	0		
8. Repetition and substitution			
8.1 Behavioural practice/rehearsal*	1		
8.2 Behavioural substitution	0		
8.3 Habit formation*	0		
8.4 Habit reversal	0		
8.5 Overcorrection	0		
8.6 Generalisation of target behaviour	0		
8.7 Graded tasks	0		
9. Comparison of outcomes			
9.1 Credible source	6		
9.2 Pros and cons	0		
9.3 Comparative imagining of future outcomes*	0		
10. Reward and threat			
10.1 Material incentive (behaviour)	0		
10.2 Material reward (behaviour)	0		
10.3 Non-specific reward	0		
10.4 Social rewards	0		
10.5 Social incentive	0		
10.6 Non-specific incentive	0		
10.7 Self-incentive	0		
10.8 Incentive (outcome)	0		
10.9 Self reward	0		
10.10 Reward (outcome)	0		
10.11 Future punishment	4		
11. Regulation			
11.1 Pharmacological support	0		
11.2 Reduce negative emotions	0		
11.3 Conserving mental resources	0		
11.4 Paradoxical instructions	0		
12. Antecedents			
12.1 Restructuring the physical environment*	0		
12.2 Restructuring the social environment*	0		
12.3 Avoidance/reducing exposure to cues for the behaviour	0		
12.4 Distraction	0		
12.5 Adding objects to the environment	0		
12.6 Body changes	0		
13. Identity			
13.1 Identification of self as role model	2		
13.2 Framing/reframing	0		
13.3 Incompatible beliefs*	0		
13.4 Valued self-identity	0		
13.5 Identity associated with changed behaviour	0		
14. Scheduled consequences			
14.1 Behaviour cost	0		
14.2 Punishment	0		
14.3 Remove reward	0		
14.4 Reward approximation	0		
14.5 Rewarding completion	0		
14.6 Situation-specific reward	0		

Details	No. performances present in (+ & ++)	Appropriate application	
		Theatre	Workshop
14.7 Reward incompatible behaviour	0		
14.8 Reward alternative behaviour	0		
14.9 Reduce reward frequency	0		
14.10 Remove punishment	0		
15. Self-belief			
15.1 Verbal persuasion about capability	6		
15.2 Mental rehearsal of successful performance	0		
15.3 Focus on past success	0		
15.4 Self-talk	0		
16. Covert learning			
16.1 Imaginary punishment	5		
16.2 Imaginary reward	0		
16.3 Vicarious consequences	6		
TOTAL BCTS for theatre and workshop use		54*	86**

* an additional 27 BCTs (in orange) noted for 'possible' application in theatre provision

** a future 2 BCTs (in orange) noted for 'possible' application in workshop provision

Appendix C – Paper 3 appendices

C.1 Young driver risk literature

No	Literature review title	Author(s), Date	Study type	No. articles	Key young driver risks identified
[1]	Young and under the influence: A systematic review of the impact of cannabis on the driving performance of youth	(Alvarez et al., 2021)	Systematic lit review	13	Drug driving
[2]	Preventative Interventions for Young adults in Nightlife: Coproduction for a systematic literature assessment followed by a stakeholder dialogue process	(Brunn et al., 2021)	Literature review	84	Drink Driving
[3]	Cell phone use and young drivers	(Dénomée et al., 2020)	Systematic lit review	29	Mobile Phone Use
[4]	The effectiveness of road hazard perception training: Literature review	(Slavinskienė et al., 2019)	Systematic lit review	9	Hazard perception skills
[5]	An integrative review on teen distracted driving for model program development	(Classen et al., 2019)	Systematic lit review	17	Hazard awareness and attention management
[6]	Reducing young drivers' crash risk: Are we there yet? An ecological systems-based review of the last decade of research	(Cassarino & Murphy, 2018)	Lit review	196	Cognitive Skills Mobile phone use Passengers Drink driving Speed Older vehicles Lack of feedback on driving ³⁶

³⁶ Single study references from Cassarino & Murphy (2018): [i] (Kinnear et al., 2013a); [ii] (Taubman – Ben-Ari et al., 2017); [iii] (Olsen et al., 2007); [iv] (Divekar et al., 2016); [v] (Stahl et al., 2016); [vi] (Underwood, 2007); [vii] (Crundall, 2016); [viii] (Scott-Parker et al., 2015); [ix] (Scott-Parker et al., 2016); [x] (Brookland & Begg, 2011); [xi] (Eichelberger et al., 2015); [xii] (Hellinga et al., 2007); [xiii] (Keall & Newstead, 2013a); [xiv] (Keall & Newstead, 2013b);

No	Literature review title	Author(s), Date	Study type	No. articles	Key young driver risks identified
[7]	Distracted walking, bicycling, and driving: Systematic review and meta-analysis of mobile technology and youth crash risk	(Stavrinou et al., 2018)	Systematic literature review	41	Mobile phone distraction ³⁷
[8]	How many crashes are caused by driver interaction with passengers? A meta-analysis approach	(Theofilatos et al., 2018)	Meta-analysis	8	Passenger distractions
[9]	Latent hazard anticipation in young drivers: Review and meta-analysis of training studies	(Unverricht et al., 2018)	Meta-analysis	19	Hazard perception
[10]	Graduated driver licensing (GDL) in the United States in 2016: A literature review and commentary	(Williams, 2017)	Lit review	n.a. (est. 129)	Experience Night-time driving Passengers ³⁸
[11]	Emotions, behaviour, and the adolescent driver: A literature review	(Scott-Parker, 2017)	Lit review	103	Emotion
[12]	The effects of sleep loss on young drivers' performance: A systematic review	(Soleimanloo et al., 2017)	Systematic lit review	16	Fatigue
[13]	Sensitivity to reward and risky driving, risky decision making and risky health behaviour: A literature review	(Scott-Parker & Weston, 2017)	Lit review	31	Passenger distraction Speeding Drink and drug driving ³⁹
[14]	A systematic review of intervening to prevent driving while intoxicated: The problem of Driving While Intoxicated	(Buckley & Chapman, 2017)	Systematic lit review	10	Drink driving

[xv] (Bolderdijk et al., 2011); [xvi] (Mullen et al., 2015); [xvii] (Lotan et al., 2014); [xviii] (Curry et al., 2015a); [xix] (Shimshoni et al., 2015); [xxii] (Lenné et al., 2011); [xxv] (White et al., 2014); [xxvi] (Steinka-Fry et al., 2015); [xxvii] (Tanner-Smith & Risser, 2016); [xxviii] (Guggenheim & Taubman – Ben-Ari, 2015); [xxx] (Chung et al., 2014); [xxxi] (Carey & Sarma, 2016); [xxxii] (Qing Li et al., 2017).

³⁷ Single study references from Stavrinou et al., (2018): [xx] (Parr et al., 2016); [xxi] (McDonald & Sommers, 2015c)

³⁸ Single study referenced from Williams (2017): [xxiii] (Tefft et al., 2012)

³⁹ Single study references from Scott-Parker & Weston (2017): [xxiv] (Greening & Stoppelbein, 2000); [xxix] (Scott-Parker et al., 2013)

No	Literature review title	Author(s), Date	Study type	No. articles	Key young driver risks identified
[15]	Adolescent cell phone use whilst driving: An overview of the literature and promising future directions for prevention	(Delgado et al., 2016)	Lit review	n.a. (est. 79)	Mobile phone distraction
[16]	A review of hazard anticipation training programmes for young drivers	(Mcdonald et al., 2015a)	Lit review	19	Hazard awareness ⁴⁰
[17]	Young drivers and their passengers: A systematic review of epidemiological studies on crash risk	(Ouimet et al., 2015)	Systematic lit review	15	Passenger distractions
[18]	The effect of secondary task engagement on adolescents' driving performance and crash risk	(Klauer et al., 2015)	Lit review	15	Mobile phone distraction
[19]	Cell Phones and Young Drivers: A systematic Review regarding the association between psychological factors and prevention	(Cazzulino et al., 2014)	Systematic lit review	29	Mobile phone distraction
[20]	Insufficient sleep in adolescents and young adults: An update on causes and consequences	(Owens, 2014)	Lit review	n.a. (est. 139)	Fatigue

⁴⁰ Single study references from Mcdonald et al., (2015a): (Horswill & McKenna, 2004)

Appendix D – Paper 4 appendices

D.1 Practitioner survey questions

No.	Question	Response options
Introduction and consent statement		
<p>Thank you for expressing an interest in this study. We are looking forward to meeting you at the forthcoming consensus building workshops. Ahead of these workshops, we are interested to understand how and in what format your organisation delivers road safety education to pre-drivers, as well as your views on important road safety issues that impact on pre-drivers.</p> <p>Any information you provide is confidential and no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. Your participation in the survey is voluntary. You can, if you wish, withdraw your data within one month of the date of filling out the survey, after which the data will be anonymised. This anonymised data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols. The survey should take you around 10 minutes to complete. If you would like to contact the PhD Research Student conducting this survey, please e-mail Elizabeth Box e.box@cranfield.ac.uk.</p> <p>By clicking the button below, you acknowledge that your participation in the survey is voluntary, you are over 18 years of age and that you are aware that you may choose to terminate your participation in the survey in accordance with the terms outlined above.</p> <p>Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.</p> <ul style="list-style-type: none"> ○ I consent, begin the survey ○ I do not consent, I do not wish to participate 		
About you		
Q1	What gender do you identify as?	Male, Female, Other, Prefer not to say
Q2	What age category are you in?	16-25, 26-35, 36-45, 46-55, 56-65, 66-75, 75+
Q3	How many years have you been working in... Your organisation? In a road safety education role?	[Scale option between 0-40 years]
Q4	Which of the following qualifications do you have?	Undergraduate degree(s) (Please state), Post Graduate degree(s) (Please state), Professional/Charter membership(s) (Please state), Professional short course(s) (Please state), On the job training (Please state), Other (Please state), None of the above

No.	Question	Response options
About your organisation		
Q5	What is your organisation's name?	[Open text response]
Q6	What type of organisation do you work for?	Fire & rescue service, Local authority, Local Police Force, Local Road Safety Partnership, Other (Please state)
About the pre-driver education your organisation provides		
Q7	What type of pre-driver education does your organisation provide to secondary school/college age students (Please select all that apply)	Matrix response: Type: Testimonial theatre performance, Other theatre performance, Lesson resources, Workshops, Guest lessons, Other (please state) Age group: Yrs 7-9 (Ages 11-14), Yrs 10-11 (Ages 14-16), Yrs 12 & 13 (Ages 16-18), Not provided
Q8	How many years has your organisation been delivering pre-driver education?	[Scale option 0 – 40 years]
Q9	When delivering pre-driver education how many schools/colleges do you typically have participating in the following activities each year?	Testimonial theatre performance, Other theatre performance, Lesson resources, Workshops, Guest lesson, Other (Please state) [Scale option 0 – 100]
Q10	When delivering pre-driver education how many pre-driving age participants do you typically have participating in the following activities each year?	[Scale option 0 – 100,000]
Q11	For the types of pre-driver education that you provide, are any of the following organisations involved in the design or delivery of these programmes? (Please tick all that apply)	Matrix response Type: Testimonial theatre performance, Other theatre performance, Lesson resources, Workshops, Guest lessons, Other (please state) Organisations: Fire & Rescue Service, Local Authority, Local Police Force, Local Road Safety Partnership, Consultants, Academics, NGOs/Charities, Industry/Business, None, Other
Q12	What topics does your current pre-driver education cover (Please select all that apply)	Matrix response Type: Testimonial theatre performance, Other theatre performance, Lesson resources, Workshops, Guest lessons, Other (please state) Topics: Seatbelts, Drink driving, Drug driving, Mobile phones, Careless driving, Passenger safety, Peer pressure, Impulsivity, Coping strategies, Other, None (not delivered)
Q12a	If you have specified that you deliver 'other' topics, please state what they are below	[Open text response]
Q13	Please indicate which of the following topics that you would like to include in future pre-driver education? (Please select all that apply)	Seatbelts, Mobile phones, Drink driving, Drug driving, Careless driving, Passenger safety, Impulsivity, Strategies for managing risk, Pre-driver experience, Driving age and safety, Driver gender, Teenage brain development, Driving distractions, Driving impairments, Driving skills gaps, Hazard perception training, Minimum learning periods, Recommended hours of

No.	Question	Response options
Q13 cont...		supervised practice, Driving practice variety, Fatigue management, Parental teen driving agreements, Vehicle crash worthiness, Sensation seeking, Peer pressure, Travel planning, Mode choice, Self-evaluation of choices, Communication & confidence, Telematics Insurance, Other (Please state)
Q14	Please indicate the value of the following pre-driver education objectives	Matrix response Objectives: Prompting goal setting, Encouraging self-monitoring of behaviour, Providing information on consequences, Planning for social support/social change, Providing instruction, Providing feedback on behaviours, Other (Please state) Value: Low value, Medium value, High value, Don't know
Q15	We are interested to hear about your organisation's views on road safety. Please state to what extent you agree or disagree with the statements below	Matrix response Views: Promoting road safety is a top priority for my employer, My organisation supports road safety by focusing on all the good things road users can do to stay safe, My organisation supports road safety by focusing on all the bad things road users do when they are unsafe, People in my organisation talk about the importance of promoting road safety, Improving road safety is important to the colleagues that I work with, Improving road safety is important to the managers in my organisation, My organisation provides professional development opportunities to learn about how to improve road safety, Employees in my organisation are encouraged to adopt safe road behaviours, Individuals response for road safety education in my organisation have the right skills and expertise Agreement: Strongly disagree, Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Agree, Strongly agree.
Budget and resources for delivering pre-driver education		
Q16	What is your organisation's budget (approx.) in 2019-2020 for pre-driver education?	[Scale option between £0 - £200,000]
Q17	How does your budget for pre-driver education in 2019-20 differ, if at all, from the budget in 2018-19?	Significantly higher budget than 2018/19 Higher budget than 2018/19 Budget the same as 2018/19 Lower budget than 2018/19 Significantly lower budget than 2018/19 Don't know
Q18	How many staff/consultants do you typically have designing your pre-driver education?	Matrix response Number of staff: [Scale option 0 – 20] Type of staff: In your organisation, in partner organisations, External consultancy, Other (Please state)

No.	Question	Response options
Q19	How many staff do you have delivering pre-driver education?	Matrix response Number of staff: [Scale option 0 – 100] Type of staff: In your organisation, In partner organisations, Other (Please state)
Evaluation of pre-driver education		
Q20	How important do you think it is...	Matrix response Questions: To evaluate the impact of pre-driver education, To use academic insights as the primary means for developing the content for pre-driver education, To use operational experience as the primary means for developing the content of pre-driver education, To use both academic insight and operational experience for developing the content of pre-driver education, To develop, trial and test a different approach to pre-driver education in the UK Importance scale: Not at all important, Slightly important, Moderately important, Very important, Extremely important
Q21	How frequently do you...	Matrix response Questions: Evaluate the impact of pre-driver education, Complete in-house evaluation of pre-driver education, Commission external evaluation of pre-driver education, Budget for the evaluation of pre-driver education. Frequency scale: Never, Sometimes, About half of the time, Most of the time, Always
PdTWER Research Project Involvement		
Q22	If your organisation decided that it could take part in this research project, it would most likely be able to participate/support the project in the following ways (Select all that apply)	Surveys to school pupils as part of the control group, Testimonial performances, similar to current formats – with before and after surveys, Trialling theatre performances, with a different content focus to traditional testimonial education – with before and after surveys, Trialling workshop content and formats with schools, Responding to surveys about yours/or your organisation's work in pre-driver education, Enabling focus groups with students and teachers in schools, Audio/video recording of existing provision for the content to be analysed for behaviour change techniques, Other (please specify), None of the above
Q23	Are there any particular reasons why you and/or your organisation would like to be involved in this research project?	[Open text response]
Q24	The project will be applying for some funds to assist with the ground level delivery of the trial. If your organisation is seeking a financial contribution to support its participation in this research study, please detail below the level of funding that would most likely be sought and the reasons for any proposed costings	[Open text response]

No.	Question	Response options
Q25	Are there any other points that you would like to raise, for consideration of the PhD researcher and/or the project partners?	[Open text response]

D.2 Practitioner consensus building workshop consent form



CONSENT FORM

Project Aim: *To evaluate whether the content and format of pre-driver theatre and workshop interventions can help pre-drivers to develop effective strategies for coping with road related risk and have an impact on future collision involvement*

The purpose of this PhD research is to find out the best way to use pre-driver theatre and workshop education to support young and novice driver safety. The PhD researcher will be working with several Local Road Safety Partnerships and Fire and Rescue Services in the UK over 3.5 years to investigate and test the effectiveness of different approaches and content for pre-driver education.

1.	I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me, and I have read the information sheet, which I may keep for my records. I understand this will involve, at this stage, taking part in a workshop to discuss: the project, practical & content elements of testimonial performances which impact on road safety and potential practice & content changes to pre-driver theatre & workshops based on the research evidence.
2.	This information from these workshops will be held and processed for the following purpose(s): To answer the research question concerned with the content and format of pre-driver theatre and workshop interventions and their impact on young driver safety. I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.
3.	I understand that my participation is voluntary and that I can, if I wish, withdraw my data within one month of the date of filling out the survey, after which the data will be anonymized. This anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols.
4.	I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.
5.	I agree to take part in the above study.

Name of Participant

Signature

Email Address

Date

Elizabeth Box
PhD Research student,
Cranfield University
e.box@cranfield.ac.uk

D.3 Practitioner consensus building workshop plan – session structure

Session	Time	Facilitation objectives	Questions
Welcome and introductions	10 mins	To welcome participants and complete a full round of introductions	<ul style="list-style-type: none"> - Introduction to facilitator and Kent FRS research programme manager - Introductions between attendees
Workshop purpose	5 mins	To set out purpose and format for the session & gain content/agreement from attendees	<ul style="list-style-type: none"> - Thank attendees for joining and for filling out the survey in advance of the session. Point to hard copies of survey for anyone that hasn't had the opportunity to complete (for break or end of session) - To detail afternoon split into three parts (as per the agenda): - 1) An introduction the planned Pre-Driver Theatre & Workshop Education Research, why they have been invited today & what sort of participation is sought going forwards - 2) To establish deliverer views about the practical and content elements of testimonial performances which have an impact on road safety, which the project should consider. - 3) To develop ideas about how current provisions could be altered to take account of the research base on young driver risk taking and intervention effectiveness. - Will conclude with next steps for project involvement and will close. - Ask whether group content to proceed on this basis, whether there is anything else they would like to discuss.
Part 1 – Introduction to planned Pre-driver Theatre and Workshop Education Research			
Presentation on PdTWER	15 mins	To provide an introduction to the PdTWER project, in way of background to the discussion that will follow.	<ul style="list-style-type: none"> - 17 slide presentation (prepared) that details background to the work (practice & research), project purpose & aim, project tasks, timescales, actions to date and next steps. Talk through.
Discussion about PdTWER	15 mins	To provide the opportunity for attendees to ask questions and/or discuss the content of the presentation	<ul style="list-style-type: none"> - Lead a focused discussion on presentation content. - Rational Aim: To identify and answer any questions that the participants have about the planned study. - Experiential Aim: To acknowledge views and opinions of participants about how the study relates to their own work and any challenges raised, to enable active engagement from practitioners in planned research and build constructive report - Objective Question – What word, phrase or image stood out to you in the presentation I just gave? and/or what caught your attention about the presentation?

Session	Time	Facilitation objectives	Questions
			<ul style="list-style-type: none"> - Reflective Question – Is there anything that concerns you about the research planned? Are you surprised by anything proposed? Is there anything that excites you about the work proposed? Where are you really clear about what is planned? Where were you confused? - Interpretative Question – Has the research plan met your expectations? What other things do we need to consider? - Decisional Question - How will you describe the research planned to someone who was not here? Who else should we be inviting to discuss this issue?
Part 2 - Workshop on deliverer views about existing provision			
Workshop 1: on deliverer views about existing provisions	45 mins	To establish deliverer views on the practical and content element of testimonial performances which impact on road safety	<ul style="list-style-type: none"> - Outline purpose and aim of the workshop – question RA and EA Rational Aim: To identify what practical and content elements of existing testimonial theatre performance intervention programmes participants think are important for improving young driver safety. - Experiential Aim: To acknowledge views and opinions of practitioners about existing provision, to enable active engagement from practitioners in planned research and build constructive report. - Outline process and timescale – 55 mins, brainstorming ideas and coming to a consensus as a group. - Start with video primer (2 min clip SDSA Surrey to help start off discussions) – embedded in presentation – 1:03 - 3:07. Start session with a focused conversation about the primer video - Objective Questions – What lines of dialogue do you recall? What topics were being discussed? - Reflective Questions – What emotions did you experience on watching the clip? Where were you most engaged with the presentation? What parts remind you of your own experience? - Interpretative Questions – What are the strengths and weakness of delivering performances in this way? What other things do we need to consider in the delivery of such interventions? What kind of changes do we need to make? What insights are beginning to emerge from this discussion? - Decisional Questions - What are we really committed to? What is the resolve of this group? - Start the consensus build – reiterate the outline Rational Aim objective and conduct the brainstorm
Break	15 mins	To provide a comfort break	<ul style="list-style-type: none"> - An opportunity for those to fill out the hard copy survey if they had not done it prior to the session
Workshop 1 continued: on deliverer views about existing provisions	45 mins	To establish deliverer views on the practical and content element of testimonial performances which impact on road safety cont...	<ul style="list-style-type: none"> - Finish other stages of the consensus build (Cluster, Name and Resolve) - Conclude with focused conversation discussion - What words stand out to you from our summary topics, does it feel like we've captured most of the points, what are the insights emerging from the discussion and how can we take this forward?

Session	Time	Facilitation objectives	Questions
Part 3 – Led focused conversation on research based alternative for future provisions			
Workshop 2: Research based alternatives for future provisions	20 mins	For deliverers to identify what practical and content changes to pre-driver theatre & workshops could be made based on the research evidence	<ul style="list-style-type: none"> - Outline purpose and aim of the workshop Rational Aim: To identify what practical and content changes to pre-driver theatre & workshops based on the research evidence. - Experiential Aim: To acknowledge views and opinions of practitioners about how they see best to translate theories into real world action. - Outline process and timescale – 60 mins, brainstorming ideas and coming to a consensus as a group. - Start with research background presentation (11 slides), which covers risk factors, social world importance, limitations of existing programmes, evidence-based risk reducing activities, behavioural models, BCTS, GDE matric, approaches to getting coping strategies – some examples of what different might look like. - Lead focused conversation on presentation provided. - Objective Question – What points were covered in the presentation. - Reflective Question – What was especially pleasing / displeasing about what was presented? - Interpretative Question – What new insights are starting to emerge? What questions did this raise for you? - Decisional Question - What does this mean for our future, what do we need to do differently.
Next steps for project involvement	10 mins	To provide deliverers with information about next steps for project involvement	<ul style="list-style-type: none"> - 2 presentation slides covering what will do with data after session (per consent form) - Next steps for project involvement

D.4 Consensus workshop method overview

FOCUS QUESTION: The question to which the workshop content and product are a response.

<p>CONTEXT</p> <p>Set the stage</p> <p>[5-10 mins]</p> <ol style="list-style-type: none"> 1. Stage the purpose or aim of the workshop. 2. Clarify the Focus Question. 3. Briefly outline the process and time frame. 4. Lead the group in talking about the topic for a few minutes using a short Focused Conversation. 	<p>RATIONAL AIM:</p> <p>What the group needs to KNOW</p> <ul style="list-style-type: none"> - The product or decision 	<p>EXPERIENTIAL AIM:</p> <p>How the group needs to BE by the end of the workshop</p>	<p>RESOLVE</p> <p>Confirm the resolve</p> <p>[5-15 mins]</p> <ol style="list-style-type: none"> 16. Focus the group on this consensus by reading all the title cards. 17. Discuss the significance of the consensus. 18. Create a chart or visual image to hold the consensus (optional). 19. Discuss implications and next steps.
	<p>BRAINSTORM</p> <p>Generate new ideas</p> <p>[10-20 mins]</p> <ol style="list-style-type: none"> 5. Individually list answers to the Focus Question. 6. Select best ideas and write on cards individually or in teams. 7. Pass up first round of cards. Ask for the clearest cards. 8. Ask for questions of clarity. 	<p>CLUSTER</p> <p>Form new relationships</p> <p>[10-20 mins]</p> <ol style="list-style-type: none"> 9. Have the group form 4-6 pairs that clearly go together. 10. Ask for the 2nd round of cards. Ask for cards that are different, which develop clusters. 11. Quickly give each cluster a symbol/tag. 12. Mark remaining cards with symbol/tag and pass up. 	<p>NAME</p> <p>Discern the consensus</p> <p>[15-30 mins]</p> <ol style="list-style-type: none"> 13. Talk through the largest cluster first. 14. Give the cluster a 3-7 word name or title which answers the focus question. 15. Repeat for the remaining clusters.

Source: (ICA-UK, 2014, p.38) <https://ica-uk.org.uk/wp-content/uploads/2020/04/Consensus-Workshop-Overview.pdf>

D.5 Practitioner survey results

Figure D.5-1 Types of pre-driver education provided to secondary school/college students (*n* = 22)

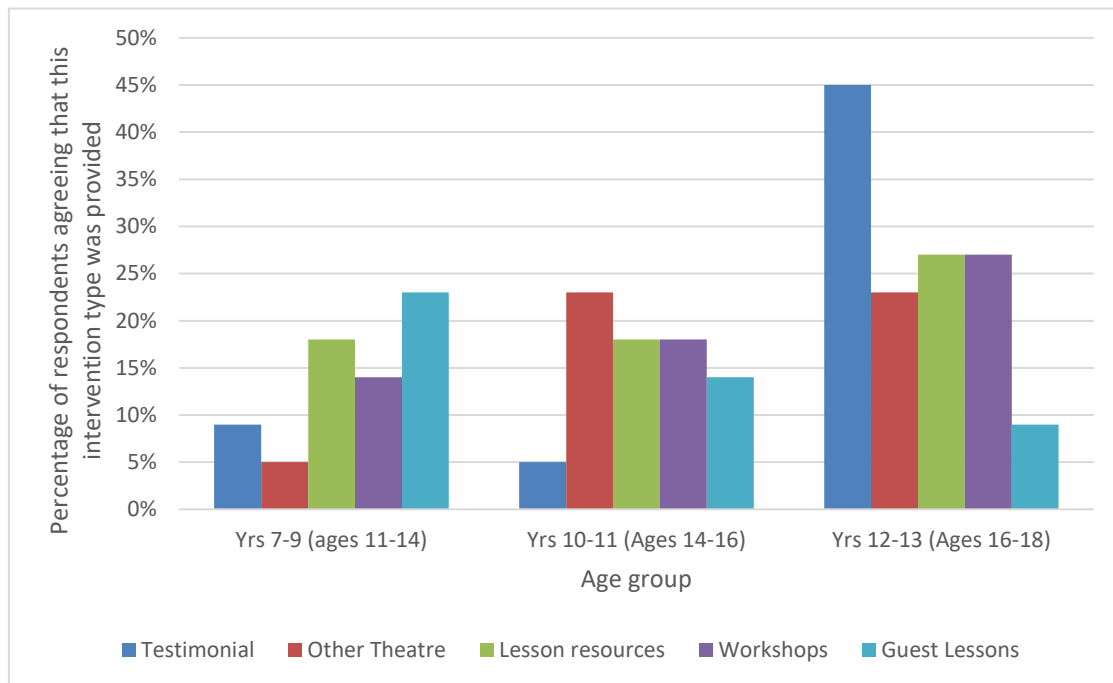


Table D.5-1 Number of schools participating in pre-driver interventions

Intervention type	Response (<i>n</i>)	Mean (<i>SD</i>)	MIN/MAX
Testimonial Theatre	11	28.64 (26.70)	0/90
Other Theatre Performance	6	28.33 (22.51)	8/61
Lesson Resources	9	36.56 (36.01)	9/100
Workshops	9	23.44 (16.59)	0/53
Guest Lessons	4	24.25 (9.54)	10/30
Other	1	100.00 (n.a.)	n.a.

Table D.5-2 Number of students participating in pre-driver interventions

Intervention type	Response (<i>n</i>)	Mean (<i>SD</i>)	MIN/MAX
Testimonial Theatre	11	25,617 (36,017)	0/100,000
Other Theatre Performance	7	1,986 (2,253)	0/5,649
Lesson Resources	6	10,669 (5,349)	2,566/18,513
Workshops	7	6,091 (6,016)	991/18,137
Guest Lessons	3	6,674 (3,142)	3,770/10,009
Other	2	3,231 (725)	2,718/3,743

Figure D.5-2 Types of organisations involved in the design or delivery of programmes (n = 22)

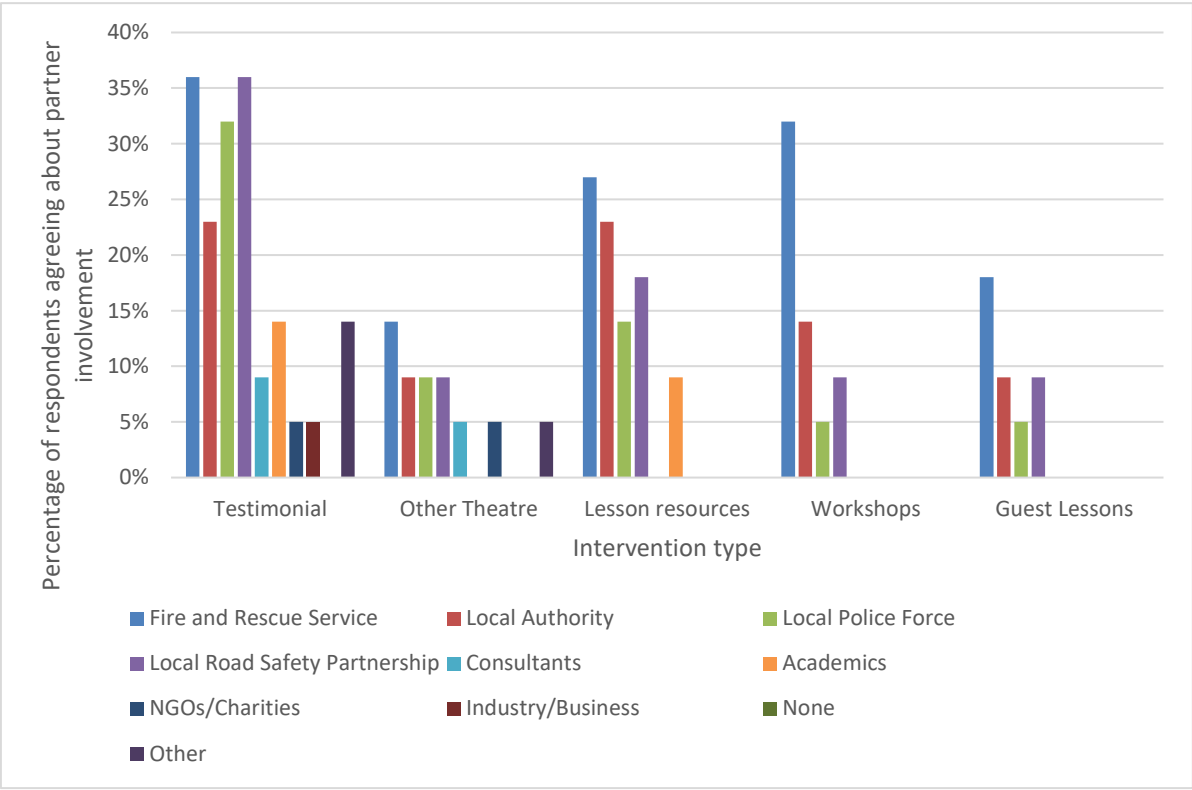


Figure D.5-3 Topics covered in pre-driver education (n = 22)

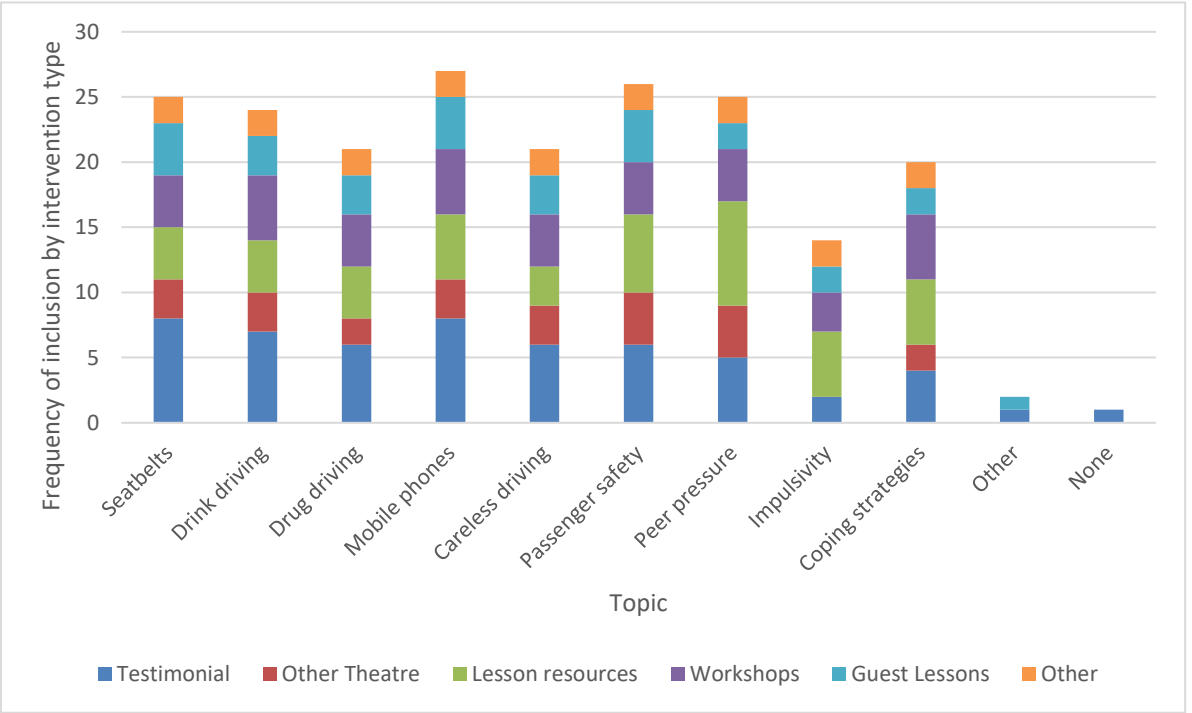


Figure D.5-4 Future provision interests/focus (*n* = 22)

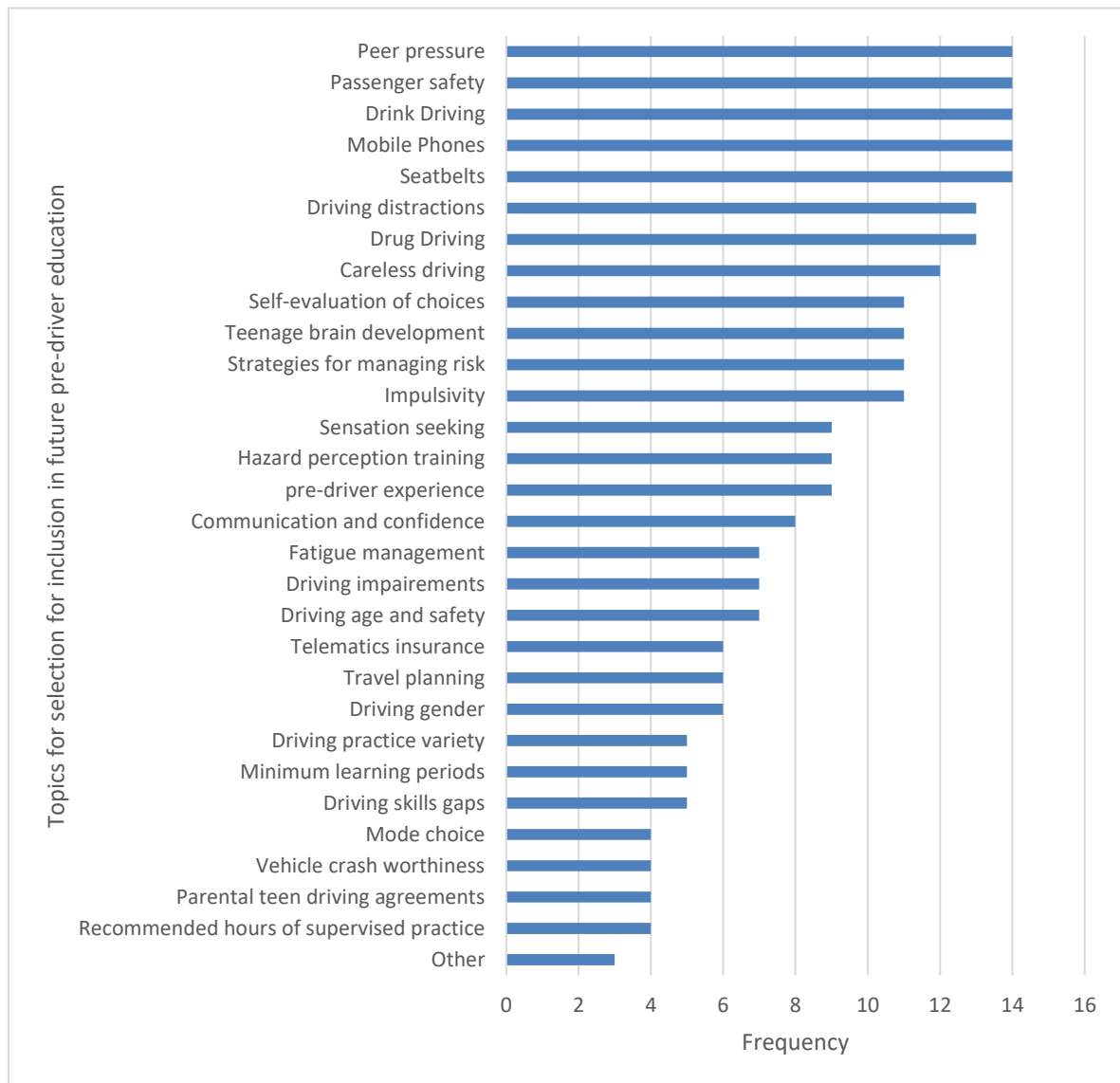


Table D.5-3 Value ascribed to pre-driver education objectives

Statement	Response (n)	Mean (SD)
Encouraging self-monitoring behaviour	15	3.00 (0.00)
Prompting goal setting	13	2.77 (0.44)
Providing feedback on behaviours	13	2.77 (0.44)
Providing information on consequences	15	2.53 (0.64)
Planning for social support/social change	12	2.33 (0.65)
Providing instruction	14	2.07 (0.73)

Nb. Scale: 1 = Low value, 3 = High value

Figure D.5-5 Comparison of pre-driver education budget in 2019-20 to the 2018-19 budget (*n* = 11)

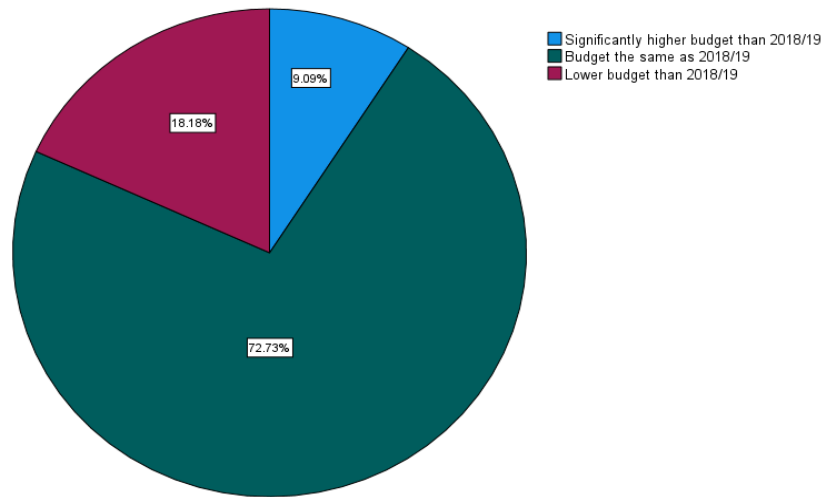


Table D.5-4 Number of staff involved in designing and delivering pre-driver education

Staff type	Response (<i>n</i>)	Mean (<i>SD</i>)	MIN/MAX
Designing pre-driver education			
In your organisation	15	2.73 (2.31)	0/8
In partner organisations	11	5.00 (5.31)	0/16
External consultancy	4	0.75 (0.50)	0/1
Delivering pre-driver education			
In your organisation	15	11.27 (25.00)	0/100
In partner organisations	12	6.50 (7.19)	2/26

Table D.5-5 Importance of pre-driver education design and evaluation* (*n* = 16)

Statement	Mean (<i>SD</i>)
To evaluate the impact of pre-driver education	4.50 (1.02)
To develop, trial and test a different approach to pre-driver education in the UK	4.27 (0.59)
To use both academic insight and operational experienced for developing the content of pre-driver education	4.19 (1.05)
To use academic insights as the primary means for developing the content for pre-driver education	4.13 (0.72)
To use operational experience as the primary means for developing the content of pre-driver education	3.63 (1.03)

* Scale: 1 = Not at all important, 5 = Extremely important

Table D.5-6 Pre-driver education evaluation frequency (*n* = 16)

Statement	Mean (<i>SD</i>)
Complete in-house evaluation of pre-driver education	2.88 (1.31)
Evaluate the impact of pre-driver education	2.81 (1.38)
Budget for the evaluation of pre-driver education*	2.27 (1.39)
Commission external evaluation of pre-driver education	2.19 (1.38)

* *n* = 15 Scale: 1 = Never, 5 = Always

Table D.5-7 Responses to questions related to involvement in research (*n* = 10)

Question	No. agreeing to support this activity
Surveys to school pupil as part of the control group	12
Testimonial performances, similar to current formats, with before and after surveys	11
Trialling workshop content and formats with schools	11
Responding to surveys about yours/your organisation's work in pre-driver education	11
Enabling focus groups with students and teachers in schools	10
Audio/video recording of existing provisions for the content to be analysed for behaviour change technique	9
Trialling theatre performances, with a different content focus to traditional testimonial education – with before and after surveys	6

D.6 Workshop one summary notes

Focus Question. What practical and content elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?	
Content	
Methods (for communication) (a)	Link to impact on others (e.g., Dad) Tone of voice – positive voice (empower)
Engagement methods (b)	Thinking time reflection Regular audience participation Interactive – own journey / support of peers Different learning styles Focus on audience needs
Topics / Content area (c)	Aims and objectives [clearly set] Ongoing evaluation [important] Passenger safety Impulsive decision making (what effects this)
Practical	
Adaptable delivery options (i)	Is theatre (Not normal environment) a plus? School based sessions Flexible delivery (i.e. time of year and location)
Delivery economies of scale (ii)	Large venues Sheer numbers able to gather at one event Consistent message to large audience
Clear expectations and information in advance (iii)	Clear information to schools – what to expect and what is expected from them
Multi-agency working (iv)	<u>Real</u> emergency officers Better enables multi-agency trends/priority inclusion <u>Real</u> examples tangible empathy uniform credible Shared personal experiences from speakers Different emergency services represented Presence of ALL services (Uniformed) Better enables different services to support

Source: Workshop post-it notes 131119

Emerging themes from the discussion	
Resource Limitations	
Funding	Limitations with existing funding regimes to support activities
Staffing	Limitation with existing funding regimes to support staffing level Highly stretched, but motivated staff
Practical delivery limitations	Time in timetable Resources to deliver classroom based initiatives Practicality of evidence based approaches within limits of school time
Securing target group and gate keeper engagement	
Engagement with target audience	Interest in active engagement with target audience Importance of students being able to reflect on issues they've heard about
Target audience gate keepers	Difficulties in encouraging some recipients to take on new approaches Importance of speaking with schools about their understanding of programme need and effectiveness
Emotional impacts	
Performance impacts	Emotional impact on students Differing professional views about visible emotional effects of performances Emotional impact and assumed levels of effectiveness
Using the evidence base and adopting a structured design process	
Improving designs	Need to clearly set aims and objective from the outset
Using the evidence base	To trial new approaches In response to delivery criticism

Intervention delivery management	
Management support	Importance of senior level project buy-in Importance of strong leadership
Multi-agency working	Importance of buy-in across agency partners Difficulty/complexity of agreeing work The need to be a 'good partner' Key importance of full LRSP buy-in to any project
Future delivery questions	
Future delivery uncertainty	Uncertainty about delivery development during any research and development phase Pros and cons of 'business as usual' approach, for now

Source: Audio recording 131119 – Brief notes on themes arising (before workshop started)

D.7 Workshop two summary notes

Focus Question. What <u>practical</u> and <u>content</u> elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?	
Content	
What is said and how (a)	Core messages – staying on theme Structure [Importance of] Locality and content that links to them Credibility Ensuring relevance Authentic not over-dramatised to shock
Providing Practical tools (b)	Coping Strategies S.A.F.E Plan
Relevance (c)	Relatable to age group – driver or passenger Access options relevant to age Intention to drive Relatable – key into each audience member
Consequences (d)	Parental contracts / Black box tech Consider the impact on others – loss/grief Loss of Driving licence
Practical	
Logistics & customer experience (i)	Removing barriers to learning Setting the right environment [scene setting theatre, context for learning]
Resources & capacity (ii)	Funding Scalability Workloads & balancing priorities Organisational knowledge/skills Replicability & consistency
Reinforcement approaches (iii)	Workshops Prompts Immediate post-theatre discussion
Relationship building in business & education (iv)	Reputation Buy-in from schools Accessible – schools able to ready book & engage
Ongoing engagement (v)	Longevity [of programmes] Relationship building with organisations Making informed decision - consequences

Source: Workshop post-it notes 281119

D.8 Workshop three summary notes

Focus Question. What practical and content elements of the existing testimonial performance intervention programmes do you think are important for improving young driver road safety?	
Content	
Make it local (a)	Reflective of the audience / local community - relatable
	Localised
	Local
Impactful authentic delivery (b)	Emotive
	Speaker quality
	Live speaker or video
Real life true stories (c)	Real people and experiences
	Whole true story
	Link stats to story
How we influence others (d)	Include social and peer pressure
	Ownership / peer influences
	Being a good friend
Ask young people (e)	Co-production – ask what would work for young people
Consequences and coping strategies (f)	Practical coping strategies / skills (Risk Management)
	Coping strategy developing...
	Consequences of actions
	Coping strategies
	Key messages to include LONG TERM CONSEQUENCES, not just death message
Practical	
Logistics and longevity (i)	Value for money
	Practical venues
	School timetables
	Mix real life story tellers and actors
	Scalability
#Now what (ii)	Encourage wider discussion with peers, parents etc.
	A takeaway and A call to action
	How does it fit into other road safety
	Opportunity to reflect / review / follow-up

Source: Workshop post-it notes 031219

Emerging themes from the discussion
Value of PdTWER research activity to the sector
To enable providers to strengthen their offer
To build on previous & ongoing academic work
To enable providers to deliver interventions that work
To assist providers in establishing the best way to move forward with work in this area, given the negative press testimonial provisions have received in recent years
To improve provider understanding about what other services providers are doing
To understand the best way to intervene with limited time and funding
To provide information to providers about how to use limited resources to greatest effect
To help understand what good evidence looks like
To assist providers with delivering the best option locally
Areas for PdTWER to provide analysis
Assisting providers to understand cohort effects (e.g. gender) of provisions
To understand how much of a primer and in what format (Video, theatre) is needed for effective workshops
Difference between current providers and intervention provision

Different intervention provision types (classroom, theatre)	
Provisions at different developmental stages across the country	
Key ingredients to current intervention provisions	
Partnership in programme delivery	
Collaborative approach	
Importance of evaluating programmes	
Future intervention focus	
Importance of developing targeted and specific interventions	
Provision suited to socio-demographics and other requirements	
Using appropriately designed interventions using educational theory	
Need for efficient provision	
Current situation & limitations	
Lack of funding	
Some pausing of work on YD, not knowing how best to proceed	
Practical project considerations	
Keeping LRSP and FRS involvement across the 3 year period	
Ways to keep people engaged in research work	
Practicalities associated with delivering coping mechanisms to large audiences	
To understand effect of confounders (rurality, cultural sensitivity etc) on the trial	
Current provision impacts	
On person, professionals and others	
Achieved through conveying real emotions	
Engagement considerations	
Importance of involving young people about how best to engage with them	
Intervention delivery/design issues – reduce frontloading to increase engagement	
Building interaction into intervention design	
Delivering in ways that resonate with the target audience	
Focus on individual consequences as harder for young people to step outside of themselves	
Current use and potential to have young offenders engage with the audience	
Follow-up requirements	
Queries about how to best get people to take ownership for their actions	
Importance of maintaining engagement levels following the intervention	
Tools and techniques	
Development of coping strategies	
Importance of improving resilience – bigger than a road safety message. A skill for life	
Strengths of current testimonial provision	
Real-life stories	
Making the subject real, with real people	
Localisation of message and delivery	
Relevant to the target audience	
Multiple message options – increase resonance potential	
Emotional impact - tap into emotional effect to deliver messaging	
Weaknesses of current testimonial provision	
Message resonance	Depends on delivery
	Different effect on different individuals
Longevity	Length of effect impact
Delivery	Emotion impact on presenters reliving their stories

Source: Audio recording 031219 – Brief notes on themes arising

Appendix E – Paper 5 appendices

E.1 Pre-driver workshop plan – session structure and Mentimeter questions

Session	Time	Facilitation objectives	Questions*
Welcome	5 mins	Welcome attendees & inform them of how the session will run.	<ul style="list-style-type: none"> - Introduction to facilitator and observer (filmmaker) - Outline PdTWER project: The purpose of the research is to find out the best way to use pre-driver theatre and workshop education to support young and novice drivers and how to help young people develop strategies for coping with road related risk. - Signing consent forms
Workshop purpose	5 mins	To set out content and schedule of activity over next hour	<ul style="list-style-type: none"> - Purpose: To hear your views on learning to drive & the first six months of driving to inform the film and workshop that we are developing to trial in schools in Devon this year. Once evaluated and if it proves successful it is expected that this film and workshop will be rolled out across the UK, so thanks in advance for sharing your views with us today, to help us develop a programme that resonates with young people. - Three sessions <ol style="list-style-type: none"> 1) Seeking your views on learning to drive and the first 6 months (Mentimeter voting) 2) Outlining the key messages which we will be looking to illustrate in the new film & workshop (First together then in 5 separate groups). We are looking to see how these key points resonate with you and will be keen to hear your feedback. 3) Film framing - Positive vs negative framing of the issues to be discussed – a couple of example films and your feedback. Also, keen to hear about the YouTubers and social media influencers that you currently follow, to inform the look and feel of the film and to get your feedback on the names we're using. Quite a lot to get in over the next hour, which we'll be following up in more detail with those joining the focus groups this afternoon. At the end of the hour, we hope that you will come away with a better understanding of how you can take control of your learning to drive and first 6 month driving journey in a way that ensures both your safety and comfort and you will help us understand how best to delivery this film.
Views on the learning to drive process and the first 6 months post-licensure			
Polls on learning to drive and the first 6 months post-licensure	15 mins	To ask the class to respond to the Mentimeter survey online to provide a summary view of attitudes and perceptions related to film & workshop content	<ul style="list-style-type: none"> - Inform class that will be working through an online survey – ask to get out phones and to enter the link and code on screen. First couple of questions will not show and are demographic details. 11 questions to go through - will stop to discuss different issues arising as appropriate as go through.

Session	Time	Facilitation objectives	Questions*
			<p>- Issues to emphasise – if already passed test, please provide actual answer rather than expected answer to the questions presented. It is not necessary to answer every question, but as many as you are able to answer helps us make sure we provide the most relevant information in the film & workshop that we are developing. There are no wrong answers. Please answer honestly as this helps us to understand how best to communicate road safety messages to you and your peers.</p>
Key messages – review, group work and discussion			
Key messages to presented in film and workshop	20 mins	To get feedback on the key messages that will be included in the film	<p>- Rational Aim: To identify how key messages are received by the target audience and what barriers and challenges they foresee in taking up the messages.</p> <p>- Experiential Aim: To acknowledge views and opinions of the class about how the key messages presented relate to their own perceptions and any challenges raised, to enable active engagement in informing the intervention messages and to build a constructive report</p> <p>Emphasis again there are no wrong answers or opinions, please be honest about any difficulties or challenges that these messages present, as this honest feedback is vital for us to make sure we develop a film and workshop which resonates with you and your peers.</p> <p>- Going through learning to drive message as a group then split into 5 groups of 6 (if 30) and pass out worksheets. Inform that facilitator and observer will come around to see how discussions are progressing. It might help to appoint one person in the group to lead through the questions and please do have one person ready to give a short 1 min review of what your group discussed. Any questions?</p>
Film framing			
Film framing options, styles preferred and programme name	10 mins	To establish how the audience views different styles and tones related to road safety	- Run through Mentimeter slides – three film examples – 2 THINK! and 1 from New Zealand. Ask for votes on safety ads, names for interventions and any feedback from the session.
Thanks and close	5 mins	To thank the class for participating & introduce focus groups	- Thank class for participating. Ask that those participating in the focus group pick up a form on the way out for them to read and sign before attending the focus group in the afternoon.

Mentimeter Workshop Questions

1. Are you...

- Male
- Female
- Non-binary

2. How old are you?

- 16
- 17
- 18

3. Do you plan to learn to drive?

- Yes, I've already passed my test
- Yes, I'm currently learning
- Yes, in the next 12 months
- Yes, in the next 5 years
- Maybe, at some point
- No, never

4. How much did it cost/do you think it will cost to learn to drive?

- Under £500
- £500 - £1,000
- £1,000 - £1,500
- £1,500+

5. How much did you/do you expect to spend on your first car?

- Under £1,500
- £1,501 - £2,500
- £2,501 - £5,000
- £5,001 - £7,500
- £7,500+

6. How many months did you/do you think you will be learning to drive for?

- 3-6 months
- 6-9 months
- 9-12 months
- 12 months
- More than 12 months

7. Which of these statements describes your parents/guardians attitude to learning to drive and getting on the road (select all that apply)

- *Learn to driver as cheap as possible*
- *Get through the test as quickly as possible*
- *You should get a banger for a first car in case you crash*
- *Take as many lessons as you need to be confident before taking the test*
- *Spend a little more on your first car to get more safety features*
- *Get a telematics (black box) insurance policy to get feedback on driving*
- *Buy whatever insurance policy is cheapest*
- *Get insured on the family car and spend time doing practice between lessons*
- *Stick to professional driving lessons only as there's no suitable family car or they don't like the idea of supervising a learner*

8. How comfortable/uncomfortable do you feel as a passenger when the driver...

- *Is using their mobile phone to message and take calls*
- *Speeds*
- *Is distracted by other passengers*
- *Is tired*
- *Has been drinking and/or taking drugs*
- *Is inexperienced*
- *Is showing off*

Very uncomfortable (1) – Very Comfortable (10)

9. How much control would you have over whether you would...

- *Drive whilst tired*
- *Get distracted by passengers whilst driving*
- *Use your mobile phone for messaging and calls whilst driving*
- *Get pressured by passengers whilst driving*
- *Drive over the speed limit*
- *Driver after having taken drink or drugs*

No control (1) – Complete control (10)

10. What percentage of new drivers do you think are involved in a collision within their first 6 months of driving?

- *0.5%*
- *1%*
- *5%*
- *10%*
- *12%*
- *15%*
- *20%*

11. Learning to drive: How willing would you be/would you have been to do the following?

- **Learn to driver for 12 months before taking your test**
- **Getting a minimum of 100hrs practice before taking the driving test**
- **Getting a variety of practice whilst learning to drive**
- **Take regular online hazard perception tests**

Not at all willing (1) – Very Willing (10)

12. If you were required to learn to drive for 12 months and get 100hrs of practice before taking your test, what barriers/problems do you foresee? [Open text response]

13. When viewing road safety ads which of the following emotional states do you think they should inspire (Select up to 4)

- Pride
- Fear
- Joy
- Sadness
- Surprise
- Happiness
- Inspiration
- Confidence
- Anticipation
- Sympathy
- Embarrassment
- Amusement
- Hope

14. Please share with us your favourite YouTubers and/or social media influences [Open text response]

15. Which of the following names for the intervention do you prefer?

- Young Driver Bootcamp
- DrivePlanUK
- Neither

16. Thank you – and finally how would you describe our session today?
[Open text response]

E.2 Pre-driver workshop consent form



CONSENT FORM

Project Aim: *To explore young people's attitudes to road safety*

This research aims to explore young people's attitudes to road safety. This workshop will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.

1.	I agree to take part in the above Cranfield University PhD research project and have had the project explained to me. I understand this will involve, at this stage, taking part in a workshop to discuss my views and opinions on road safety issues that affect me as a learner driver, driver or a passenger.
2.	The information from this workshop, collected via Mentimeter will be held and processed for the following purpose(s): To answer the research question concerned with the nature of young people's attitudes to road safety. I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.
3.	I understand that my participation is voluntary and that I can, if I wish, refuse to take part. Due to the nature of the survey tool (Mentimeter) used, once the workshop has been completed, I understand that data provided cannot be withdrawn. I understand that my anonymized data will be stored securely on Cranfield University file servers, and that only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion.
4.	I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.
5.	I agree to take part in the above study.

Name of Participant

Signature

Date

Elizabeth Box
PhD Research student,
Cranfield University
e.box@cranfield.ac.uk

E.3 Pre-driver focus group facilitators topic guide

Focus group objectives: Establish the behavioural, subjective norm and control beliefs underlying responses to key messages presented. Discuss barriers, opportunities and challenges presented by these key messages as well as intentions and willingness to act on messages and topics discussed.

Focus Group 1 - Key messages for testing

Learning to drive

- Learn to drive for 12 months before taking your test
- Getting a minimum of 100hrs practice before taking the driving test
- Getting a variety of practice whilst learning to drive
- Taking regular hazard perception tests

Fitness to drive - fatigue

- Make a commitment not to drive drowsy or fatigued
- Practice good sleep habits and aim to get 7-8 hours' sleep before driving the next day
- Use sleep tech to monitor your progress
- Plan journeys around your sleep needs (i.e., times of day when will be most sleepy)
- Support drivers to take a break when travelling as the passenger
- Know what to do if you feel sleepy whilst driving (caffeine & nap, take a break on longer journeys, check in on tiredness & know when to stop)

Fitness to drive – drink & drug driving

- Commit to not consuming any intoxicating substance before driving
- Never drive for a social occasion where you think you might be tempted to take an intoxicating substance
- Commit to not having more than one alcoholic drink if you have to drive the following morning
- Support friends not to consume any intoxicating substances if they are driving
- Refuse to travel as a passenger with a driver who is intoxicated

Session structure

Session	Time	Facilitation objectives	Questions*
Welcome	5 mins	Welcome attendees & inform them of how the session will run.	[Reading and signing of consent forms]
Learning to drive	7 mins	Use the Learning to Drive key messages as material to support a discussion to meet workshop objectives	<ul style="list-style-type: none"> - BB: What effect do you think driving experience whilst learning to drive has on your driving performance? What are the consequences associated with not getting enough driving experience? Would 2hrs a week driving practice, 1hr profession 1hr with family over 12 months seem feasible? - NB: What would your friends and family think about you needing to get 100hrs of practice 12 months practice? What do people you know currently do? - CB: What experiences do you think would mean it is more or less likely for you to get sufficient experience? What are the challenges and the barriers?
Fitness to drive - Fatigue	7 mins	Use the Fitness to drive – Fatigue - key messages as material to support a discussion to meet workshop objectives	<p>Ask who was in this group in class</p> <p>BB: What impact do you think driving tired has on driving ability? To what extent would it be harmful/beneficial to drive whilst tired?</p> <p>NB: Do you have friends and family who drive tired? How do they manage things? Do you think driving tired is something a lot or a few people do? Do you think fatigue can be enforced by the police?</p> <p>CB: Do you think driving tired is under your control? How easy would it be to actually do the key messages on the sheet? What are the challenges, opportunities? What would be easy to do, what would not be easy to do?</p>
Fitness to drive – Drink & drug driving	6 mins	Use the Fitness to drive – Drink & drug driving key messages as material to support a discussion to meet workshop objectives	<p>Ask who was in this group in class</p> <p>BB: What impact do you think drink and drug driving has on driving ability? How common an issue is it? To what extent would be pleasant/unpleasant to drive whilst intoxicated?</p> <p>NB: What do you think the general public think about drink and drug driving. Do your friends or family have strong views about it?</p> <p>CB: To what extent do you feel drink and drug driving is under your control? What circumstances would make it difficult to make the right choices? How easy would it be to actually do the key messages on the sheet? What are the challenges, opportunities? What would be easy to do, what would not be easy to do?</p>
Close	5 mins	Thank participants for their input	Thank attendees for their participation and engagement. Restate the importance of this groups contribution to this work. Hope today has given you some ideas to think about as you progress through learning to drive & first six months of solo driving. Driving provides great opportunity. What we are encouraging you to do is be mindful of the risks and develop plans to keep yourselves safe in the moment.

* BB = Behavioural Beliefs, NB = Normative Beliefs, CB = Control beliefs

Focus Group 2 - Key messages for testing

Staying in control of your journey - Speeding

- Plan to control your car within the speed limit every time you drive, despite the challenges faced (i.e., if running late, trying to keep up with traffic or being pressured by other drivers)
- Adjust your speed within the speed limit when you experience different driving conditions (i.e., weather or traffic)
- Monitor your speed frequently whilst driving
- Manage your space on the road by leaving a 2 second gap to the car in front

Driving Focus – mobile phones

- Make a plan for managing your phone when in the car so that you are not distracted whilst driving
- Reduce your mobile phone use in everyday life, to improve your health, wellbeing, relationships and to make it easier to unplug and focus whilst driving
- Discuss message response times with family & friends so that it is easier to delay responding to messages, which will reduce the pressure you feel to respond whilst driving

Driving focus – peer passengers

- Drivers should only carry one passenger during the day when they have less than 6 months of post-test driving experience
- Drivers should make clear the rules of their car to their passengers
- Passengers should only travel with a newly qualified driver (with less than six months experience) during the day, when they are the only passenger
- Passengers should take responsibility for their own safety, help the driver with certain tasks and support their concentration by not distracting them.

Session structure

Session	Time	Facilitation objectives	Questions*
Welcome	5 mins	Welcome attendees & inform them of how the session will run.	[Reading and signing of consent forms]
Staying in control of journey - Speed	7 mins	Use the Staying in control of journey – Speed key messages as material to support a discussion to meet workshop objectives	Ask who was in this group in class BB: What impact do you think speeding has on driving ability? To what extent is speeding a harmful/beneficial thing to do? NB: How common do you think speeding is? Do you know people that speed, a little or a lot? What approach do you think the police take to enforcing speeding? What do you think the general public thinks about speeding? CB: Do you think speeding is under your control? What circumstances do you think it is difficult to stay within the speed limit? How easy would it be to actually do the key messages on the sheet? What are the challenges, opportunities? What would be easy to do, what would not be easy to do?
Focus – Mobile phones	7 mins	Use the Focus – Mobile phones - key messages as material to support a discussion to meet workshop objectives	Ask who was in this group in class BB: What impact do you think hand-held mobile phone use has on driving ability? To what extent is it wise/foolish. NB: How common do you think hand-held mobile phone use is? Do you know people that use mobile phones whilst driving, a little or a lot? What approach do you think the police take to enforcing mobile phone use? What do you think the general public thinks about mobile phone use? CB: Do you think using a mobile phone is under your control? What circumstances do you think it is difficult to not use a mobile phone whilst driving? How easy would it be to actually do the key messages on the sheet? What are the challenges, opportunities? What would be easy to do, what would not be easy to do?
Focus – Peer passengers	6 mins	Use the Focus – Peer passengers –key messages as material to support a discussion to meet workshop objectives	Ask who was in this group in class BB: What impact do you think having young passengers in the car effects driving ability? To what extent is it wise/foolish. NB: How common do you think having multiple peer passengers in a newly qualified driver's car at night is? Do you know people that do this a little/a lot? What about distracting the drivers – how common is this in your experience. CB: Do you think managing passenger risks is under your control? What circumstances do you think it is difficult to manage passenger risks? How easy would it be to actually do the key messages on the sheet? What are the challenges, opportunities? What would be easy to do, what would not be easy to do?
Close	5 mins	Thank participants for their input	Thank attendees for their participation and engagement. Restate the importance of this group's contribution to this work. Hope today has given you some ideas to think about as you progress through learning to drive & first six months of solo driving. Driving provides great opportunity. What we are encouraging you to do is be mindful of the risks and develop plans to keep yourselves safe in the moment.

* BB = Behavioural Beliefs, NB = Normative Beliefs, CB = Control belief

E.4 Pre-driver focus group information sheet and consent form

Information sheet – Focus groups



Pre-driver theatre & workshop education research

Your school/college is being invited to take part in this study

This is a national programme of research which is being supported by the UK Department for Transport, the National Fire Chiefs Council and other UK road safety charities and NGOs.

Your school has agreed to take part in a workshop and two focus group sessions to support the project.

1. Why is this research taking place?

Newly qualified young drivers are at a higher-risk of death or serious injury within the first year of passing their driving test. Pre-driver education is currently delivered throughout the UK. This study is investigating how pre-driver education can improve young driver's ability to cope with road related risk.

2. Why are we being asked to take part?

You are being invited to take part in this research as your local Fire and Rescue Service has identified your school as being well placed to support the piloting of this national level research.

3. What are the benefits of taking part?

In agreeing to support this research you will be helping policy makers and delivers in the UK and further afield better understand young people's attitudes to road safety and how pre-driver education can help reduce the risks experienced by young and novice drivers. Any learning from this study will directly influence the future delivery of similar programmes across the UK.

Contents

1. Why is this research taking place?
2. Why are we being asked to take part?
3. What are the benefits of taking part?
4. What is involved in taking part?
5. Are there any risks with taking part?
6. Who is delivering & funding the research?
7. What happens next?

How to contact us

If you have any questions about this study, please contact: **Elizabeth Box**, PhD Student, Driving Research Group, Cranfield University
e.box@cranfield.ac.uk

1 of 2

4. What is involved in taking part?

Following a classroom presentation, the project researcher, accompanied by another member of the ~~PdTWER~~ project team will hold a 30min focus group session where you will be asked to contribute your views on road safety in relation to the questions presented. The focus group will be audio recorded.

5. Are there any risks with taking part?

All information students provide at the focus groups will remain confidential, and no information that could lead to the identification of any individual will be disclosed in any project reports, or to any other party. No identifiable personal data will be published. The research has received ethical approval from the Cranfield University Research Ethics Board (CURES/3733/2018). Due to the nature of the group discussion, once the focus group has been completed it will not be possible to withdraw your data.

All anonymized data will be stored securely on Cranfield University file servers. Only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion.

6. Who is delivering & funding the research?

[Elizabeth Box](#), PhD Research Student at [Cranfield University](#) is delivering the research. The National Fire Chiefs Council are providing the project management support for the work. [The Department for Transport](#), [the Road Safety Trust](#), [RAC Foundation](#), [National Fire Chiefs Council](#), [Kent Fire and Rescue Service](#) and [Road Safety GB](#) are jointly funding the research work being conducted for this PhD research.

7. What happens next?

If you have any further questions please ask the researcher at the start of the focus group session. There will be an opportunity to express any concerns you have before the session starts. If you have any further questions after the focus group has been completed, you can contact the researcher on the email details provided at the front of this information sheet.



CONSENT FORM

Project Aim: *To explore young people's attitudes to road safety*

This research aims to explore young people's attitudes to road safety. This focus group will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.

1.	<p>I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me, and I have read the information sheet, which I may keep for my records.</p> <p>I understand this will involve, at this stage, taking part in an audio recorded focus group to discuss my views and opinions on road safety issues that affect me as a learner driver, driver or a passenger.</p>
2.	<p>This information from this focus group will be held and processed for the following purpose(s):</p> <p>To answer the research question concerned with the nature of young people's attitudes to road safety.</p> <p>I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.</p>
3.	<p>I understand that my participation is voluntary and that I can, if I wish, refuse to take part. Due to the nature of the group discussion, once the focus group has been completed, data cannot be withdrawn. I understand that my anonymized data will be stored securely on Cranfield University file servers, and that only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion.</p>
4.	<p>I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.</p>
5.	<p>I agree to take part in the above study.</p>

Name of Participant

Signature

Date

Elizabeth Box
PhD Research student,
Cranfield University
e.box@cranfield.ac.uk

E.5 Workshop Mentimeter results

Table E.5-1 Age, gender and driving stage of workshop participants (n = 26)

Age (SD)		16.79 (0.42)
Gender	Male (%)	50%
	Female (%)	31%
	Non-binary (%)	4%
	Unknown (%)	15%
Driving stage	I'm current learning (%)	46.2%
	Learning in the next 12 mnths (%)	42.3%
	Maybe learning at some point (%)	3.8%
	Not stated (%)	7.7%

Figure E.5-1 Expected months taken to learn to drive (n = 26)

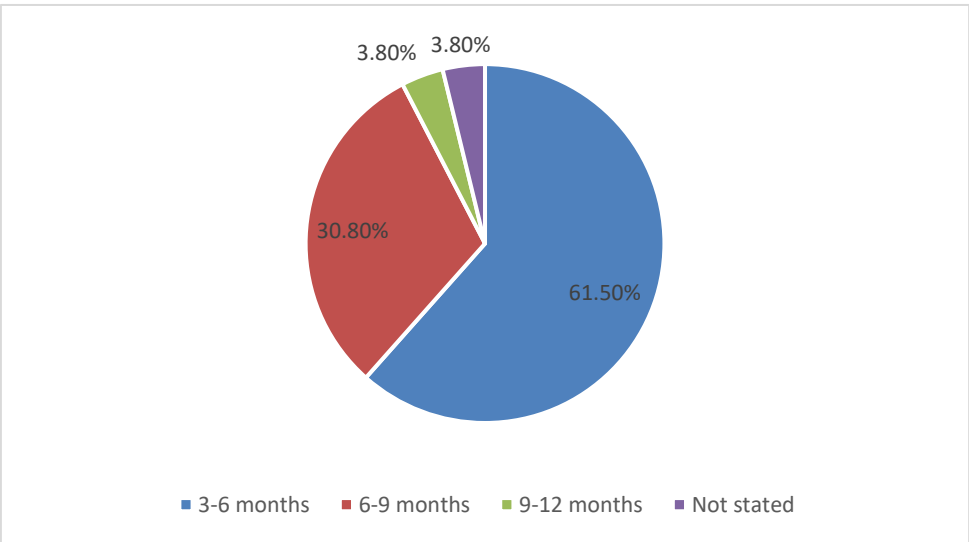


Figure E.5-2 Expected number of hours to learn to drive (n = 26)

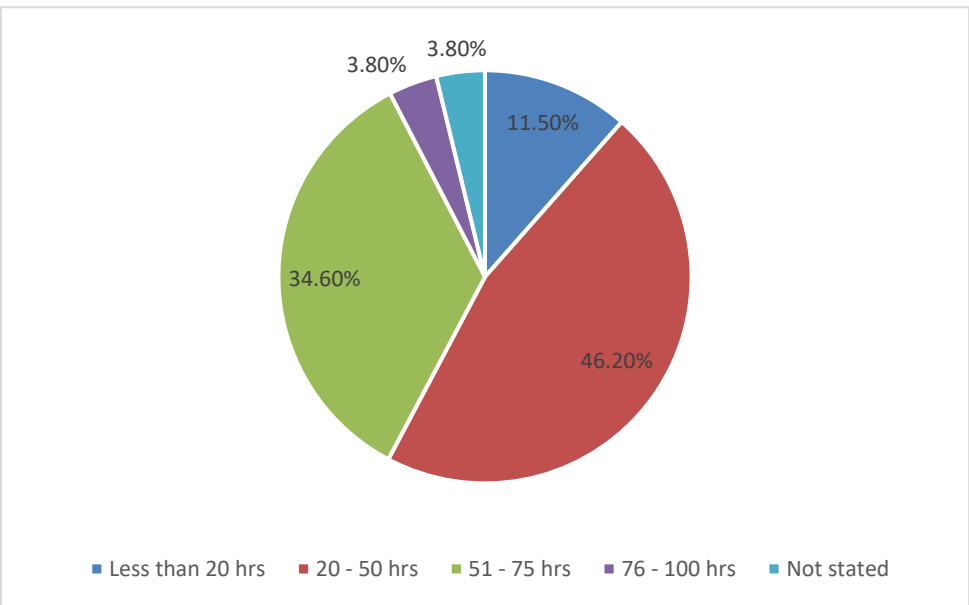


Table E.5-2 Workshop participant willingness to engage in the following learning to drive behaviours (*n* = 25)

Q. Learning to Drive: How willing would you be/would you have been to do the following...

Response	Mean (SD)
Getting a variety of practice whilst learning to drive	7.92 (2.45)
Learn to drive for 12 months before taking your test	7.00 (3.25)
Take regular online hazard perception tests	6.12 (3.35)
Getting a minimum of 100hrs practice before taking the driving test	4.56 (3.25)

Nb. Scale 1 = Not at all willing, 10 = Very willing

Table E.5-3 Workshop participant identified barriers/problems with learning to drive for 12 months and getting 100hrs of practice before taking the driving test (*n* = 26)

Q. If you were required to learn to drive for 12 months and get 100hrs of practice before taking your test, what barriers/problems do you foresee?

Theme	Responses
Time costs	"Finding the time" "Long days" "Time" "Take up your time" "Amount of free time I have with work, school and socialising, it can sometimes be hard to fit even 1 hour a week in" "Getting schoolwork done etc" "School work may be effected" "School work" "School would get in the way of learning to drive" "School, football, gym" "Time with family and friends"
Financial costs	"Amount of money" "Costly" "Expensive" "It can be expensive" "Money" "Price would be difficult" "The cost"
Impatience, lack of interest or boredom	"Taking too long" "Get bored" "Waste of time" "May get bored and get put off driving" "Not being bothered"
Impact on safety	"Could get hurt during that time" "People may go out driving without yet having passed their test"
Private practice concerns	"The family and friends may teach you differently from the instructor themselves"
None	"None"

Figure E.5-3 Expected costs for learning to drive ($n = 26$)

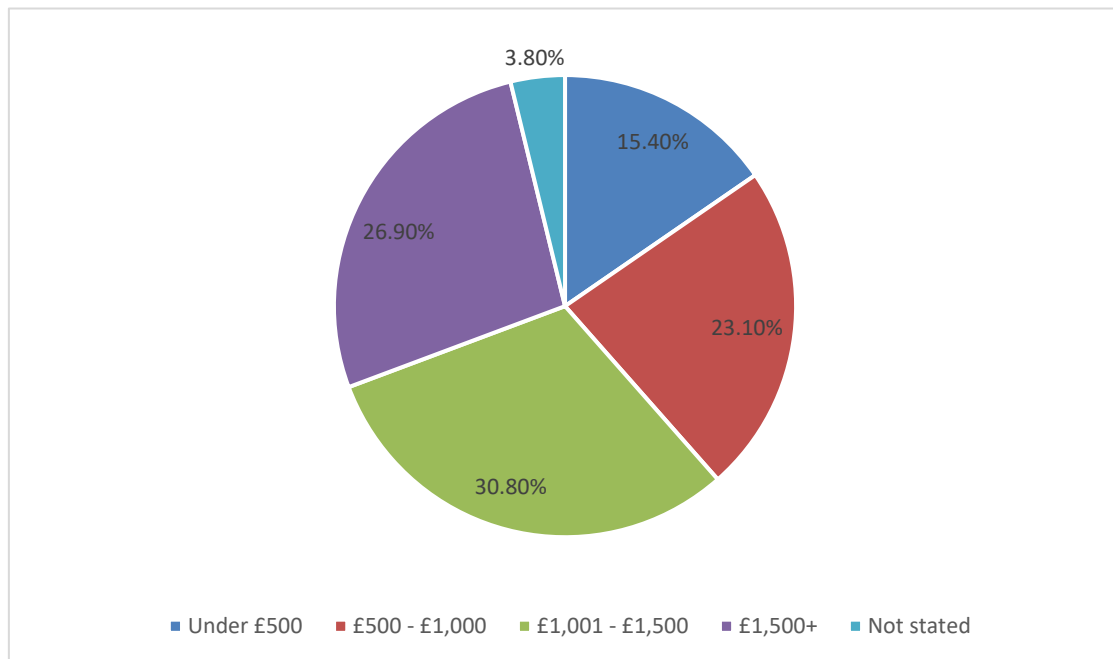


Table E.5-4 Parent/guardian attitudes to learning to driver and getting on the road ($n = 26$)

Q. Which of these statements describes your parents/guardian's attitude to learning to drive and getting on the road (select all that apply)

Statement	Frequency
Take as many lessons as you need to be confident before taking the test	19
Get insured on the family car and spend time doing practice between lessons	6
Buy whatever insurance policy is cheapest	3
Spend a little more on your first car to get more safety features	3
You should get a banger for a first car in case you crash	3
Get through the test as quickly as possible	2
Get a telematics (black box) insurance policy to get feedback on driving	2
Stick to professional driving lessons only as there's no suitable family car or they don't like the idea of supervising a learner	1

Table E.5-5 Workshop participant reported control as a driver in risk circumstances ($n = 24$)

Q. How much control would you have over whether you would...

Behaviour	Mean (SD)
Drive over the speed limit	6.29 (3.30)
Get distracted by passengers whilst driving	5.79 (3.18)
Drive whilst tired	4.88 (3.22)
Get pressured by passengers whilst driving	4.83 (3.49)
Use your mobile phone for messaging and calls whilst driving	3.63 (3.44)
Drive after having taken drink or drugs	2.75 (3.42)

Nb. Scale 1 = No control, 10 = Complete control

Table E.5-6 Workshop participant comfort as a passenger when the driver is taking part in the following activities (*n* = 25)

Q. How comfortable/uncomfortable do you feel as a passenger when the driver...

Behaviour	Mean (SD)
Speeds	5.52 (3.19)
Is distracted by other passengers	4.76 (3.73)
Using their mobile phone to message and take calls	4.48 (3.57)
Is tired	3.72 (3.54)
Is inexperienced	2.72 (3.10)
Is showing off	3.72 (3.10)
Has been drinking and/or taking drugs	2.08 (3.10)

Nb. Scale 1 = Very uncomfortable, 10 = Very comfortable

Table E.5-7 Workshop participant perceptions of collision involvement in first 6 months of driving (*n* = 26)

Q. What percentage of new drivers do you think are involved in a collision within their first 6 months of driving?

Response	Percentage selected (%)
1%	3.8%
10%	15.4%
12%	19.2%
15%	15.4%
20%	34.6%
Not selected	11.5%

Table E.5-8 Workshop participant views on the emotional states that they believe road safety ads should inspire (*n* = 26)

Q. When viewing road safety ads which of the following emotional states do you think they should inspire? (Select up to 4)

Theme	Responses
Confidence	12
Inspiration	12
Fear	12
Embarrassment	6
Sadness	5
Surprise	5
Anticipation	4
Sympathy	4
Amusement	3
Joy	3
Pride	3
Happiness	1
Hope	1

Table E.5-9 Workshop participant favourite YouTubers and/or social media influencers (*n* = 6)

Youtuber / social media influencer	Description	Handle	Subscribers (Million)
James Charles	Make-up social media influencer	@JamesCharles	23.8
The Slow Mo Guys	Slow motion filmed stunts	@theslowmoguys	14.7
Miranda Sings	Comedy character vlogger	@mirandasings	10.8
Yes Theory	Adventure Vlogger	@YesTheory	8.26
Trisha Paytas	Lifestyle Vlogger	@blndsundoll4mj	5.00
Jack Sucks At Life	Reaction and gaming videos	@JackSucksAtLife	2.71
Achievement Hunter	Gaming Vlogging with podcast style discussions	@AchievementHunter	1.45
Lana Rhoades	3 girls 1 kitchen podcast presenter, personal development podcast	@LanaRhoadesand2G1K	1.02
TOTAL Subscribers			67.74

Table E.5-10 Workshop participant intervention name preference (*n* = 26)

Suggested intervention name	Percentage nominating as preferred name
DrivePlanUK	61.5%
Young Driver Bootcamp	7.7%
Neither	11.5%
Not stated	19.2%

Appendix F – Paper 6 appendices

F.1 DriveFit intervention design and approach

	Support	Avoid
Research	Robust study design (e.g., controlled, cRCT) ¹	Weak study design (e.g., non-controlled, pre-post evaluation) ¹
	Longer-term evaluations measuring objective behavioural outcomes ¹	Short-term evaluations measuring self-report behavioural outcomes ¹
	Complete intervention evaluation (e.g., effectiveness and process evaluations, sub-group evaluation) ¹	Incomplete evaluations (e.g., process or effectiveness only, no sub-group evaluation) ¹
Practical	Designing intervention and follow-ups with school timetable in mind ⁴	Designing intervention without reference to school/college delivery options ⁴
	High quality production to secure intervention credibility ⁴	Low quality film production ⁴
	Setting clear and realistic expectations for schools/colleges about what will be included in the intervention ⁴	Providing unclear information to schools/colleges about intervention to be delivered ⁴
Scope	Theoretically grounded and evidentially based intervention design ^{1, 2}	Intervention design based on personal intuition and experience (i.e., a focus on learning styles) ^{1, 2}
	Positive emotional appeal ^{1, 2, 4}	Negative emotional appeal (i.e., graphic descriptions of trauma, real-life emotional stories) ^{1, 2, 4}
	Multiple-intervention points ¹	One-off intervention delivery ¹
	Optimal timing of interventions (i.e., just before full licensure) ⁴	Inconsistent timing of intervention delivery, driven by practical concerns rather than timing that supports optimal effectiveness ⁴
	Active learning (i.e., audience participation, interactivity and time for reflection) ^{1, 4}	Passive, impersonal learning ^{1, 4}
	Focus on developing audience self-efficacy and PBC through provision of follow up tools (e.g., action planning exercises (BCT 1.4) implementation intentions, efficacy statements, safe driving plans, personal resilience skills) ^{2, 4}	Designing interventions without follow-up activities to addressing self-efficacy and PBC ^{2, 4}
	Broader range of high potential BCTs for target audience (e.g., sparing use of health consequences presented in a non-sensational way ² and a focus on social and economic consequences (BCT 5.3) ⁴	Narrow BCT use (i.e., natural consequences: descriptions of collisions and injuries) ²
	Credible source voices (BCT 9.1) with relevant content for the target audience ^{2, 4}	Dominant emergency service worker voice ²
	Inclusion of young people in content design ⁴	Designing content without any input from the target audience ⁴
	Use of peer-age presenters ^{2, 4}	Use of non-diverse, non-representative speakers ^{2, 4}
Content	Content that is relatable to the attendees lives and current driving status (i.e., passenger related content) ⁴	Content that is not relatable to attendees lives and current driving status ⁴

	Support	Avoid
Content	Infrequent use of consequences information/knowledge provision ^{1, 2, 4} although focus on areas of identified knowledge deficit: the extent of road risk for young drivers during the first 6 months of driving licensure, as well as a lack of knowledge about speeding, mobile phone use and fatigue enforcement consequences. ⁵	Heavy focus on consequences and Information / knowledge provision only ^{1, 2, 4}
	Factually accurate, clear content ²	Factually inaccurate, unclear content ²
	Safety messages that support and promote a safe road safety system ²	Inadvertent negative messages (e.g., enforcement deterrents) ²
	Focus on risk factors most associated with crash risk ^{2, 4}	Focus on fatal five ^{2, 4}
	Setting examples in social context ⁴	Setting examples in local context ⁴
	Focusing on the broader actions supported by the road safety system ²	Focusing solely on individual 'sharp end' actions ²
	Focusing on five main areas of risk 1) maximising the learning to drive process (i.e., getting sufficient driving experience and gaining necessary cognitive skills), 2) making decisions that support safety (i.e., vehicle choice and feedback on driving behaviours) 3) maintaining focus: reducing in-vehicle distractions (i.e., mobile phone use and passengers) 4) fitness to drive (i.e., managing fatigue, avoiding drink and drug impairment and managing speed) and 5) Staying in control of the journey (i.e., managing speed). ³	
	Addressing beliefs identified by the target audience (pre-licensure practice required, the role of individual difference ability in safety and learning to drive, unsafe beliefs about speeding being inevitable and mobile phone use being allowable in certain circumstances (i.e., sat nav use) ⁵	

Nb. numbered references throughout table refers to the paper(s) which the conclusions were drawn from.

F.2 Young driver risk preventative focus informed by Papers 3 and 5

Themes	Evidence	Intervention aims	Key intervention message
Maximising the learning to drive process			
Getting sufficient driving experience	Insufficient driving experience effects driving performance is related to unsafe driving and collisions amongst this group (See: Paper 3 Section 4.4.1.1.1)	To promote extensive practice whilst driving	Learning to drive for 12 months and securing over 100 hours of supervised practice in varied circumstances, with a mixture of professional and private practice will make attendees better and safer drivers.
Gaining necessary cognitive skills	The ability to anticipate or detect potential hazards has been linked to crash involvement with both on-road experience and hazard perception training having been found to increase the development of necessary cognitive skills in young and novice drivers (See: Paper 3, Section 4.4.1.1.2)	To challenge the belief that you need only do hazard perception training to pass your theory test	Improving your hazard perception skills will make you a better and safer driver
Elicited beliefs from target audience (See: Paper 5, Section 6.4.1.1) <ul style="list-style-type: none"> • BB: The driving test determines safety, not amount of driving experience; practice after the test is just as valuable as practice before the test; the amount of practice needed is dependent on an individual's natural abilities; getting sufficient driving practice can lead to boredom/impatience/loss of interest/people driving without a driving licence. Getting sufficient driving practice can reduce the chances of messing up. • NB: Getting sufficient driving practice is supported by parents and peer passengers and disapproved of by parents • CB: Getting sufficient driving practice is less likely when there are problems getting driving instruction and tests; there is a need to travel to work; private practice with friends and family is different to when with a driving instructor; due to the cost and time taken and when being encouraged to get through the test quickly. It is more likely when there is access to a private car and willing supervisor 			
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: It takes time for everyone to develop driving experience and getting varied practice ahead of the test will help. • NB: Parents are well placed to support learning. • CB: There are ways to fit practice into busy schedules and within available budgets; planning practice with parents can help. 			

Themes	Evidence	Intervention aims	Key intervention message
Making decisions that support safety			
Vehicle choice	The age and condition of a vehicle that young novice drivers have access to in their first year of driving post-licensure is an important, but not commonly addressed road safety consideration (See: Paper 3, Section 4.4.1.2.1)	To inform the audience of how to make vehicle choices which support safety	Vehicle choices made by new drivers and their parents can support their safety and comfort in the first 6 months of driving and beyond
Feedback on driving behaviours	Feedback on driver behaviours, recorded using in-vehicle data recorders (IVDRs), has been shown by numerous studies to reduce young driver risk, particularly where feedback is combined with rewards (See: Paper 3, Section 4.4.1.2.2)	To inform the audience of how to make insurance choices which support safety	Insurance choices made by new drivers and their parents can support their safety and comfort in the first 6 months of driving and beyond
Maintaining focus: Reducing in-vehicle distractions			
Mobile phone use	For young drivers, mobile phone use whilst driving is a strong environmental predictor of road collisions (See: Paper 3, Section 4.4.1.3.1)	To promote unplugging from technology and focusing on the driving task	Mobile phone use whilst driving is avoidable and controllable
Elicited beliefs from target audience (See: Paper 5, Section 6.4.4.1) <ul style="list-style-type: none"> • BB: Mobile Phone use allows the use of other useful functions in the car. • NB: Some young people approve of the use of mobile phones in cars, but peer passenger and the police do not approve. • CB: Mobile phone use is more likely because of use of mobile phones in everyday life and needing to reply to an urgent call. 			
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: Emphasise the dangers of using mobile phones in cars in relation to other risk taking activities (i.e., drink driving) and how multitasking relates to maximum processing abilities of the brain • NB: Re-emphasis legal consequences of using mobile phone in the car (i.e., strength of penalty and chances of getting caught and implications for losing licence – New Drivers Act) • CB: Emphasis the importance of setting limits on responding whilst driving and using supporting technology (i.e., do not disturb/drive safe mode) 			

Themes	Evidence	Intervention aims	Key intervention message
Passengers	Younger drivers are more likely to engage in risky driving behaviour in the presence of passengers than older drivers, with the effect being particularly strong for peer age passengers who are risk accepting or actively or passively exerting pressure to inspire risky driving behaviour (See: Paper 3, Section 4.4.1.3.2)	To promote reducing the number of peer passengers carried in the first 6 months of solo driving	Peer passenger distractions can be controlled by both drivers and passengers
Elicited beliefs from target audience (See: Paper 5, Section 6.4.4.2) <ul style="list-style-type: none"> • BB: Passengers cause problems if they do not take account of a driver's needs. Passengers can help to build driving experience and feelings of freedom and independence. • NB: Friends think young drivers should drive with peer passengers • CB: The dangers associated with travelling with peer passengers is more likely if passengers keep quiet and do not speak out due to lack of confidence or due to power dynamics. Limits on passengers or safe and helpful passenger behaviours would make travel safer 			
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: Inform that passengers have a distracting effect on novice drivers (i.e., risk goes up for every peer passenger carried) • NB: Emphasise that it is common in other countries to have limits on the number of peer passengers in a new drivers car • CB: Encourage to set rules for early post-licensure – like only carrying one passenger in the first 6 months and having conversations with friends before passing the test. 			

Themes	Evidence	Intervention aims	Key intervention message
Fitness to drive			
Managing Fatigue	Young drivers are at significant risk of fatigue related collisions due to disrupted sleep schedules and their reduced ability to function optimally with a sleep deficit (See: Paper 3, Section 4.4.1.4.1)	To challenge the belief that driver sleepiness is unavoidable	Driver sleepiness is controllable and avoidable
Elicited beliefs from target audience (See: Paper 5, Section 6.4.2.2) <ul style="list-style-type: none"> • BB: Driving whilst fatigued leads to slow reaction times, reduced attention and increased crash risk • NB: Fatigued driving is disapproved of by important others (i.e., peer passengers, police, parents etc.) • CB: Social media usage effecting sleep quality effects fatigued driving. Drinking caffeine, asking a passenger to drive or find a safe place to stop are ways in which fatigue can be managed. 			
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: Re-emphasise the impact that fatigue has on driving safety, particularly driving at night and why young drivers are particularly effects (i.e., biological sleep needs) • CB: Promote drivers setting themselves to being safe and alert whilst driving, how to recognise the signs of tiredness, how to plan for reducing fatigue and how to manage in the moment if driving whilst fatigued. 			
Avoiding drink and drug impairment	Drink and drug driving is a causal factor in collisions involving young drivers (See: Paper 3, Section 4.4.1.4.2)	To inform the audience that being a passenger in an intoxicated driver's car or being intoxicated whilst driving is something under their control.	Drink and drug driving is avoidable and controllable
Elicited beliefs from target audience (See: Paper 5, Section 6.4.2.1) <ul style="list-style-type: none"> • BB: driving after having consumed drink and drugs would impair driving performance, increase chances of losing control and increase the chances of injury to self and others. • NB: Important people (e.g., family, friends, police etc) do not think that that people should drive after consuming drink or drugs. • CB: Driving after having consumed drink or drugs. Less likely - having access to alternative transport (e.g., taxis, Ubers, lifts from parents). More likely - having easy access to drink and drugs and having friends that find it hard to speak out again impaired driving. 			

Themes	Evidence	Intervention aims	Key intervention message
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: Reinforce existing behavioural beliefs about impacts of drink and drug driving (i.e., impacts on decision-making, judgement, reaction times and ability to spot hazards). • NB: Reinforce existing normative beliefs that there is a social stigma associated with drink and drug driving. Reinforcement enforcement mechanisms for being caught and penalised. • CB: Emphasise that there are ways to get home safely (e.g., keeping money aside for a Taxi, designated drivers and getting lifts from parents). 			
Controlling your journey			
Managing Speed	Speeding has been identified as a common cause of collisions amongst young drivers with social norms and peer influence having a particular impact on speeding behaviours amongst this at risk group (See: Paper 3, Section 4.4.1.4.3)	To promote skilful drivers as being able to control their car within the speed limit	Selecting an appropriate speed and staying in control of speed is important and can be achieved with practice and planning.
Elicited beliefs from target audience (See: Paper 5, Section 6.4.3.1) <ul style="list-style-type: none"> • BB: driving over the speed limit is inevitable • NB: It is common for people to speed (i.e., parents, young people showing off, people travelling on common roads). The police do not approve of speeding • CB: Empty roads can encourage speeding, tools to help remind not to speed can help (i.e., only a fool breaks the two second rule) 			
Intervention outcomes to emphasise: <ul style="list-style-type: none"> • BB: Reinforce why it is important to stay within the speed limit (i.e., small changes have a big impact if a collision occurs, vehicles do not completely protect people. Reinforce that there are no excuses for speeding. Emphasise that speeding does not save time. • NB: The police think keeping within the speed limit is important and will enforce even if someone is only travelling a small amount over the speed limit. Reinforce the legal consequences • CB: Emphasis ways in which drivers can stay within the speed limit (i.e., two second rule, reading the road, see where the vanishing point of the road is) 			

F.3 DriveFit content – Getting sufficient driving experience

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To promote extensive practice whilst learning to drive	Learning to drive for 12 months and securing over 100 hours of supervised practice in varied circumstances, with a mixture of professional and private practice will make attendees better and safer drivers. Taking these actions should increase the chance of learners passing first time.	1. To recognise what actions whilst learning to drive support the development of capable drivers 2. To recognise how to overcome barriers to get the practice needed before taking the test	1. To give examples of action to take whilst learning to drive to help create capable drivers 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support extensive practice whilst learning to drive	1.1 – Goal setting (Behaviour) 1.2 – Problem solving 1.4 – Action planning 2.3 – Self-monitoring of behaviour 3.1 – Social support (Unspecified) 3.2 – Social support (Practical) 5.1 – Information about health consequences 7.1 – Prompts/cues 9.1 – Credible source
<p>Speaker briefing:</p> <p>Learning to drive for 12 months: Driving as well as other areas of learning can take time and a lot of experience to master. People can learn physical driving skills quickly, but it takes longer to develop a good understanding and awareness of interacting with other road traffic.</p> <p>Get a minimum of 100hrs practice or more before taking the test: Set the goal of getting 2hrs of driving practice every week for 12 months, 1hr professional driving instruction and 1hr private practice. You could skew it to more professional practice to start and more private practice as the learning progresses. Professional lessons are importance for ensuring correct technique. How to find a qualified driver instructor and what qualifies as eligible supervision from friends and family - https://www.safedrivingforlife.info/advice/car-driving/pass-your-learner-tests/find-driving-instructor/ and how to access learner driver insurance.</p> <p>Get a variety of driving practice: Drive at different times of day in different conditions. Set the goal of driving the family car on a regular journey at least once a week. Set the goal of trying a different driving route every other week, to challenge yourself in an unfamiliar driving situation. Attendees could use the end of the weekend as a the time to think about their driving practice for the next week. Ask attendees to record weekly, whether they have met their learning to drive goals and that once a week they examine how well they are meeting these behavioural goals and how they can engage with family members to support.</p> <p>Overcoming barriers to getting the practice needed before taking the driving test: Reference that audience will be able to think of other challenges and barriers to meeting these goals (i.e., wanting to pass sooner, feeling the pressure to pass quickly, lack of time and money no car for private practice). The workshop that follows this film will explore the challenges and limitations associated with taking these and other actions forward, given their particular relevance and will help the development of action plans to help support driving safety.</p>				

* KNW = Knowledge, CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control

F.4 DriveFit content – Gaining necessary cognitive skills

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To challenge the belief that you need only do hazard perception training to pass your theory test	Improving your hazard perception skills will make you a better and safer driver	1. To recognise why hazard perception skills matter to driving safety 2. To recognise the frequency of practice recommended whilst learning to drive 3. To recognise how to access to hazard perception practice materials and make a plan to use them	1. To evaluate barriers and facilitators to being able to take-action on practicing hazard perception 2. To create an if-then plan to support hazard perception practice	1.2 – Problem solving 1.4 – Action planning 5.1 – Information on health consequences 5.3 – Information about social and environmental consequences 6.1 – Demonstration of the behaviour 9.1 – Credible source
<p>Speaker briefing: Why hazard perception skills matter: Hazard perception is important for the safety of all drivers, as well as younger more in-experienced drivers specifically. Demonstration of hazard prediction simulation to be provided.</p> <p>The importance of practice: Discussion about the effect of practice, discuss how this can be achieved and how any barriers to practice can be overcome.</p> <p>How hazard perception and prediction materials can be accessed: Provide details of resources which can be accessed and encourage plan for practice.</p>				

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control

F.5 DriveFit content – Making safety supportive vehicle and insurance choices

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To inform the audience of how to make vehicle and insurance choices which support safety	Vehicle and insurance choices made by new drivers and their parents can support their safety and comfort in the first 6 months of driving and beyond	1. To recognise the impact that vehicle choice and insurance has on safety 2. To recognise what vehicle and insurance choices support new driver safety	1. To give examples of what vehicle and insurance choices support new driver safety 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support safety supportive vehicle and insurance choices	1.1 – Goal setting (behaviour) 1.2 – Problem solving 5.1 – Information on health consequences 5.3 – Information about social and environmental consequences 6.1 – Demonstration of the behaviour 9.1 – Credible source
<p>Speaker briefing:</p> <p>Why vehicle and insurance choice matters: Cars are getting safer every year thanks to new technology such as automatic emergency breaking, new airbag features and electronic stability control. None of these technologies take away from the importance of being a competent driver who is focused, fit to drive and in control of their speed, but they are an important part of how to secure the safest driving experience. Over the past decade, telematics 'black box' have become a more common insurance offer for newly qualified drivers. Given the elevated risk that newly qualified drivers present, traditional insurance premiums are very expensive for newly qualified drivers. Telematics insurance, where a black box or dongle is placed in the car monitors for harsh acceleration and breaking, sharp changes in steering and the speed of the vehicle to determine the risk the user is taking and makes a journey based charge accordingly. This for competent and in control drivers typically leads to financial savings.</p> <p>What vehicle and insurance choices support new driver safety: Using telematic insurance for at least the first year of driving (ideally longer) should provide a lower premium and feedback on performance on the road. Whenever possible getting a car under 10 years old means that the car will benefit from more modern safety equipment, which will reduce injury severity in the event of a collision. Getting as new a car as possible for the budget is good to aim for. You can look up the safety performance of cars from EuroNCAP or use consumer sites such as FirstCar.</p>				

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control

F.6 DriveFit content – Mobile phone use

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To promote unplugging from technology and focusing on the driving task	Mobile phone use whilst driving is avoidable and controllable	1. To recognise the impact that mobile phone use has on driving safety 2. To explain the social & legal consequences of mobile phone use whilst driving 3. To recognise how to avoid using a mobile phone whilst driving to stay in control and focused	1. To give examples of how to stay focused on the driving task and how to avoid mobile phone use 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support focus driving	1.2 – Problem solving 1.4 – Action planning 3.2 – Social support (Practical) 4.1 – Instruction on how to perform the behaviour 5.1 – Information on health consequences 5.3 – Information about the social and environmental consequences 6.1 – Demonstration of the behaviour 9.1 – Credible source
<p>Speaker briefing: The impact of mobile phone use on driving: Mobile phone use causes distraction and increases the risk of collision and injury. Mobile phones impair driving performance, cause loss of control, diverts attention and slows reactions. Comparative effect of mobile phone use on reaction times.</p> <p>The social and legal consequences of mobile phone use whilst driving: Provide information about what people think about mobile phone use in vehicles and the legal consequences of using a mobile phone (i.e., New Drivers Act, loss of job, relationship, opportunities, own transport). Outline police and government interest in reducing mobile phone use to reduce collisions. Highlight the embarrassment of being pulled over for mobile phone use and having to admit this to significant others. Drivers are legally, socially and morally accountable for being fit and healthy when driving. Ask attendees to assess the degree of regret they would feel if they were involved in a collision because they were distracted by a mobile phone.</p> <p>How to avoid using a mobile phone whilst driving to stay in control and focused: Make a plan for managing your phone when in the car. Put the mobile phone on silent/do not disturb and out of reach every time they get in the car. Provide instruction for how car modes and other phone options can be used to support non phone use whilst driving, use the car door shutting as your prompt to 'check you phone in', use your passengers to support your safety and as a passenger help a driver manage their phone, the importance of connecting music/ sat nav before setting off and only doing set up when stationary, suggest the creation of play lists in advance of the journey to avoid temptation to change track whilst travelling. For phones used for navigation, ensure fixed in a cradle and that notifications are turned off. Implementation intention: IF I get a message or phone call whilst driving THEN I will focus my attention on the roadway ahead. Reduce phone use when out of the car: To help reduce reflex reaction to phone, which is of benefit to mental health, wellbeing and relationships and for managing phone in the car. Make use of the technology/support apps that help monitor use to inform progress in reducing mobile phone use. Discuss message response times with family and friends. Discuss and agree reasonable expectations for mobile phone response times to reduce the pressure to respond to messages and calls whilst driving. Highlight the temptation to respond to close friends and family and emphasise the importance of discussing with friends and family and their potential to be a good role model. Discuss how to overcome barriers to staying focused whilst driving.</p>				

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control SN = Subjective norms

F.7 DriveFit content – Passengers

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To promote reducing the number of peer passengers carried in the first 6 months of solo driving	Peer passenger distractions can be controlled by both drivers and passengers	1. To recognise the impact that peer passengers have on driving safety 2. To recognise how to manage peer passenger risks as a newly qualified driver 3. To recognise how to be a safe passenger when travelling with a newly qualified driver	1. To give examples of how newly qualified drivers and passengers can manage peer passenger distractions 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support focused driving without peer-passenger distractions	1.1 – Goal setting (Behaviour) 1.2 – Problem solving 1.4 – Action planning 5.1 – Information on health consequences 9.1 – Credible source
<p>Speaker briefing: The impact peer passengers can have on driving safety: Outline the risks posed by peer age passengers and the impact of their presence (i.e., multiple peer passengers can impair driving performance, diverts attention and slows reactions particularly at night, which can lead to a loss of vehicle control). Ask attendees to assess the degree of regret they would feel if they were involved in a collision, where passengers were injured as a result of them being distracted whilst they are still developing their driving skills in the first six months of driving, or if the passengers had provided the distraction. Provide information about countries around the world which have a phased licensing process (impact and support for licensing changes).</p> <p>How to manage peer passenger risks when driving: Recommend that drivers only carry on passenger during the day when you have less than 6 months solo driving experience. Make clear the rules of your car. Develop your own 'my car, my rules' plan including things such as wearing a seatbelt and minimising distraction and discuss with your passengers. Outline ways in which to overcome barriers to manage passenger risks.</p> <p>How to be a safe passenger: Only travel with a newly qualified driver during the day when you are the only passenger and take responsibility for your own safety. Help the driver with certain tasks and support the driver's concentration by not distracting them.</p>				

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control SN = Subjective norms

F.8 DriveFit content – Managing fatigue

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To challenge the belief that driver sleepiness is unavoidable	Driver sleepiness is controllable and avoidable	1. To recognise the impact fatigue has on driving and why young drivers are at increased risk 2. To recognise the causes and signs of fatigue 3. To explain the benefits associated with good sleep 4. To explain the consequences of sleepy driving 5. To recognise how to avoid driver sleepiness and stay in control and alert	1. To give examples of how to take control of whether to drive whilst fatigue 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support alert driving	1.1 – Goal setting (Behaviour) 1.2 – Problem solving 1.4 – Action planning 1.9 – Commitment 3.1 – Social support – unspecified 3.2 – Social support – practical 4.2 – Information about antecedents 5.1 – Information on health consequences 5.3 – Information about the social and environmental consequences 9.1 – Credible source
<p>Speaker briefing:</p> <p>Impact of fatigue on driving: Fatigue is a factor in a significant proportion of crashes each year. Fatigue diverts attention and slows reactions. Collisions involving fatigue are likely to be more severe (and more likely to be fatal), as a sleepy driver is not able to brake. Young drivers and pre-drivers are at high risk of daytime sleepiness, in part due to biological brain development. Young males have higher trait sleepiness (Epworth sleepiness score), shift workers are most at risk. Young drivers have been found to overestimate their ability to drive safely whilst drowsy. Sleep related crashes occur in towns for short journeys as well as on motorways.</p> <p>Causes and signs of fatigue: Sleep is a basic biological need, without enough sleep will experience fatigue. You can predict times where you are going to be most sleepy. Fatigue influenced by time of day (2am – 6am and 2pm-4pm), lack of or disturbed/short sleep, awake too long, irregular sleep patterns (shift workers), poor sleep (interruptions and sleep disorder), going against your body clock and time on task. Difficulty concentrating, yawning, heavy eyelids, eye's start to roll, nodding head are all signs that you're fatigued. It is not always possible to spot immediate sleep onset (and young drivers can find it difficult to spot drowsy driving), which can cause problems whilst driving, if you're already sleepy you are unlikely to be able to make good decisions in the moment, which is why planning is the best defence. We all have individual difference in our sleep needs. Know yourself and know your limits.</p> <p>The benefits of good sleep: Good mental and physical wellbeing. Short sleep durations are related to weight gain/obesity. A lack of sleep related to risk of illness which can have an adverse effect on appearance. Links have been between sleep and poor mental health, poor mood, decision making, reaction times, sports performance and exam performance. Impairment can happen from on-off sleep loss.</p>				

The social and legal consequences of driving sleepy: Whilst there isn't a specific offence of driving whilst tired, doing so significantly increases the chances of committing other offences or causing a collision. If convicted of death by dangerous driving, could be sentenced to up to 14 years in prison. Drivers are legally, socially and morally accountable for being fit and healthy when driving. Emphasis to be placed on anticipated regret if were drowsy or fell asleep at the wheel.

Avoid driver sleepiness by staying in control and alert: Make a commitment to not driver drowsy or fatigued. It need not be a risk that you accept taking. Driving is a situation worth changing/prioritising good sleep habits. Set a sleep target. Make time for sleep. Aim to get 7-8 hours sleep before driving the next day. Set good sleep habits. Have a regular bedtime, avoid screens late at night, avoid caffeine late at night and make sure sleeping space is comfortable. Work towards better sleep habits. Use sleep technology to monitor your progress and restructure the environment (i.e. reduce online gaming, or putting phone on charge outside of bedroom before brushing teeth. Ask friend or family member to act as buddy if struggling with managing sleep, or ask them to reinforce things (i.e., turning off TV if you are tempted to stay up late). Draw attention to attendees staying up late when they need to get up early the next day as incompatible with their belief that they are in control of their actions. Plan your journeys around your sleep needs. Sleepiness is predictable (it is a cycle). We also know when and in what circumstances fatigue increases and can plan around this. Tired people are less able to make an informed decision so need to take action before they are too tired to do so. Avoid night-time driving and avoid/carefully plan long journeys. Set a good example. Talk to your parents and sibling about getting good sleep habits in place. Be a good passenger. Encourage the driver to take a break and have a caffeinated drink. Challenge friends and family on their sleepy driving. Look out for somewhere to stop. Know what to do if you feel sleepy whilst driving. Take in some caffeine and have a nap (Caffeine then 20min nap), take breaks when driving on longer journeys (20 min every 2 hrs). Prompt audience to compare likely or possible outcomes if they do not stop for a break on long journeys. Check in with how you are feeling. Use the 'tiredness kills, take a break' signs as a cue to check in and assess your own sleepiness level. Know when it is time to stop driving. Reference that audience will be able to think of other challenges and barriers to meeting these goals (i.e. enjoy watching tv/socialising at night, not tired in evening). The workshop that follows this film will explore the challenges and limitations associated with taking these and other actions forward, given their particular relevance to you and will help you to develop your own action plans to help support your driving safety.

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control SN = Subjective norms

F.9 DriveFit content – Avoiding drink and drug impaired driving

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To inform the audience that being a passenger in an intoxicated driver's car or being intoxicated whilst driving is something under their control.	Drink and drug driving is avoidable and controllable	1. To recognise the impact that alcohol and drugs has on driving 2. To explain the social & legal consequences of drink and drug driving 3. To recognise how to avoid driving whilst intoxicated 4. To recognise how to avoid being a passenger of an intoxicated driver	1. To give examples of how to avoid being an intoxicated driver or a passenger of an intoxicated driver 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support driving and travelling with a driver who is fit to drive	1.2 – Problem solving 1.4 – Action planning 3.2 – Social support (Practical) 5.1 – Information on health consequences 5.3 – Information about the social and environmental consequences 6.3 – Information about others approval 9.1 – Credible source
<p>Speaker briefing:</p> <p>The impact that drink and drugs have on driving safety: It is an important issue to address. Drink and drug driving impairs driving performance, diverts attention and slows reactions, which can lead to loss of vehicle control. There are also longer term effects on driving (morning after for alcohol). It is not possible to say how much alcohol you can drink and stay below the limit. The way alcohol effects your body dependent on several factors (e.g., your weight, age, sex and metabolism (the rate your body uses energy), the type and amount of alcohol you're drinking, what you've eaten recently, your stress levels at the time. If you are driving it is best to have none for the road. Alcohol and drugs have a specific effect on young drivers due to their biology.</p> <p>The social and legal consequences of drink and drug driving: Drink and drug driving is not support by the public or by young people. Drink and drug driving attract penalties and fines. Drivers are legally, socially and morally accountable for being fit and healthy when driving. Emphasis issues of anticipated regret would feel if were involved in a collision because of impairment by drink or drugs.</p> <p>How to avoid driving whilst intoxicated: Commit to not consuming any intoxicating substance before driving. Commit to never driving for a social occasion where you think you might be tempted to take an intoxicating substance. Encourage a plan to get a taxi, take public transport or get lifts from parents and advise talking with parents about providing lifts for these occasions & calling a friend for support if they are tempted to drive. Also encourage to think about a recent social occasion they went to and how their plan would have worked. When the social get together is agreed is the cue/reminder of how to travel. Socialising with people that support and take part in impaired driving should be avoided. Commit to not having more than one alcoholic drink if you have to drive the following morning.</p>				

How to avoid being a passenger of a driver intoxicated by drink or drugs: Support friends not to consume any intoxicating substance if they are driving. Make a plan to support friends – find out if their friend is driving and challenge them if they consume substances which will affect their ability to drive. Look out for signs that they have been drinking – more talkative/relaxed, changes to reaction and co-ordination, more uninhibited, slurring speech, this is their cue to intervene. Draw attention to the fact that standing by and letting someone drive whilst intoxicated is incompatible with their belief that they are a good friend that looks after their mates. Refuse to travel as a passenger with a driver who is intoxicated. Make a plan not to get in a car as a passenger with a driver who is intoxicated by drink and drugs and make an exit plan to get out of a car if not feeling safe. Passengers are in control and can restore themselves to physical and emotional safety. Reference that audience will be able to think of other challenges and barriers to meeting these goals. Reference that audience will be able to think of other challenges and barriers to meeting these goals (i.e., willpower to stick with the decision, missing out on fun, reactions of friends, lack of alternatives). The workshop that follows this film will explore the challenges and limitations associated with taking these and other actions forward, given their particular relevance to you and will help you to develop your own action plans to help support your driving safety.

* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control SN = Subjective norms

F.10 DriveFit content – Managing speed

Overall purpose	Key message	Learning objectives		BCTs applied
		Film	Workshop	
To promote skilful drivers as being able to control their car within the speed limit	Selecting an appropriate speed and staying in control of speed is important and can be achieved with practice and planning.	1. To recognise the impact speeding has on driving safety 2. To explain the social & legal consequences of speeding whilst driving 3. To recognise how to stay in control of speed whilst driving	1. To give examples of how to take control of speed whilst driving 2. To evaluate barriers and facilitators to being able to take-action 3. To create an if-then plan to support being in control of speeding	1.4 – Action planning 5.1 – Information on health consequences 5.3 – Information about the social and environmental consequences 5.5 – Anticipated regret 6.1 – Demonstration of behaviour 6.3 – Information about others approval 9.1 – Credible source
Speaker briefing: The impact that speeding has on driving: This is an important issue to address given the injuries related to speeding. It is important to travel at the right speed for the conditions, within the speed limit gives people time and space to react to circumstances that appear on the road. Speeding means anything over the speed limit and just 1mph over the limit can make a big difference in a collision's outcomes. Emphasis that there are never conditions for speeding as non-extraordinary events, such as a tyre blow out can create a crash. Driving over the speed limit increases the chances of a collision and injuring self and other road users, impairs driving performance, makes it hard to detect hazards and puts pedestrians at risk. It is a high risk activity with multiple consequences such as loss of life, emotional impacts, stress and effect on wellbeing.				

The social and legal consequences of speeding whilst driving: Neither passengers nor bystanders appreciate speeding. Your driving style will be appreciated more by your passengers/partner if you stay in control of your speed. Speeding whilst driving is disapproved of by the police attracting penalties and fines. Impact of penalties given New Drivers Act would mean 6 penalty point limit and licence revoked, could lead to losing job, relationship, opportunities and control over own transport (needing to take lifts). Fine cost like working for free for the day. Outline police approach for enforcement (including dashcam) and Gov interest in reducing speeding to reduce collisions. Highlight embarrassment of being pulled over for speeding and having to admit this to significant others also unattractive damage to vehicles from collisions. Drivers are legally, socially and morally accountable for being fit and healthy when driving. Speeding contradicts the view they have of themselves being a considerate driver. Ask attendees to assess the degree of regret they would feel if they were involved in a collision because they were speeding.

How to stay in control of speed whilst driving: Control your car within the speed limit every time you drive. Develop a plan to avoid purposeful and accidental speeding. Could include using technology to help stay in control of speed (i.e., cruise control, speed limit, speed notifications via sat nav systems, readable digital speed displays, telematics insurances). Highlight that driving at the speed limit uses less fuel and is more relaxing. Encourage attendees that might seek to speed for fun, to seek other outlets to get their adrenaline pumping (i.e., high energy sports). Emotions have an impact on speed choice (i.e., frustration, anger and boredom). It is important not to drive whilst angry, or to pull over if get angry whilst driving to let the nervous system calm down and recover (deep breathing). Suggest healthier ways to maintain attention and interest whilst driving (e.g., listen to music). If running late ring ahead or stop at a safe place and do so enroute. Plan to leave enough time for the journey to take account of traffic and other unexpected delays, use a lower gear to reduced chance you'll speed, remind self that speeding does not save much time. It is a common feeling amongst new drivers to want to keep up with traffic. If you feel you are holding people up remember that you are a skilful driver in being able to control your car within the speed limit. It takes a lot more skill and discipline to stay within the speed limit than to let your impulses take over. If you receive pressure from passengers to drive faster, remember it is your car and your rules. You are in control of your own speed and have responsibility for keeping your passengers safe. Use your passengers to support you and ask them to point out if you are travelling too fast. It is important that you adjust your speed within the speed limit when you experience different driving conditions (i.e., weather or traffic). Use different conditions as your cue/reminder to adjust your speed. If there is snow, ice or heavy rain or heavy traffic then adjust your speed to give yourself more time to react and stay in control. If you are driving on a road with a limited sightline, then you should choose a lower speed to give yourself enough time to react to something unexpected. Monitor your speed frequently whilst driving. Pay close attention to your speed, particularly when the road environment or the speed limit changes. Digital speed limits can be easier to read, if you have the option of this in your car. If you're in a 30mph limit, staying in third gear can make it easier to drive within the limit. Failing to monitor driving speed is incompatible with your belief that you are a good, responsible and safe driver (Instruction on how to perform a behaviour. Manage your space on the road by leaving a two second gap to the car in front 'only a fool breaks the two second rule', which increases to 4 seconds if in heavy rain or similar conditions). Reference that audience will be able to think of other challenges and barriers to meeting these goals (i.e., accidental speed, enjoying driving fast, not knowing the speed limit, feeling overconfident in their abilities to manage at a higher speed). The workshop that follows this film will explore the challenges and limitations associated with taking these and other actions forward, given their particular relevance to you and will help you to develop your own action plans to help support your driving safety.

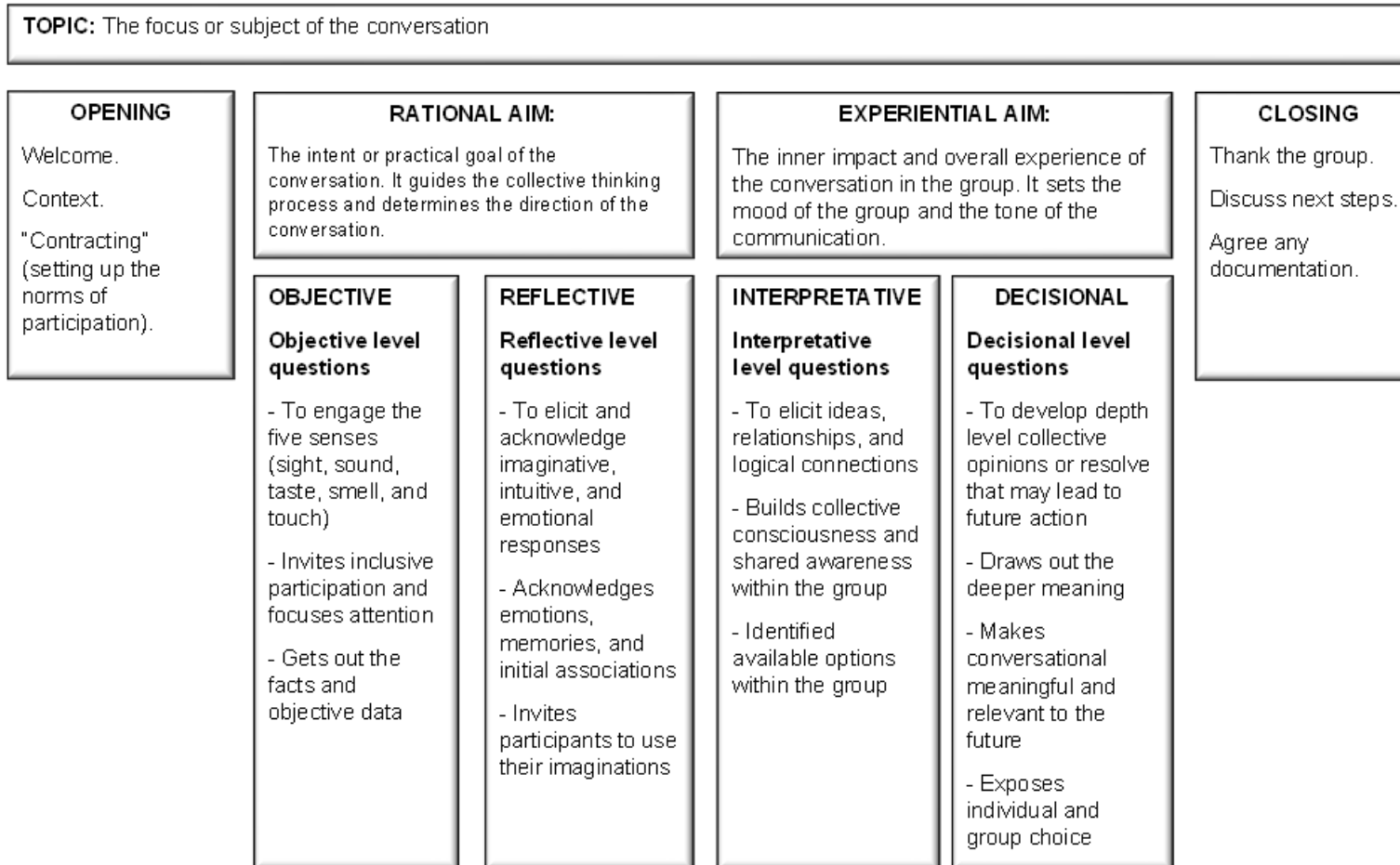
* KNW = Knowledge, RSK = Risk Perception, ATT = Attitudes CMP = Comprehension, EVL = Evaluation, SYN = Synthesis, PBC = Perceived Behavioural Control SN = Subjective norms

F.11 Behaviour Change Techniques employed within the DriveFit film

BCT	DE	HP	VIC	MOB	PASS	FTG	DDD	SPD	TOTAL topics employing BCT
1.1 Goal Setting (behaviour)									4
1.2 Problem solving									7
1.4 Action planning									7
1.9 Commitment									1
2.3 Self-monitoring of behaviour									1
3.1 Social support (unspecified)									2
3.2 Social support (practical)									4
4.1 Instruction on how to perform the behaviour									1
4.2 Information about antecedents									1
5.1 Information about health consequences									8
5.3 Information about social and environmental consequences									6
5.5 Anticipated regret									1
6.1 Demonstration of the behaviour									4
6.3 Information about others approval									2
7.1 Prompts/cues									1
9.1 Credible source									8
TOTAL BCTs per topic	9	6	6	8	5	10	7	7	

Nb. DE = Driving experience, HP = Hazard perception, VIC = Vehicle & insurance choices, MOB = Mobile phone use, PASS = Passengers, FTG = Fatigue, DDD = Drink & Drug Driving, SPD = Speed

F.12 Focused Conversation Method Structure



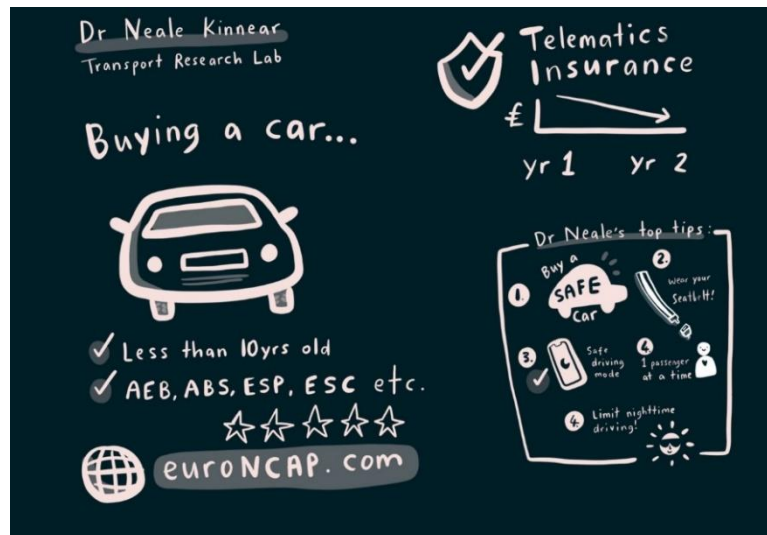
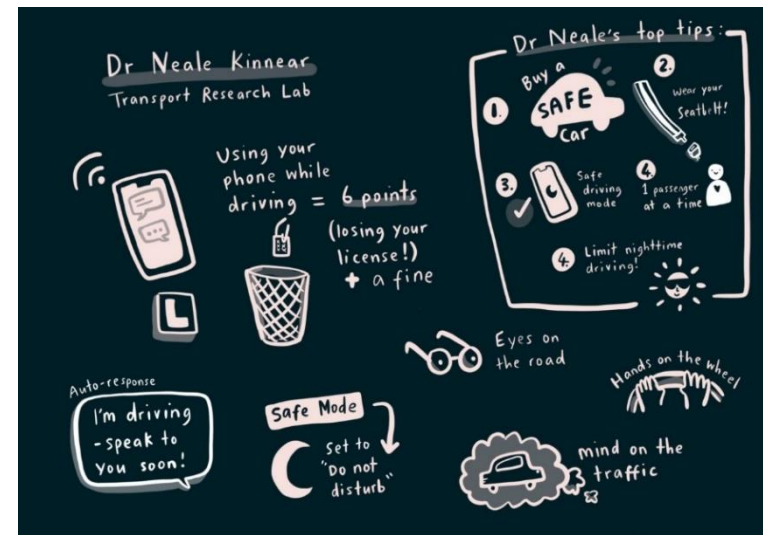
Source: (ICA-UK, 2014, p.19) <https://ica-uk.org.uk/wp-content/uploads/2020/04/Focused-Conversation-Overview.pdf>

F.13 DriveFit workshop protocol

Session	Time	Facilitation objectives	Mentimeter slide details
Welcome & introductions	4 mins	Welcome attendees & inform them of how the session will run.	[DriveFit logo] Our session today <ol style="list-style-type: none"> 1. Introduction and warm-up 2. Remembering and reviewing the DriveFit film 3. Personal action planning 4. Summary, close and survey [nb. thumbs up and heart emojis available on all screens for students to interact with]
Warm-up	3 mins	To enable participants to become familiar with the interactive polling software and to enable the facilitator to have an understanding of whether participants are learning to drive.	Survey question: Are you already driving or do you plan to learn to drive? Options: Yes, I am currently learning/driving; Yes, in the next 12 months; Yes, in the next couple of years; Maybe at some point; No never Results display: Bar chart
Reviewing the DriveFit film	10 mins	To enable to participants to remember the DriveFit film (Objective Question)	Survey question: What one thing do you remember the most from the DriveFit film? Options: Open text Results display: Word cloud
			Facilitator led discussion: Review of the key themes from the DriveFit film using an illustration from the film [See end of this table]
	10 mins	To enable the participants to reflect on whether they would be able to take part in the safety promoting actions promoted in	Group discussion: In pairs or threes chat with your fellow students... - Which of the key themes of the film stood out the most for you and why? Survey question: How easy or difficult would you find it to... Matrix response: Get the recommended hours practice whilst learning to drive. Do regular hazard perception training and practice. Have access to a vehicle that is 10 years old or less. Manage mobile phone use in the car.

Session	Time	Facilitation objectives	Mentimeter slide details
Reviewing the DriveFit film cont...		the DriveFit film (Reflective Question)	Manage passengers in the car. Manage tiredness whilst travelling as a driver or passenger. Manage my driving speed Not drive as, or travel with, an intoxicated driver [Scale options Easy – Difficult 5-point scale]
		To enable participants to explore the significance of discussed situations for them personally (Interpretive Question)	Group discussion: Chat with your fellow students in pairs or threes. Which of the situations you scored easy or difficult to deal with do you think you are most likely to find yourself in? For examples driving over the speed limit?
Personal Action Planning	10 mins	To enable participants to explore what should be done and next steps (Decisional question)	<p>Individual activity: Using the situations you said you would most likely find yourself in...</p> <ul style="list-style-type: none"> - What can you personally do, what action(s) could you take? - What might get in the way (barriers)? - Was there something from the film you remember that could help? - Using the if xxxxx happens, then xxxxx - Capture these in your DriveFit booklets first <p>Worked example to support activity: If, then example(s): If I am tempted to speed when I am late or in a hurry to get somewhere then I will remind myself that I am not actually saving much time by speeding If I have been driving for 2 hours then I will stop for at least a 20 minute break</p> <p>For more if, then examples scan the QR code provided or this URL: www.bit.ly/3xfjDt5 . Scan read & add 2 or 3 new statements.</p>
Workshop summary and close	8 mins	To recap on the workshop, summarise key points, thank participants and ask them to complete the online survey.	<p>Thank you</p> <p>Now we would like you to do a quick survey, here is the link that you need for the survey [Link provided] or use the QR code to access the survey</p>

F.14 DriveFit content – Graphic illustrations





F.15 Student survey questions – DriveFit film pilot

No.	Question	Response options
Informed consent statement		
<p>Aim: To explore young people's responses to the DriveFit intervention</p> <p>This survey is part of a programme of research which aims to explore young people's attitudes to road safety. The survey will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety. I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me and I have read the student information sheet, which I may keep for my records. I understand this will involve taking part in completing up to two surveys and taking part in a focus group to provide my views on the DriveFit programme (film, online workshop and website), which forms the pilot study for this research.</p> <p>This information will be held and processed for the following purpose(s): To explore young people's responses to the DriveFit programme.</p> <p>Upon taking part in the research I understand that I can, if I wish, withdraw my data within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. I understand that this anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols. I understand that any information I provide is confidential and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.</p> <p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project and that I can withdraw my data within 2 months of the date of completing the first survey without being penalized or disadvantaged in any way. I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act. I agree to take part in the above study.</p> <p>If you would like to contact the PhD Student who is running the study to discuss this research, please e-mail Elizabeth Box (e.box@cranfield.ac.uk). If you have detailed questions about the processing of your data by Cranfield University please email gdpr@cranfield.ac.uk. Please note that whilst this survey has been optimised for mobile device display, it will be best displayed on a laptop or desktop computer.</p> <ul style="list-style-type: none"> ○ I consent to take part in the survey ○ I do not consent, I do not wish to participate 		
About you		
Q1	What gender do you identify as?	Male, Female, Non-binary, Prefer not to say
Q2	How old are you?	15, 16, 17, 18, 19
Q3	What is your ethnic group	White; Mixed or multiple ethnic groups; Asian or Asian British; Black, African, Caribbean or Black British; Other ethnic group; Prefer not to say

No.	Question	Response options
Q3a	[Further segmentation of ethnic groups]	[Further segmentation of ethnic groups as asked by Census]
Q4	What is the name of your school/college	[Selection of two school/colleges involved in piloting]
Q5	What year group are you in?	Year 12, Year 13, Other (Please state)
Q6	What is your name?	First name, surname
Q7	Do you plan to learn to drive?	Yes, I have already passed my driving test (Please state MM/YYYY of test pass); Yes, I am currently learning; Yes, in the next 12 months; Yes, in the next 5 years; Maybe, at some point; No, never.
Your views on the DriveFit film and website		
Q8	To what extent do you agree or disagree with the following statement: 'The film kept my attention'	Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree
Q8a	[If agree with Q8] What about the film kept your attention?	[Open text response]
Q8b	[If disagree with Q8] Why do you think the film did not keep your attention?	[Open text response]
Q9	To what extent do you agree or disagree that the film you just watched was...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Amusing, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q10	What did you like about the DriveFit film?	[Open text response]
Q11	What did you dislike about the DriveFit film?	[Open text response]
Q12	Please indicate the extent to which you agree or disagree with the following statements about the film you have seen	Matrix response: I feel I have benefited from watching this film I am now more aware of my responsibilities as a driver/future driver I am now more aware of my responsibilities as a passenger The film has changed how I think about being a driver I plan to take the learning from the film and apply it to how I behave as a driver/future driver [Strongly agree – Strongly disagree] [5-point scale]
Q13	A DriveFit website is being developed for the DriveFit programme. Which, if any, of the following content do you think should be included on the DriveFit website? (Please select all that apply)	DriveFit video clips; Links to other websites providing relevant information (e.g., car safety star ratings); illustrations from the DriveFit film; hints and tips for travelling safely; Quizzes to help inform you decision making; Prompts and planners to support your goal setting; None of the above; Other (please specify)

No.	Question	Response options
Q14	Please indicate the extent to which you agree or disagree with the following statements about your planned use of the DriveFit website	Matrix response: I would visit the DriveFit website at least once; I expect to visit the DriveFit website more than once; I would share the DriveFit website with my parents/guardians; I would share the DriveFit website with my friends; I would share information about the DriveFit website via social media [Strongly agree – Strongly disagree] [5-point scale]
Q15	If you have any further comments to make about the DriveFit film or the planned DriveFit website please write them here	[Open text response]
Thank you for taking part in this survey.		
You can find the information sheet about this study at the following link , should you wish to keep this for your records		

F.16 Student survey questions – DriveFit workshop pilot

No.	Question	Response options
About you		
Q1	What is the name of your school/college	[Selection of two school/colleges involved in piloting]
Q2	What is your name?	First name, surname
Your views on the DriveFit workshop and website		
Q3	To what extent do you agree or disagree that the workshop you have just taken part in was...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Amusing, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q4	To what extent do you agree or disagree with the following statement: 'The workshop kept my attention'	Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree
Q4a	[If agree with Q4] What about the workshop kept your attention?	[Open text response]
Q4b	[If disagree with Q4] Why do you think the workshop did not keep your attention?	[Open text response]
Q5	To what extent do you agree or disagree that the workshop you have taken part in...	Matrix response: Has provided you with new insights Has been beneficial to you personally Has covered ideas that you see yourself doing

No.	Question	Response options
Q5. cont...		Has highlighted changes that you need to make Will make a difference to your decisions and behaviours as a driver or passenger [Strongly agree – Strongly disagree] [5-point scale]
Q6	What did you like about the DriveFit workshop?	[Open text response]
Q7	What did you dislike about the DriveFit workshop?	[Open text response]
Q8	Was there anything discussed in the DriveFit workshop that you would like to see included on the DriveFit website?	[Open text response]
Q9	On a scale of 1-10, how would you rate the...	Matrix response: DriveFit film DriveFit workshop DriveFit Film & workshop combined [1 = Poor, 10 = Excellent]
Q10	If you have any further comments to make about the DriveFit workshop or the overall DriveFit programme (film and workshop) Please write them below	[Open text response]
Q11	Would you like to take part in a focus group, run by the DriveFit researcher, to discuss your views and experiences of the DriveFit programme?	Yes, No
Thank you for taking part in this survey.		
You can find the information sheet about this study at the following link , should you wish to keep this for your records		

F.17 Teacher survey questions – DriveFit film pilot

No.	Question	Response options
About your students		
Q1	What is the name of your school/college?	[Choice text]
Q2	What courses are your students taking?	Academic (i.e., A levels), Vocational (i.e., BTEC), Academic and Vocational, Other (Please state) [Open text]
Q3	To your knowledge, has your class received any other road safety education over the past 6 months?	Yes, No, Don't know
Q3a	What road safety education have they received in the past 6 months?	[Open text response]
Q4	How many students have watched the film today?	[Open text response]
Your views on pilot study information and set up		
Q5	How easy did you find it to access and play the DriveFit film in your class?	Very easy – Not at all easy [5-point scale]
Q6	To what extent do you agree or disagree with the following statement 'The information provided ahead of the delivery of the DriveFit film was clear and easy to understand'	Strongly agree – strongly disagree [5-point scale]
Q7	To what extent do you agree or disagree with the following statement: 'Students were able to fill in their post-film online questionnaires without any difficulty'	Strongly agree – Strongly disagree [5-point scale]
Q8	Please provide any further comments below on improvements which could be made to support the delivery of the DriveFit film	[Open text response]
Your views on the DriveFit film		
Q9	To what extent do you agree or disagree that your students found the DriveFit film...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Fun, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]

No.	Question	Response options
Q10	On a scale of 1-10 to what extent did the film hold the class's attention?	Dial option: 0 = did not hold class's attention at all; 10 = Maintained very high levels of attention
Q10a	Please provide comments on the attention level of the class and how the film could be improved to increase attention and engagement?	[Open text response]
Q11	To what extent were the information, hints and tip(s) provided in the film pitched at the right level for your students?	[Very much so – Not at all] [7-point scale]
Q12	Are there any improvements that could be made to the film to increase accessibility and inclusivity, particularly for SEN students?	[Open text response]
Q13	What aspects of the curriculum (if any) does the DriveFit film help fulfil for this age group	[Open text response]
Q14	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit workshop	Matrix response: I feel that my students have benefited from watching this film I think my students are more aware of their responsibilities as drivers/future drivers I think my students are more aware of their responsibilities as passengers I think that the learning from the workshop will help support safer behaviours amongst my students I would recommend the DriveFit film to my colleagues I would support disseminating information about the DriveFit programme to parents/guardians
Q15	If you have any further comments to make about the DriveFit workshop please write them below	[Open text response]

F.18 Teacher survey questions – DriveFit workshop pilot

No.	Question	Response options
About your students		
Q1	What is the name of your school/college?	[Open text response]
Your views on pilot study information and set up		
Q2	How easy did you find it to set up and support the running of the DriveFit workshop in your class	[Very easy – Not at all easy] [5-point scale]
Q3	To what extent do you agree or disagree with the following statement: “The information provided ahead of the delivery of the DriveFit workshop was clear and easy to understand”	[Strongly agree – Strongly disagree] [5-point scale]
Q4	To what extent do you agree or disagree with the following statement: “Students were able to fill in their post-workshop online questionnaires without any difficulty”	[Strongly agree – Strongly disagree] [5-point scale]
Q5	Please provide any further comments below on improvements that could be made to supporting the delivery of the DriveFit workshop	[Open text response]
Your views on the DriveFit workshop		
Q6	To what extent do you agree or disagree that your students found the DriveFit workshop...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Fun, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q7	On a scale of 1-10 to what extent did the workshop hold the class's attention?	Dial option: 0 = did not hold class's attention at all; 10 = Maintained very high levels of attention
Q7a	Please provide comments on the attention level of the class and how the workshop could be improved to increase attention and engagement?	[Open text response]
Q8	To what extent were the exercises provided in the workshop pitched at the right level for your students?	[Very much so – Not at all] [7-point scale]
Q9	Are there any improvements that could be made to the workshop to increase accessibility and inclusivity, particularly for SEN students?	[Open text response]

No.	Question	Response options
Q10	What aspects of the curriculum (if any) does the DriveFit workshop help fulfil for this age group	[Open text response]
Q11	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit workshop	Matrix response: I feel that my students have benefited from taking part in the DriveFit workshop I think that the learning from the workshop will help support safer behaviours amongst my students I would recommend the DriveFit workshop to my colleagues I would support disseminating information about the DriveFit programme (film & workshop) to parents/guardians
Q12	If you have any further comments to make about the DriveFit workshop please write them below	[Open text response]
Your views on the DriveFit programme (Film & workshop)		
Q13	On a scale of 1-10, how would you rate the...	Matrix response: DriveFit Film DriveFit workshop DriveFit Film & Workshop combined
Q14	What do you like and/or dislike about the DriveFit programme as a whole?	[Open text response]

F.19 DriveFit pilot survey results

F.19.1 DriveFit film pilot - Student survey responses

Table F.19.1-1 Demographics and driving stage of survey respondents (*n* = 75)

Age (SD)		16.76 (0.63)
Gender	Male (%)	13.3%
	Female (%)	77.3%
	Non-binary (%)	2.7%
	Prefer not to say (%)	6.7%
Driving stage	Passed or currently learning (%)	36.0%
	Learning in the next 12 mnths – 5 yrs (%)	42.7%
	Maybe learning at some point / never learning (%)	5.3%
	Not stated (%)	16.0%
	Not stated (%)	2.7%
Ethnicity	White (%)	72.0%
	Non-white (%)	22.7%
	Not known (%)	5.3%
School	School 1 (%)	25.3%
	School 2 (%)	70.7%
	Not known (%)	4.0%
Year group	Year 12 (%)	36%
	Year 13 (%)	61.3%
	Not known (%)	2.7%

Table F.19.1-2 Student reasons for agreeing or disagreeing that the DriveFit film kept their attention (*n* = 29)*

Q. What about the film did/did not keep your attention?

Reasons given for film keeping attention (<i>n</i> = 13)	<i>n</i>	Reasons given for film not keeping attention (<i>n</i> = 16)	<i>n</i>
Tips and topics discussed	4	Not very engaging	8
Contains good and important information	3	Boring	7
Hazard perception demonstration video	3	Too long	5
Interviews	1	Repetitive	4
Role play	1	Lack of information provided	2
Graphical pictures	1	Lack of diverse speakers in the film	1
		Too conversation heavy	1
		Not interesting	1
		Not exciting	1

* Nb. Open text responses coded into multiple categories if required

Table F.19.1-3 Student reasons for liking ($n = 52$) or disliking ($n = 49$) the DriveFit film

Reasons given for liking the film	<i>n</i>	Reasons given for disliking the film	<i>n</i>
Film provides a lot of information	26	Film was boring	15
Film provides facts	5	Film was too long	7
Film provides hints and tips	4	Film was not engaging	6
Nothing	4	Film was not interesting	6
Variety of information provided	3	Film did not keep their attention	6
VR demonstration	3	Too much talking	5
Interviews	2	Repetitive	3
Illustrations	2	Nothing	3
Easy to understand	2	Too many topics	2
Well structured	1	No interaction	2
		Too slow	1
		Everything	1
		Drawings	1
		Didn't address distracted driving	1

* Nb. Open text responses coded into multiple categories if required

Table F.19.1-4 Cognitive and emotional response to DriveFit film ($n = 61$)

Q. To what extent do you agree or disagree that the film you just watched was...

Response	Mean (SE)
Important	1.85 (0.08)
Informative	2.03 (0.09)
Credible	2.18 (0.09)
Useful	2.18 (0.11)
Boring	2.39 (0.14)
Worrying	3.33 (0.11)
Interesting	3.33 (0.14)
Shocking	3.41 (0.11)
Surprising	3.41 (0.13)
Enjoyable	3.62 (0.12)
Frightening	3.69 (0.12)
Amusing	3.72 (0.11)

Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

Table F.19.1-5 Student assessed effect of the DriveFit film ($n = 61$)

Q. Please indicate the extent to which you agree or disagree with the following statements about the film you have seen...

Response	Mean (SE)
I plan to take the learning from the film and apply it to how I behave as a driver/future driver	2.28 (0.08)
I am now more aware of my responsibilities as a passenger	2.38 (0.12)
I am now more aware of my responsibilities as a driver/future driver	2.43 (0.12)
I feel I have benefited from watching this film	2.67 (0.13)
The film has changed how I think about being a driver	3.02 (0.14)

Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

Table F.19.1-6 Content for inclusion on DriveFit website (*n* = 53)

Q. A DriveFit website is being developed for the DriveFit programme. Which, if any, of the following content do you think should be included on the DriveFit website? (Please select all that apply)

Response	Frequency*
Hints and tips for travelling safely	36
DriveFit video clips	33
Quizzes to help inform your decision making	31
Illustrations from the DriveFit film	24
Links to other websites providing relevant information (e.g., car safety star ratings)	21
Prompts and planners to support your goal setting	18
None of the above	0
Other	0

* Nb. multiple answers per respondent could be provided to this question

Table F.19.1-7: Student planned use of DriveFit website (*n* = 61)

Response	Mean (SE)
I would visit the DriveFit website at least once	2.91 (0.13)
I would share the DriveFit website with my parents/guardians	2.97 (0.13)
I would share the DriveFit website with my friends	3.10 (0.13)
I expect to visit the DriveFit website more than once	3.34 (0.13)
I would share information about the DriveFit website via social media	3.56 (0.12)

Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

F.19.2 DriveFit workshop pilot – Student survey responses

Table F.19.2-1 Student reasons for agreeing or disagreeing that the DriveFit workshop kept their attention*

Q. What about the film did/did not keep your attention?

Reasons given for workshop keeping attention (<i>n</i> = 26)	<i>n</i>	Reasons given for workshop not keeping attention (<i>n</i> = 4)	<i>n</i>
Interactive tasks (i.e., polling, discussions and if-then activities)	15	Boring	3
Useful presentation of information	7	Repetitive	1
Engagement with the presenter	3	Uninteresting	1
Booklets and illustrations provided	2	Technical issues experienced	1
Fast pace of workshop	1		

* Nb. Open text responses coded into multiple categories if required

Table F.19.2-2 Student reasons for liking or disliking the DriveFit workshop

Reasons given for liking the workshop (<i>n</i> = 40)	<i>n</i>	Reasons given for disliking the workshop (<i>n</i> = 38)	<i>n</i>
Activities	11	Nothing	12
New information and advice	7	Too long	7
Interactivity	5	Boring	5
Informative nature	5	Activities not fun	3
Nothing	4	Not appealing	3
Entertaining	2	Repetitive	3
Interesting	2	No new information	2
Encouraged thought	2	Technical issues	2
Engaging	1	Not personalised to student	1
Good pace	1	Not relevant	1
Presenter	1		
Relevant	1		
Important	1		

* Nb. Open text responses coded into multiple categories if required

Table F.19.2-3 Cognitive and emotional response to DriveFit workshop (*n* = 50)

Q. To what extent do you agree or disagree that the workshop you have just taken part in was...

Response	Mean (SE)
Important	1.74 (0.09)
Credible	1.86 (0.10)
Informative	1.88 (0.09)
Useful	2.00 (0.09)
Interesting	2.44 (0.14)
Enjoyable	2.76 (0.15)
Amusing	2.86 (0.11)
Surprising	2.92 (0.14)
Boring	3.18 (0.14)
Shocking	3.34 (0.15)
Worrying	3.60 (0.15)
Frightening	3.86 (0.12)

Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

Table F.19.2-4 Student rated effect of the workshop (*n* = 47)

Q. To what extent do you agree or disagree that the workshop you have just taken part in...

Response	Mean (SE)
Will make a difference to your decisions and behaviours as a driver or passenger	2.53 (0.15)
Has covered ideas that you see yourself doing	2.53 (0.16)
Has provided you with new insights	2.55 (0.14)
Has been beneficial to you personally	2.64 (0.16)
Has highlighted changes that you need to make	3.00 (0.16)

Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

Table F.19.2-5 Content for inclusion on DriveFit website (*n* = 27)

Q. Was there anything discussed in the DriveFit workshop that you would like to see included on the DriveFit website?

Response	Frequency
No information from workshops needed	21
Information discussed in the workshop (i.e., hours of lessons required before taking the test)	3
No additional information needed	2
Fun educational activities to do	1

Table F.19.2-6 Overall student rating for the DriveFit programme (*n* = 47)

Q. On a scale of 1-10, how would you rate the...

Response	Mean (SE)
DriveFit film and workshop combined	6.79 (0.31)
DriveFit workshop	6.68 (0.29)
DriveFit film	5.64 (0.37)

Nb. Scale 1 = Poor, 10 = Excellent

F.19.3 DriveFit film and workshop pilot – Teacher survey responses

Table F.19.3-1 Teacher assessment of DriveFit film and workshop components (*n* = 1)

Component	Agreement	Disagreement
Film & workshop	Credible Useful Important Boring	Interesting Shocking Worrying Frightening
Film only	Informative	Enjoyable Amusing
Workshop only	Enjoyable	n.a.

Appendix G – Paper 7 appendices

G.1 DriveFit trial School/College recruitment information



Invitation to take part in a national research programme

Dear Senior Management Team and/or Year 12 & Year 13 Teacher/Tutors,

- Your school/college is being invited to take part in a national programme of research which will influence pre-driver education delivery across the UK from 2022 onwards;
- Participating schools/colleges who successfully complete the study will be gifted a £200 contribution towards their school/college funds;
- Information about what is involved in taking part is provided in this letter. A more detailed explanation of the study can be found in the school/college [study information sheet](#) and in a [recorded explanation of the trial](#) from the study researcher;
- To confirm whether your school/college would like to take part, please complete this short [online response form](#) or contact the Devon study co-ordinator Annabelle Priest (annabellepriest@dsfire.gov.uk).

Your school/college is being invited to take part in a national programme of research, which aims to establish the best way to use pre-driver education to support young and novice driver safety. Participating schools/colleges in Devon who successfully complete the study will be gifted a £200 contribution towards their school/college funds as a thank you for taking part in this research study of national importance.

Currently around one in ten newly qualified drivers have a collision in their first six months of solo driving. This [pre-driver theatre and workshop education research \(PdTWER\)](#) programme seeks to help pre-drivers develop effective strategies for coping with road related risk.

The research is being funded by the [UK Department for Transport](#), [the Road Safety Trust](#), [the RAC Foundation](#), [the National Fire Chiefs Council](#), [Road Safety GB](#) and [Kent Fire and Rescue Service](#) and is being run by Elizabeth Box, [Head of Research at the RAC Foundation](#) and [Doctoral Researcher at Cranfield University](#) with support from [Devon and Somerset Fire and Rescue Service](#) and [Surrey Fire and Rescue Service](#). Once the research is complete, it is expected that this programme will be rolled out to all schools across the UK from Autumn 2022.

What is involved in taking part

Schools/colleges who agree to be involved in this programme of research will be randomly assigned to one of two trial conditions:

- **PdTWER programme:** Three year 12 and/or year 13 classes to complete three surveys and be provided with the PdTWER programme in November 21; or
- **Control Group:** Three year 12 and/or year 13 classes to complete three surveys and receive the PdTWER film for watching from mid-January 22.

There is a 50:50 chance of your school/college being asked to take part in the programme or control condition. Both groups are vitally important for the study, as without the control group, we will not know if the programme is improving the safety of young and novice drivers.

If your school/college is assigned the programme condition you will be asked to make two 60min lesson slots available over a two week period in November 21 for three of your year 12 and/or year 13 classes to take part in. A weblink will be provided for a 45 minute film to be shown to the classes for lesson 1, and a facilitated online workshop, requiring individual student access to computers which can interact in a Zoom call, will be provided for lesson 2. All other year 12 and year 13 classes in the intervention school/college are welcome to watch the film in November 21 at a convenient time and will not be required to take part in a workshop or online surveys.

If your school/college is assigned to the control group, three year 12 and/or year 13 classes will be asked to complete three surveys and will be provided the film to watch from mid-January 22 without any further surveys required. All other year 12 and year 13 classes in your school/college who were not involved in the control surveys will also be able to watch the film from mid-January 22, without needing to fill in any online surveys.

Students from the three classes in the programme and control conditions will be asked to fill in the three surveys between the following dates:

1st survey	Mon 20 th Sept 21 – Fri 1 st Oct 21
2nd survey	Mon 8 th Nov 21 – Fri 3 rd Dec 21
3rd survey	Mon 3 rd Jan 22 – Fri 14 th Jan 22

The surveys will be provided through an online link, each of which will take no longer than 10 minutes to complete. The first survey will include a student information sheet and consent form, which will inform students how their data will be collected and stored as part of the project. It will also inform students that their participation in the surveys is voluntary and that they can, if they wish, decide not to complete the surveys, without being penalized or disadvantaged in any way. It is important that time is made available within school hours for students to complete these surveys on their mobile devices.

How to sign up to take part

If you would like to take part in this study, please select whether you would like to take part in group 1 or 2, based on the timescales provided below.

Group 1	Lesson 1 (1hr)	Mon 1 st Nov 21 – Fri 5 th Nov 21
	Lesson 2 (1hr)	Mon 8 th Nov 21 – Fri 19 th Nov 21
Group 2	Lesson 1 (1hr)	Mon 15 th Nov 21 – Fri 19 th Nov 21
	Lesson 2 (1hr)	Mon 22 nd Nov 21 – Fri 3 rd Dec 21

Please fill out the following [online response form](#) to confirm whether your school/college would like to take part, and if so which group you would like to take part in. If you have any queries or would prefer to email your response, please contact annabellepriest@dsfire.gov.uk.

Once you have signed up to be involved in the trial, please block out some time in the weeks outlined for the trial to be delivered. The project team will be in touch w/c 4th October 21, once your school/college has been randomly assigned a group, to confirm dates and times for these lessons to take place. If your school is in the control group, you will not need to make time in November for the lessons and the film link will be made available to you from mid-January 22.

Further information

For more information about the trial please see the [study information sheet](#), which outlines how the study will be conducted and how data from the project will be handled. You can also [watch a short video recorded by Elizabeth Box](#), the Principal Investigator for this project, who outlines the purpose of the research, what is involved in taking part and how to sign up to the trial. If you have any further questions, please contact the Devon study co-ordinator Annabelle Priest annabellepriest@dsfire.gov.uk. Thank you for taking the time to consider your schools/college involvement in this research. We look forward to hearing from you.

Elizabeth Box
Head of Research – RAC Foundation | Doctoral Researcher – Cranfield University



Pre-driver theatre & workshop education research

Your school/college is being invited to take part in this study

This is a national programme of research which is being supported by the UK Department for Transport, the National Fire Chiefs Council and other UK road safety charities and NGOs.

The main aim of this study is to improve the safety of young and novice drivers. The delivery of this trial is due to take place between November 21 and January 22.

1. Why is this research taking place?

Newly qualified young drivers are at a higher-risk of death or serious injury within the first year of passing their driving test. Pre-driver education is currently delivered throughout the UK. This study is investigating how pre-driver education can improve young driver's ability to cope with road related risk.

2. Why are we being asked to take part?

You are being invited to take part in this research as a provider of 16-18 year old education in your county. Devon and Somerset Fire and Rescue Service are assisting with delivering this national level research which is taking place across three counties in England.

3. What are the benefits of taking part?

In agreeing to support this trial at your school/college you will be helping policy makers and delivers in the UK and further afield better understand young people's attitudes to road safety and how pre-driver education can help reduce the risks experienced by young and novice drivers. Any learning from this study will directly influence the future delivery of similar interventions across the UK. Schools/colleges who successful complete the study will be gifted a £200 contribution towards their school/college funds as a thank you for taking part in this research study of national importance.

Contents

1. Why is this research taking place?
2. Why are we being asked to take part?
3. What are the benefits of taking part?
4. What is involved in taking part?
5. Are there any risks with taking part?
6. Who is delivering & funding the research?
7. What happens next?

How to contact us

If you have any questions about this study, please contact: **Annabelle Priest**, Road Safety Team, Devon & Somerset Fire & Rescue Service

annabellepriest@dsfire.gov.uk

4. What is involved in taking part?

Schools/colleges who agree to be involved in the trial will be randomly assigned to one of two trial conditions: Programme (provided with the PdTWER programme) or control (Carry on as normal, receiving the programme film in mid-January 22).

There is a 50:50 chance of your school/college being asked to take part in the programme or control condition. Both groups are vitally important for the study, as without the control group, we will not know if the programme is improving the safety of young and novice drivers.

If your school is assigned the programme condition you will be asked to make two 45-60min lesson slots available over a two week period in November 21 for three of your year 12 and/or year 13 classes to take part in the programme. A weblink with a 45 minute film will be provided to be shown to the classes for lesson 1, and a facilitated online workshop, requiring individual student access to computers which can interact in a Zoom call, will be provided for lesson 2.

Students in both programme and control conditions will be asked to fill in three questionnaires across a 6 week period, using an online link, each of which will take no longer than 10 minutes to complete. The first survey will include a student information sheet and consent form, which will inform students how their data will be collected and stored as part of the project. It will also inform students that their participation in the surveys is voluntary and that they can, if they wish, refuse to take part, without being penalized or disadvantaged in any way.

5. Are there any risks with taking part?

All the information students provide within the surveys is confidential, and no information that could lead to the identification of any individual

will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The research has received ethical approval from the Cranfield University Research Ethics Board (CURES/3733/2018).

Students may request to withdraw their data from this research project within 2 months of completing their first survey, after which time it will be anonymised and cannot be accessed.

All data will be stored securely on Cranfield University file servers. Only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion.

6. Who is delivering & funding the research?

[Elizabeth Box](#), PhD Research Student at [Cranfield University](#) is delivering the research with the support of [Kent Fire and Rescue Service](#), [Devon and Somerset Fire and Rescue Service](#) and [Surrey Fire and Rescue Service](#). The National Fire Chiefs Council are providing the project management support for the work. [The Department for Transport](#), [the Road Safety Trust](#), [RAC Foundation](#), [National Fire Chiefs Council](#), [Kent Fire and Rescue Service](#) and [Road Safety GB](#) are jointly funding the research work being conducted for this PhD research.

7. What happens next?

If you would like your school/college to take part in this research, please fill out the following [online response form](#) or contact annabellepriest@dsfire.gov.uk to inform the project team of your decision, who will be in touch in early September 21 to discuss next steps.

G.2 Power Analysis

Means – Sample Size/Clustered

Compare the mean of a continuous measurement in two samples. This calculator determines sample size given clinically significant effect size and allows for clustered sampling. Although the t-test will be used to compare the means, this calculator approximates the t-statistic with the z-statistic.

Instructions: Enter parameters in the red cells. Answers will appear in blue below.

Step 1: Calculate sample sizes without adjustment for clustering

α (two-tailed) =	<input type="text" value="0.050"/>	Threshold probability for rejecting the null hypothesis. Type I error rate.
β =	<input type="text" value="0.200"/>	Probability of failing to reject the null hypothesis under the alternative hypothesis. Type II error rate.
q_1 =	<input type="text" value="0.500"/>	Proportion of subjects that are in Group 1 (exposed)
q_0 =	<input type="text" value="0.500"/>	Proportion of subjects that are in Group 0 (unexposed); $1 - q_1$
E =	<input type="text" value="0.250"/>	Effect size
S =	<input type="text" value="1.100"/>	Standard deviation of the outcome in the population

Calculate

The standard normal deviate for $\alpha = Z_\alpha = 1.960$

The standard normal deviate for $\beta = Z_\beta = 0.842$

$A = (1/q_1 + 1/q_0) = 4.000$

$B = (Z_\alpha + Z_\beta)^2 = 7.849$

Standardized Effect Size = $(E/S) = 0.227$

Without correction for clustering:

Total group size = $N_{\text{total}} = AB/(E/S)^2 = 607.82$

N_1 : 304

N_0 : 304

N_{total} : 608

b. Fixed cluster size

With a fixed cluster size, ρ can take any value between 0 and 1.

$N_{\text{total}} =$	607.82	Total group size (without adjustment)
$q_1 =$	0.500	Proportion of subjects that are in Group 1 (exposed)
$m =$	<input type="text" value="60"/>	Cluster size
$\rho =$	<input type="text" value="0.05"/>	Within-cluster correlation coefficient (must be greater than 0 and no greater than 1)

Calculate

$$\text{Design Effect} = 1 + (\rho(m-1)) = 3.95$$

$$\text{Clusters in Group 1} = C_1 = N_{\text{total}} * \text{Design Effect} * q_1 / m = 20.01, \text{ rounded to } 20$$

$$\text{Clusters in Group 0} = C_0 = N_{\text{total}} * \text{Design Effect} * q_0 / m = 20.01, \text{ rounded to } 20$$

N'_1 : 1200
 N'_0 : 1200
 N'_{total} : 2400

Because the formula used here is based on approximating the t statistic with a z statistic, it will slightly underestimate the sample size when N is less than about 30.

Reference:

Donner A, Birkett N, Buck C. *Randomization by cluster. Sample size requirements and analysis.* Am J Epidemiol 1981;114:906-14.

Source: Kohn and Senyak (2021)

G.3 Student participation information form

Student Information Sheet



Road Safety Attitudes Survey

You are being invited to take part in several surveys about your attitudes to road safety

- Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve.
- Please take the time to read the following information carefully.
- You are free to decide whether or not you would like to take part in this series of surveys, and you may request to withdraw your data from this research project within 2 months of completing the first survey.
- Please ask if anything is not clear or you would like more information.

Important things that you need to know

- We would like to hear about your attitudes to road safety.
- These surveys will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.
- This research is being completed by Elizabeth Box, a PhD Student at Cranfield University.
- As part of this research, you will be asked to fill in up to three questionnaires between now and the end of January 2022. Your school/college may also be invited to take part in two classroom sessions about young driver safety.

Contents

1. Why is this research taking place?
2. What is involved in taking part?
3. Why are we being asked to take part?
4. Are there any risks with taking part?
5. What are the benefits of taking part?
6. Who is delivering & funding the research?
7. What happens next?
8. More information about taking part

How to contact us

If you have any questions about this study, please contact: **Elizabeth Box**, PhD Student, Driving Research Group, Cranfield University
e.box@cranfield.ac.uk

1 of 2

1. Why is this research taking place?

Newly qualified young drivers are at a higher-risk of death or serious injury within the first year of passing their driving test. Pre-driver education is currently delivered throughout the UK. This study is investigating how pre-driver education can improve young driver's ability to cope with road related risk.

2. What is involved in taking part?

The study will involve you filling out up to three online surveys, each will take approximately 10 minutes to complete. You will be asked to fill out the surveys between now and the end of January 2022. Your teacher/ form tutor will provide you with the online link for each of the surveys. Your school/college may also be invited to take part in two 1hr classroom sessions about young driver safety.

3. Why are we being asked to take part?

You are being invited to take this survey because your school/college has agreed to take part in this research.

4. Are there any risks with taking part?

All the information you provide is confidential, and no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The research has received ethical approval from the Cranfield University Research Ethics Board (CURES/3733/2018). You may request to withdraw your data from this research project within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. All anonymized data will be stored securely on Cranfield University file servers.

Only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion. If you have detailed questions about the processing of your data by Cranfield University, please email gdpr@cranfield.ac.uk.

5. What are the benefits of taking part?

In agreeing to take part in this survey you will be helping us to better understand young people's attitudes to road safety and how pre-driver education can help reduce the risks experienced by young and novice drivers. Any learning from this study will directly influence the future delivery of young driver education across the UK.

6. Who is delivering & funding the research?

Elizabeth Box, a PhD Research Student at Cranfield University is delivering the research. The National Fire Chiefs Council are providing the project management support for the work. The [Department for Transport, Road Safety Trust](#), [RAC Foundation](#), [National Fire Chiefs Council](#), [Kent FRS](#) and [Road Safety GB](#) are jointly funding the research work being conducted for this PhD research.

7. What happens next?

If you would like to take part in this research, please complete and sign the consent form attached to the first online questionnaire.

8. More information about taking part

If you would like any more information about this research, please contact us on the details provided in the **How to contact us** section on page one of this information sheet.

G.4 Participant Road Safety Attitude Survey – T1, T2 & T3 (Control), T1 & T3 (DriveFit)

No.	Question	Response options
Informed consent statement		
	<p>Aim: To explore young people's attitudes to road safety.</p> <p>This research aims to explore young people's attitudes to road safety. The survey will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.</p> <p>I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me and I have read the student information sheet, which I may keep for my records. I understand this will involve taking part in completing up to three questionnaires about my attitudes to road safety. This information will be held and processed for the following purpose(s):</p> <p>To answer the research question concerned with the nature of young people's attitudes to road safety.</p> <p>Upon taking part in the study I understand that I can, if I wish, withdraw my data within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. I understand that this anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols.</p> <p>I understand that any information I provide is confidential and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.</p> <p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project and that I can withdraw my data within 2 months of the date of completing the first survey without being penalized or disadvantaged in any way.</p> <p>I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.</p> <p>I agree to take part in the above study.</p> <p>If you would like to contact the PhD Student who is running the study to discuss this research, please e-mail Elizabeth Box (e.box@cranfield.ac.uk). If you have detailed questions about the processing of your data by Cranfield University please email gdpr@cranfield.ac.uk.</p> <p>Please note that whilst this survey has been optimised for mobile device display, it will be best displayed on a laptop or desktop</p> <ul style="list-style-type: none"> ○ I consent to take part in the survey ○ I do not consent, I do not wish to participate 	

No.	Question	Response options
About you		
Q1	What gender do you identify as?*	Male, Female, Non-binary, Prefer not to say
Q2	How old are you?*	15, 16, 17, 18, 19
Q3	What is your ethnic group*	White; Mixed or multiple ethnic groups; Asian or Asian British; Black, African, Caribbean or Black British; Other ethnic group; Prefer not to say
Q3a	[Further segmentation of ethnic groups]*	[Further segmentation of ethnic groups as asked by Census]
Q4	What school/college do you attend?	[Selection of all schools/colleges taking part in the trial]
Q4a	[If select 'Other' in Q4] Please write the name of your school/college below	[Open text response]
Q5	What year group are you in?*	Year 12, Year 13, Other (Please state)
Q6	Who is your form teacher/tutor?	[Open text response]
Q7	What is your name?	First name, surname
About learning to drive		
Q8	Do you plan to learn to drive?	Yes, I have already passed my driving test (Please state MM/YYYY of test pass); Yes, I am currently learning; Yes, in the next 12 months; Yes, in the next 5 years; Maybe, at some point; No, never.
Q8a	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] How many months did it take you to pass your driving test (counting from your first driving practise with a driving instructor or an experienced driver?)	1-2 months, 3-4 months, 5-6 months, 7-8 months, 9-10 months, 11-12 months, over 12 months
Q8b	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] On average, how many hours of driving practise did you get each month whilst learning to drive?	Less than one hour per month, Between one hour and 2 hours per month, Between 3 hours and 4 hours per month, Between 5 and 6 hours per month, Between 7 and 8 hours per month, More than 8 hours per month
Q8c	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] Who did you learn to drive with? (Please select all that apply)	Driving instructor, Parents/guardians, other eligible family (over the age of 21, who have held a driving licence for at least 3 years, Eligible friends, Other (Please state)
Q9	In total, how many cars or vans are owned, or available for use, by members of your household?	None, 1, 2, 3, 4, 5 or more (Please write in the number)

No.	Question	Response options
Your attitudes and views about specific driving behaviours		
Q10	Driving whilst messaging or talking on a hand-held mobile is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q11	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q12	Driving whilst over the legal alcohol limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q13	How likely and willing would you be to drive whilst over the legal alcohol limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q14	Driving whilst feeling very tired is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q15	How likely and willing would you be to drive whilst feeling very tired?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Your attitudes and views about managing speed		
Q16	Driving over the speed limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q17	People who are important to me think that I should/should not drive over the speed limit.	Think I should – Think I should not* [7-point scale]
Q18	People who are important to me would approve/disapprove of me driving over the speed limit.	Would approve – Would disapprove* [7-point scale]
Q19	How much control would you have over whether or not you would drive over the speed limit?	Complete control – No control [7-point scale]
Q20	If I wanted to, driving over the speed limit would be...	Easy – Difficult* [7-point scale] [Nb. scaled this way for analysis (1 = safest response), but item not used due to difficulty with interpretation (by participants and for analysis)]
Q21	How likely and willing would you be to drive over the speed limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]

No.	Question	Response options
Q22	To what extent do you agree or disagree with the following statements?	Matrix response Decreasing the speed limit on the motorways is a good idea, Even at night-time on quiet roads it is important to keep within the speed limit, Drivers who cause accidents by reckless driving should be banned from driving for life, People should never overtake on the inside lane even if a slow driver is blocking the outside lane, In towns where there are a lot of pedestrians the speed limit should be 20mph, Penalties for speeding should be more severe Response options: Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q22a	[If 'Yes, I have already passed my driving test' is selected] How often have you kept within 30mph speed limits when driving over the last month?	Never – Nearly all the time* [7-point scale]
Q22b	[If 'Yes, I have already passed my driving test' is selected] I have kept within 30mph speed limits when driving over the last month...	Strongly disagree – Strongly agree* [7-point scale]
Your attitudes and views about general driving behaviours		
Q23	When driving, how safe do you think the following situations are?	Matrix response: Driving with 2 or more passengers, Driving between midnight and 6am, Driving at 70mph in a 60mph zone, Driving at 40mph in a 30mph zone, Driving while talking on a mobile phone, Driving a car which is over 10 years old, Driving with a blood alcohol level just above the legal limit, Driving whilst messaging on a mobile phone, Driving after smoking marijuana, Going through a red light Response options: Always safe, Mostly safe, Sometimes safe, Rarely safe* [4-point scale]
Q24	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting?	Matrix response: I will make sure I avoid reckless or impulsive actions, I will make sure I keep a safe distance from the vehicle in front, I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather, I will make sure I watch my speed carefully. Response options: Not at all – Very Much* [6-point scale]
Q25	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving.	Strongly agree – Strongly disagree [5-point scale]

Thank you for taking part in this survey.

You can find the information sheet about this study at the following [link](#), should you wish to keep this for your records

+ Items not included in T3 survey. One additional question included on DriveFit T3 surveys 'If you have any further comments to make about the DriveFit programme or the programme of research more generally please write them here' [Open text response] * Survey items reverse coded for analysis

G.5 Participant Road Safety Attitude Survey - T2 (DriveFit)

No.	Question	Response options
Informed consent statement		
	Aim: To explore young people's attitudes to road safety.	
	This research aims to explore young people's attitudes to road safety. The survey will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.	
	I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me and I have read the student information sheet, which I may keep for my records. I understand this will involve taking part in completing up to three questionnaires about my attitudes to road safety. This information will be held and processed for the following purpose(s):	
	To answer the research question concerned with the nature of young people's attitudes to road safety.	
	Upon taking part in the study, I understand that I can, if I wish, withdraw my data within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. I understand that this anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols.	
	I understand that any information I provide is confidential and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.	
	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project and that I can withdraw my data within 2 months of the date of completing the first survey without being penalized or disadvantaged in any way.	
	I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.	
	I agree to take part in the above study.	

If you would like to contact the PhD Student who is running the study to discuss this research, please e-mail Elizabeth Box (e.box@cranfield.ac.uk). If you have detailed questions about the processing of your data by Cranfield University please email gdpr@cranfield.ac.uk.

Please note that whilst this survey has been optimised for mobile device display, it will be best displayed on a laptop or desktop

- I consent to take part in the survey
- I do not consent, I do not wish to participate

No.	Question	Response options
About you		
Q1	What gender do you identify as?	Male, Female, Non-binary, Prefer not to say
Q2	How old are you?	15, 16, 17, 18, 19
Q3	What is your ethnic group?	White; Mixed or multiple ethnic groups; Asian or Asian British; Black, African, Caribbean or Black British; Other ethnic group; Prefer not to say
Q3a	[Further segmentation of ethnic groups]	[Further segmentation of ethnic groups as asked by Census]
Q4	What school/college do you attend?	[Selection of all schools/colleges taking part in the trial]
Q4a	[If select 'Other' in Q4] Please write the name of your school/college below	[Open text response]
Q5	What year group are you in?	Year 12, Year 13, Other (Please state)
Q6	Who is your form teacher/tutor?	[Open text response]
Q7	What is your name?	First name, surname
Q7i	Which of the following have you watched/taken part in? (Select all that apply)	DriveFit film, DriveFit workshop, Neither
Q7ii	Have you received any other road safety education in the past 3 months?	Yes, No
Q7iia	[If selected 'Yes' in Q7ii]	What road safety education have you received in the past 3 months? [Open text response]
About learning to drive		
Q8	Do you plan to learn to drive?	Yes, I have already passed my driving test (Please state MM/YYYY of test pass); Yes, I am currently learning; Yes, in the next 12 months; Yes, in the next 5 years; Maybe, at some point; No, never.
Q8a	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] How many months did it take you to pass your driving test (counting from your first driving practise with a driving instructor or an experienced driver?)	1-2 months, 3-4 months, 5-6 months, 7-8 months, 9-10 months, 11-12 months, over 12 months

No.	Question	Response options
Q8b	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] On average, how many hours of driving practise did you get each month whilst learning to drive?	Less than one hour per month, Between one hour and 2 hours per month, Between 3 hours and 4 hours per month, Between 5 and 6 hours per month, Between 7 and 8 hours per month, More than 8 hours per month
Q8c	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] Who did you learn to drive with? (Please select all that apply)	Driving instructor, Parents/guardians, other eligible family (over the age of 21, who have held a driving licence for at least 3 years, Eligible friends, Other (Please state)
Q9	In total, how many cars or vans are owned, or available for use, by members of your household?	None, 1, 2, 3, 4, 5 or more (Please write in the number)
Your attitudes and views about specific driving behaviours		
Q10	Driving whilst messaging or talking on a hand-held mobile is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q11	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q12	Driving whilst over the legal alcohol limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q13	How likely and willing would you be to drive whilst over the legal alcohol limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q14	Driving whilst feeling very tired is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q15	How likely and willing would you be to drive whilst feeling very tired?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Your attitudes and views about managing speed		
Q16	Driving over the speed limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]

No.	Question	Response options
Q17	People who are important to me think that I should/should not drive over the speed limit.	Think I should – Think I should not* [7-point scale]
Q18	People who are important to me would approve/disapprove of me driving over the speed limit.	Would approve – Would disapprove* [7-point scale]
Q19	How much control would you have over whether or not you would drive over the speed limit?	Complete control – No control [7-point scale]
Q20	If I wanted to driving over the speed limit would be...	Easy – Difficult* [7-point scale] [Nb. scaled this way for analysis (1 = safest response), but item not used due to difficulty with interpretation (by participants and for analysis)]
Q21	How likely and willing would you be to drive over the speed limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q22	To what extent do you agree or disagree with the following statements...	Matrix response Decreasing the speed limit on the motorways is a good idea, Even at night-time on quiet roads it is important to keep within the speed limit, Drivers who cause accidents by reckless driving should be banned from driving for life, People should never overtake on the inside lane even if a slow driver is blocking the outside lane, In towns where there are a lot of pedestrians the speed limit should be 20mph, Penalties for speeding should be more severe Response options: Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q22a	[If 'Yes, I have already passed my driving test' is selected] How often have you kept within 30mph speed limits when driving over the last month?	Never – Nearly all the time* [7-point scale]
Q22b	[If 'Yes, I have already passed my driving test' is selected] I have kept within 30mph speed limits when driving over the last month.	Strongly disagree – Strongly agree* [7-point scale]
Your attitudes and views about general driving behaviours		
Q23	When driving, how safe do you think the following situations are?	Matrix response: Driving with 2 or more passengers, Driving between midnight and 6am, Driving at 70mph in a 60mph zone, Driving at 40mph in a 30mph zone, Driving while talking on a mobile phone, Driving a car which is over 10 years old, Driving with a blood alcohol level just above the legal limit, Driving whilst messaging on a mobile phone, Driving after smoking marijuana, Going through a red light Response options: Always safe, Mostly safe, Sometimes safe, Rarely safe [4-point scale]

No.	Question	Response options
Q24	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting?	Matrix response: I will make sure I avoid reckless or impulsive actions, I will make sure I keep a safe distance from the vehicle in front, I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather, I will make sure I watch my speed carefully. Response options: Not at all – Very Much* [6-point scale]
Q25	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving.	Strongly agree – Strongly disagree [5-point scale]
Thank you for taking part in this survey.		
You can find the information sheet about this study at the following link , should you wish to keep this for your records		

* Survey items reverse coded for analysis

G.6 Survey measures

Measure	Acronym	No. items	Scale	Question *	Cronbach Alpha		
					T1	T2	T3
Primary outcome measures							
All intentions (Excluding alcohol)	INT_ALL	8	1:7	[Scaled mean of INT_MOB, INT_FATIGUE & INT_SPEED) [Unlikely - Likely] [Not at all willing – Very willing]	0.80	0.84	0.89
Mobile phone use intentions	INT_MOB	2	1:7	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone	0.87	0.75	0.90
Drink driving intentions	INT_ALCO	2	1:7	How likely and willing would you be to drive whilst over the legal alcohol limit	0.88	0.76	0.83
Driving whilst fatigued intentions	INT_FATIGUE	2	1:7	How likely and willing would you be to drive whilst feeling very tired	0.81	0.82	0.89
Speeding intentions	INT_SPEED	2	1:7	How likely and willing would you be to drive over the speed limit	0.90	0.86	0.92
Secondary outcome measures							
All attitudes (Excluding alcohol)	ATT_ALL	16	1:7	[Scaled mean of ATT_MOB, ATT_FATIGUE, ATT_SPEED) [Harmful – Beneficial], [Negative – Positive] [Foolish - Wise], [Unpleasant - Pleasant]	0.91	0.92	0.94
Mobile phone use attitudes	ATT_MOB	4	1:7	Driving whilst messaging or talking on a hand-held mobile is...	0.82	0.83	0.86
Drink driving attitudes	ATT_ALCO	4	1:7	Driving whilst over the legal alcohol limit is...	0.73	0.77	0.82
Driving whilst fatigued attitudes	ATT_FATIGUE	4	1:7	Driving whilst very tired is...	0.88	0.89	0.91
Speeding attitudes	ATT_SPEED	4	1:7	Driving over the speed limit is...	0.90	0.91	0.92

Measure	Acronym	No. items	Scale	Question	Cronbach Alpha		
					T1	T2	T3
Additional secondary outcome measures							
Subjective norms associated with speeding	SNORM	2	1:7	People who are important to me [think that I should/should not] / [would approve/disapprove of me] drive/ing over the speed limit [Think I should not – Think I should] [Would disapprove – would approve]	0.77	0.74	0.84
Perceived behavioural control associated with speeding	PBC	1	1:7	How much control would you have over whether or not you would driver over the speed limit [Complete control – No control]	-	-	-
Attitudes to Driving Violations Scale	ADVS	7	1:5	To what extent do you agree or disagree with the following statements...Decreasing the speed limit on motorways is a good idea; Even at night-time on quiet roads it is important to keep within the speed limit; Drivers who cause accidents by reckless driving should be banned from driving for life; People should driver slower than the speed limit when it is raining; Cars should never overtake on the inside lane even if a slow driver is blocking the outside lane; In towns where there are a lot of pedestrians the speed limit should be 20mph; Penalties for speeding should be more severe [Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree]	0.66	0.70	0.77
Perception of risk scale	P_RISK	10	1:4	When driving, how safe do you think the following situations are...Driving with 2 or more passengers; Driving between midnight and 6am; Driving at 70mph in a 60mph zone; Driving at 40mph in a 30mph zone; Driving while talking on a mobile phone; Driving a car which is over 10 years old; Driving with a blood alcohol level just over the legal limit; Driving whilst messaging on a mobile phone; Driving after smoking marijuana; Going through a red light. [Rarely safe, , Sometimes safe,,Mostly safe, Always safe]	0.68	0.78	0.80

Measure	Acronym	No. items	Scale	Question	Cronbach Alpha		
					T1	T2	T3
Driver coping questionnaire scale	DCQ	4	1:6	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting...I will make sure I avoid reckless or impulsive actions; I will make sure I keep a safe distance from the vehicle in front; I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather; I will make sure I watch my speed carefully [Very much – Not at all]	0.84	0.88	0.89
Efficacy	EFF	1	1:5	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving [Strongly agree – Strongly disagree]	-	-	-

* Survey measures displayed as scaled for analysis

G.7 DriveFit lesson plan information for teachers



DRIVEFIT LESSON PLAN 1 – FILM

Date: Mon 8th Nov - Fri 19th Nov

➤ *Accessing the DriveFit film*

In the first lesson, please show your students the DriveFit film provided. You can access the DriveFit film on Vimeo using the following web address and password.

DriveFit Film: <https://vimeo.com/611642919/922e919d08>

Password: Dr4veFit

If required, a subtitled version of the film is also available here:

Subtitled version: <https://vimeo.com/630928852>

Password: Dr5veFit

When you click on the film you will be asked to complete a short survey before playing the film. This has been put in place so that the DriveFit team can keep track of the schools/colleges that have watched the film. Please let us know if you experience any issues in completing the short survey ahead of watching the film.

➤ *During the DriveFit film*

The film is 42 minutes long, with a break-point midway. Before starting the film, please ask your students to make notes whilst watching the film, writing down any particular points that they find to be important, interesting or useful. Booklets will be delivered by 1st November to Coombeshead Academy for your students to use as notebooks to record their thoughts about the DriveFit programme. Please pause the film halfway through (21:40), at the point indicated in the film, for a short break and discussion. Please take **up to 5 minutes** to ask your class the following questions:

- What main points were made in the first half of the film?
- What stood out and why?

At the end of the film, please take **up to 5 minutes** to ask your class the following questions:

- What main points were made in the second half of the film?
- What stood out and why?
- What one thing might you do differently after watching the film?

It would be helpful if your class can keep their DriveFit booklets somewhere where they can access them again for the workshop.

➤ *Post film survey - Teacher*

We are interested to hear your views on the film and your perceptions about how your students responded to the delivery and the content of the film. You can access the teacher's feedback survey using the following link https://cranfielduniversity.eu.qualtrics.com/jfe/form/SV_6J7mERZeAeNNXyC

DRIVEFIT LESSON PLAN 2 – ONLINE WORKSHOP

Date: Mon 22nd Nov - Fri 3rd Dec

The DriveFit online workshop will be 45 minutes in length and will be delivered within two weeks of your students having watched the DriveFit film. The online workshop will be delivered by professionally qualified, and DBS checked facilitators via MS Teams or Zoom, depending on your preference. You will also receive postcards for students to record the plans they develop during the workshop session.

➤ *Post workshop survey - Students*

After taking part in the workshop, students will be invited by the facilitator to complete the following online survey https://cranfielduniversity.eu.qualtrics.com/jfe/form/SV_b0WFSuJPqcgLEil which will help the DriveFit team evaluate the DriveFit programme. The survey can also be accessed by scanning the QR Code below with a mobile phone camera.



The survey should take the students approximately 10 minutes to complete and a link to the information sheet for the study will be provided again for the student's information. Students will be asked whether they would be willing to take part in a focus group with the project researcher, to discuss in more detail how they found the DriveFit programme.

➤ *Post workshop survey - Teacher*

We are also interested to hear your views on the workshop and your perceptions about how your students responded to the delivery and the content of the workshop. You can access the teacher's feedback survey using the following link

https://cranfielduniversity.eu.qualtrics.com/jfe/form/SV_clpevt1P1UTYXwq

G.8 Sub-group analysis – Intentions

Figure G.7-1 T2 Speed sub-group analysis

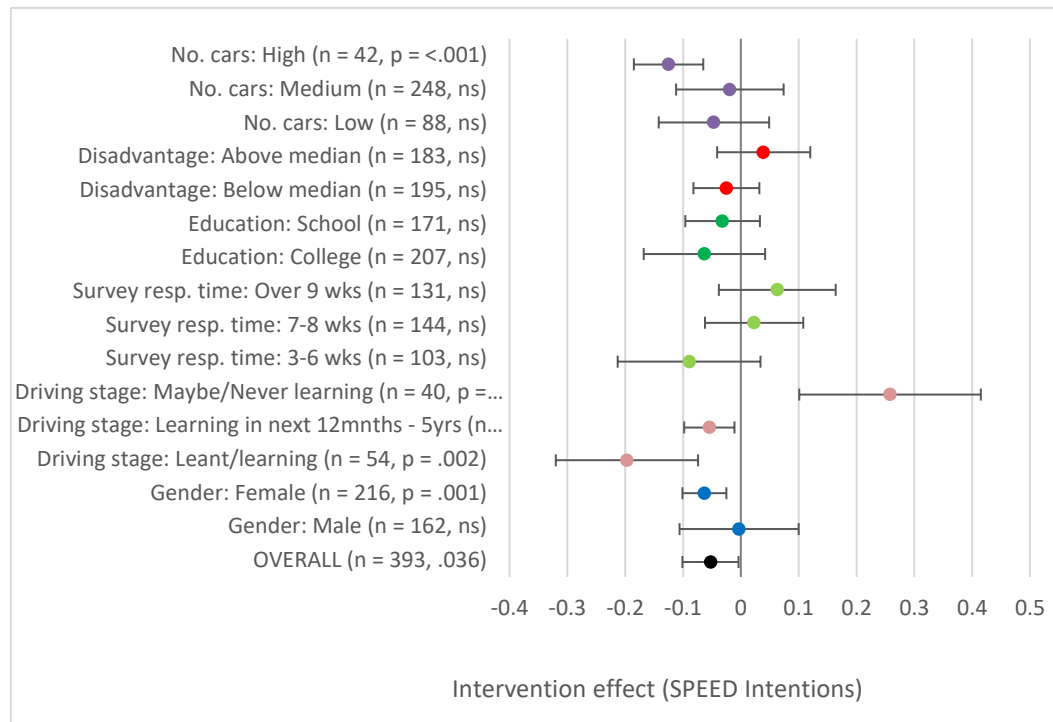


Figure G.7-2 T3 All-risk sub-group analysis

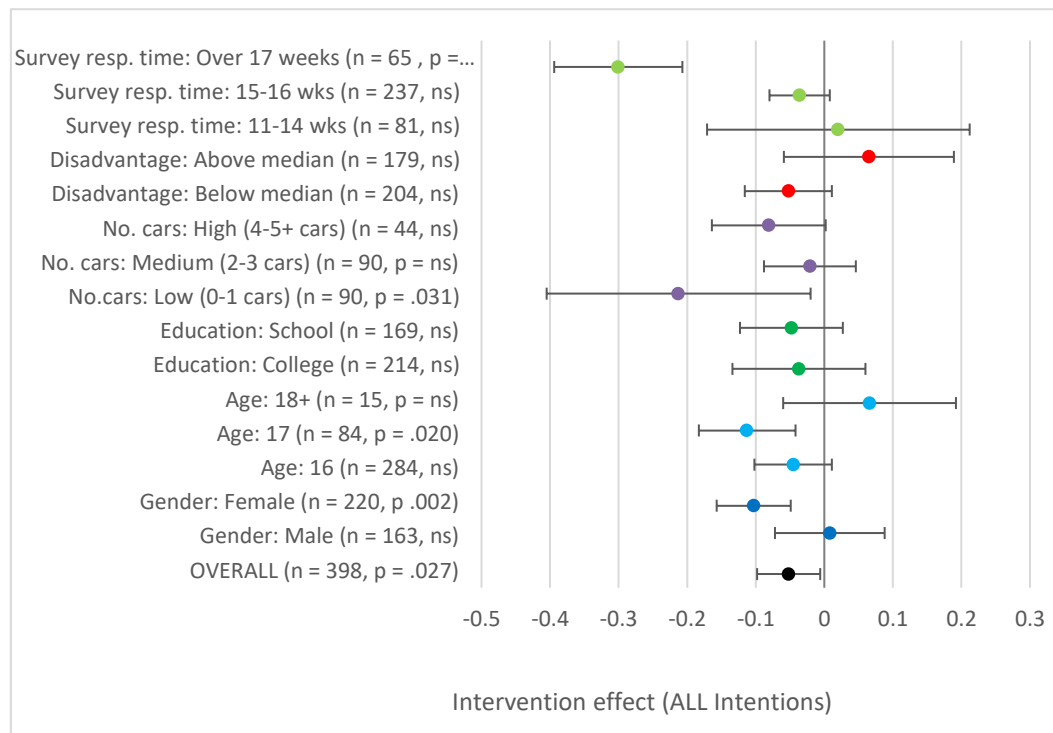
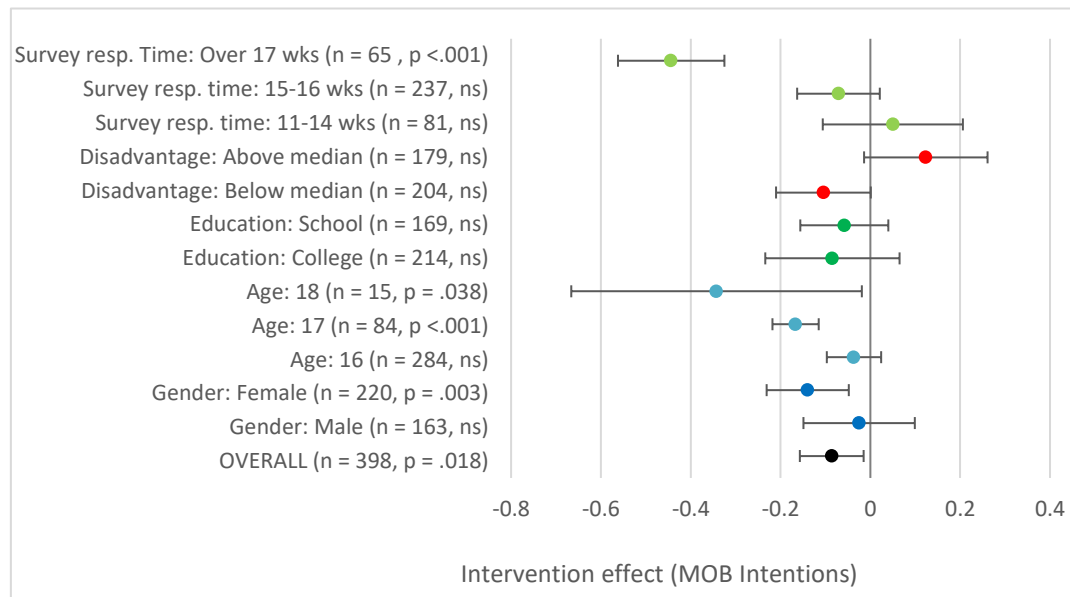


Figure G.7-3 T3 Mobile phone use sub-group analysis



G.9 Sub-group analysis – Attitudes

Figure G.8-1 T2 & T3 Mobile phone use sub-group analysis

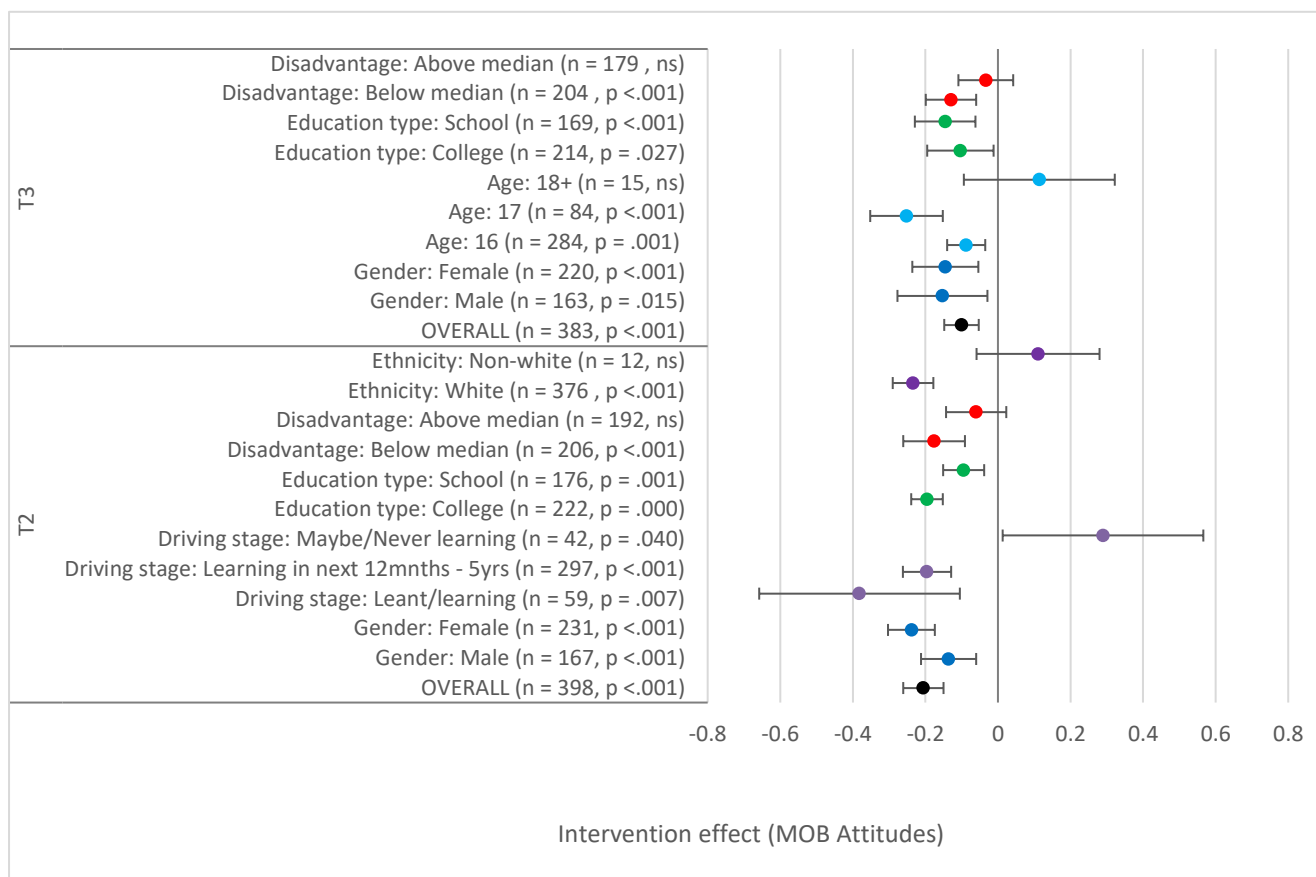


Figure G.8-2 T2 & T3 Speed sub-group analysis

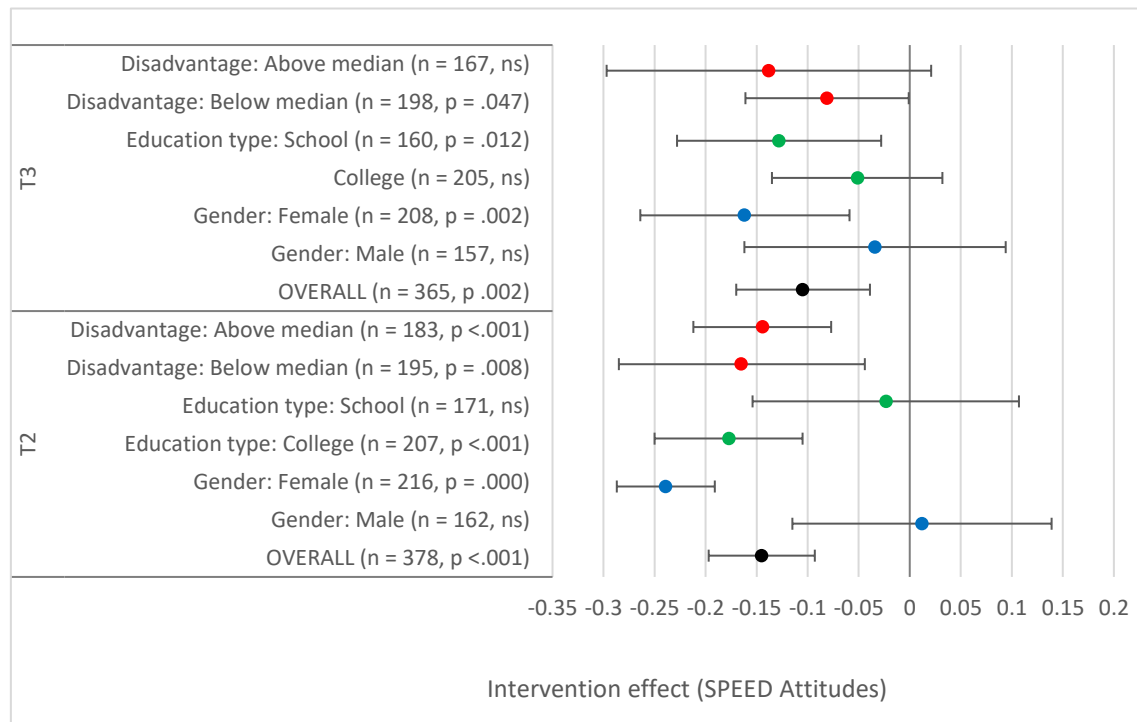


Figure G.8-3 T2 & T3 All-risk sub-group analysis

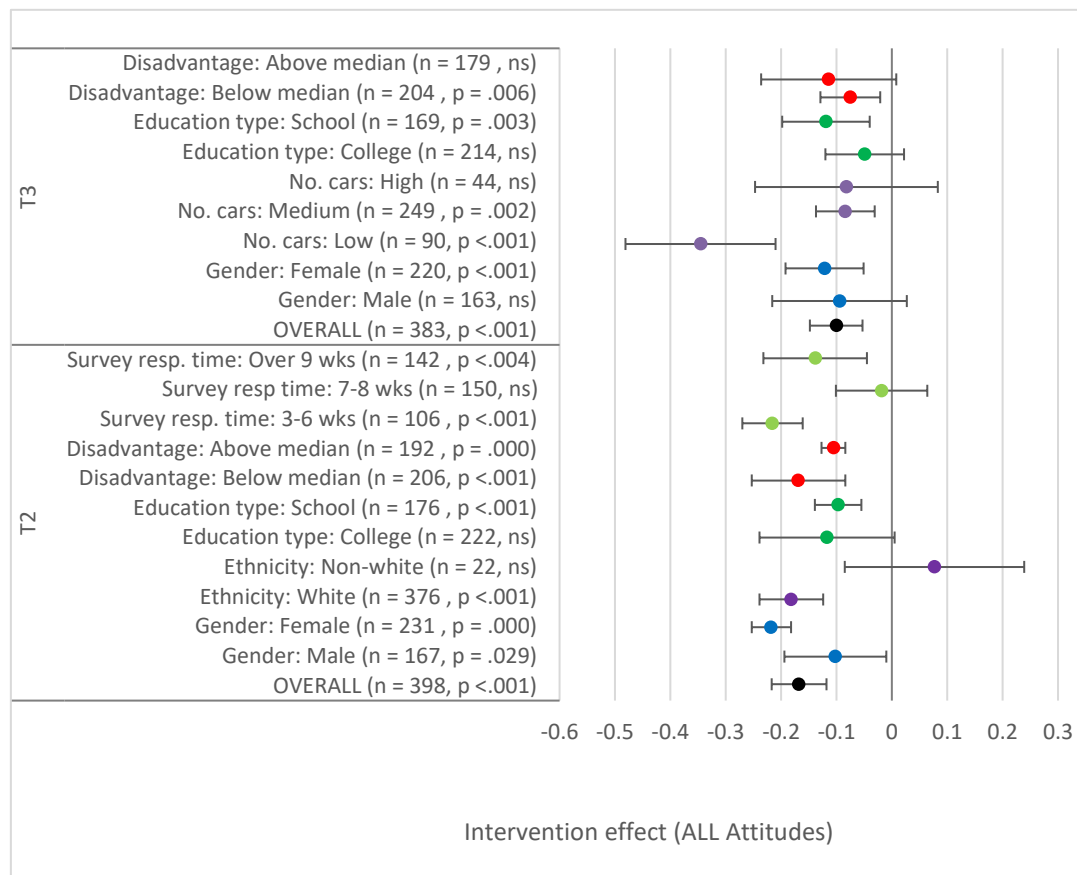


Figure G.8-4 T2 Fatigue sub-group analysis

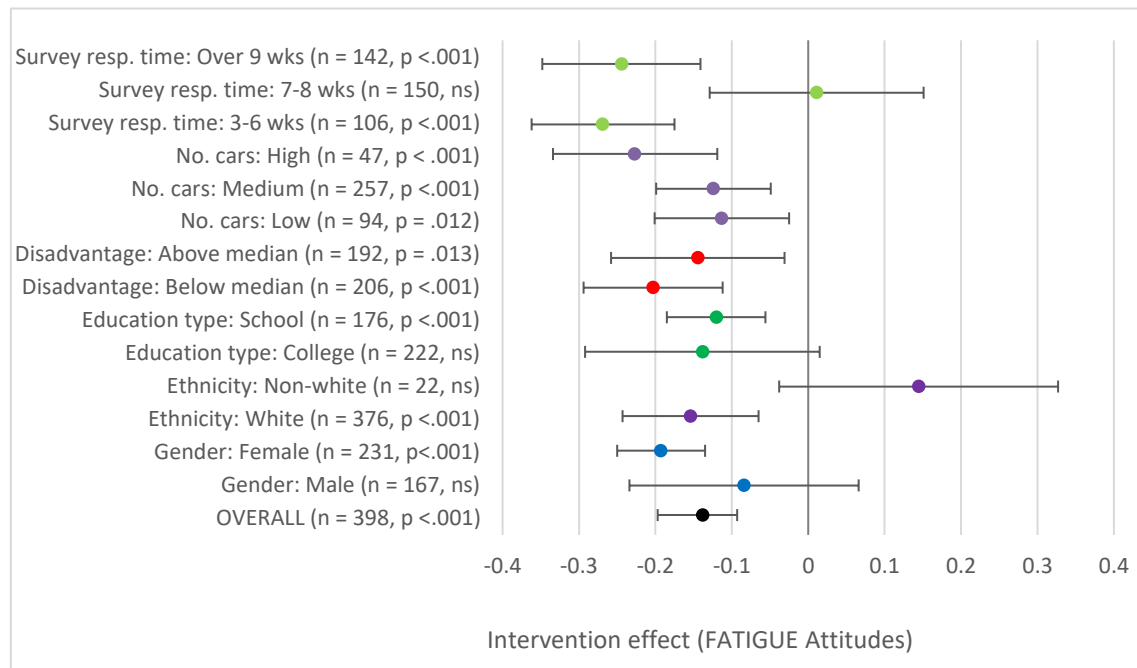
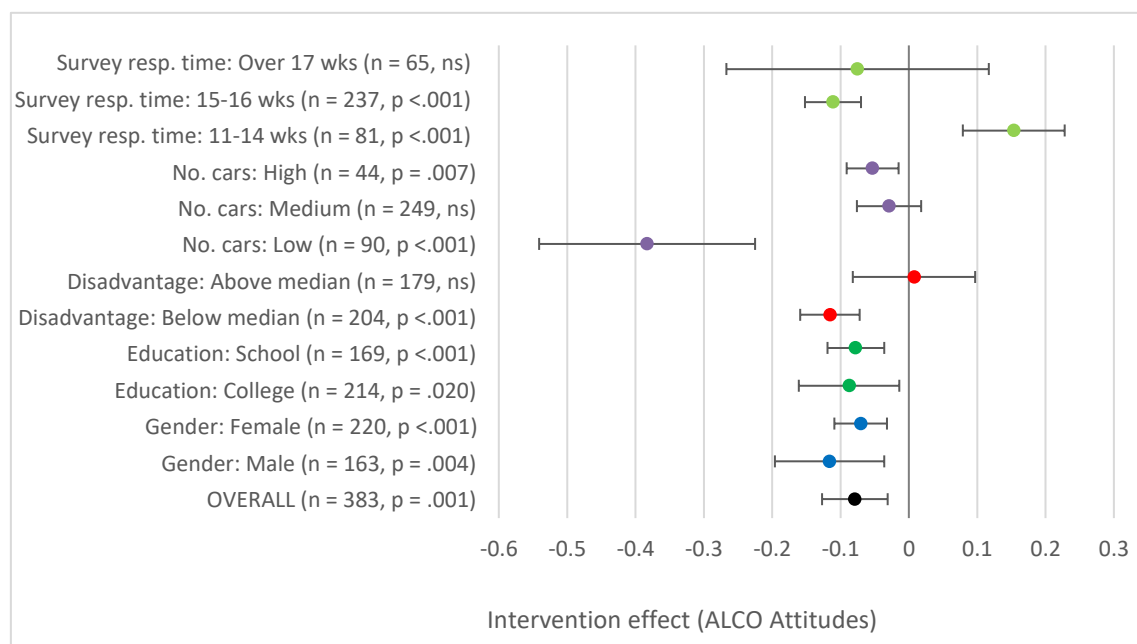


Figure G.8-5 T3 Drink driving sub-group analysis



G.10 Sub-group analysis – Other measures

Figure G.9-1 T2 & T3 PRISK sub-group analysis

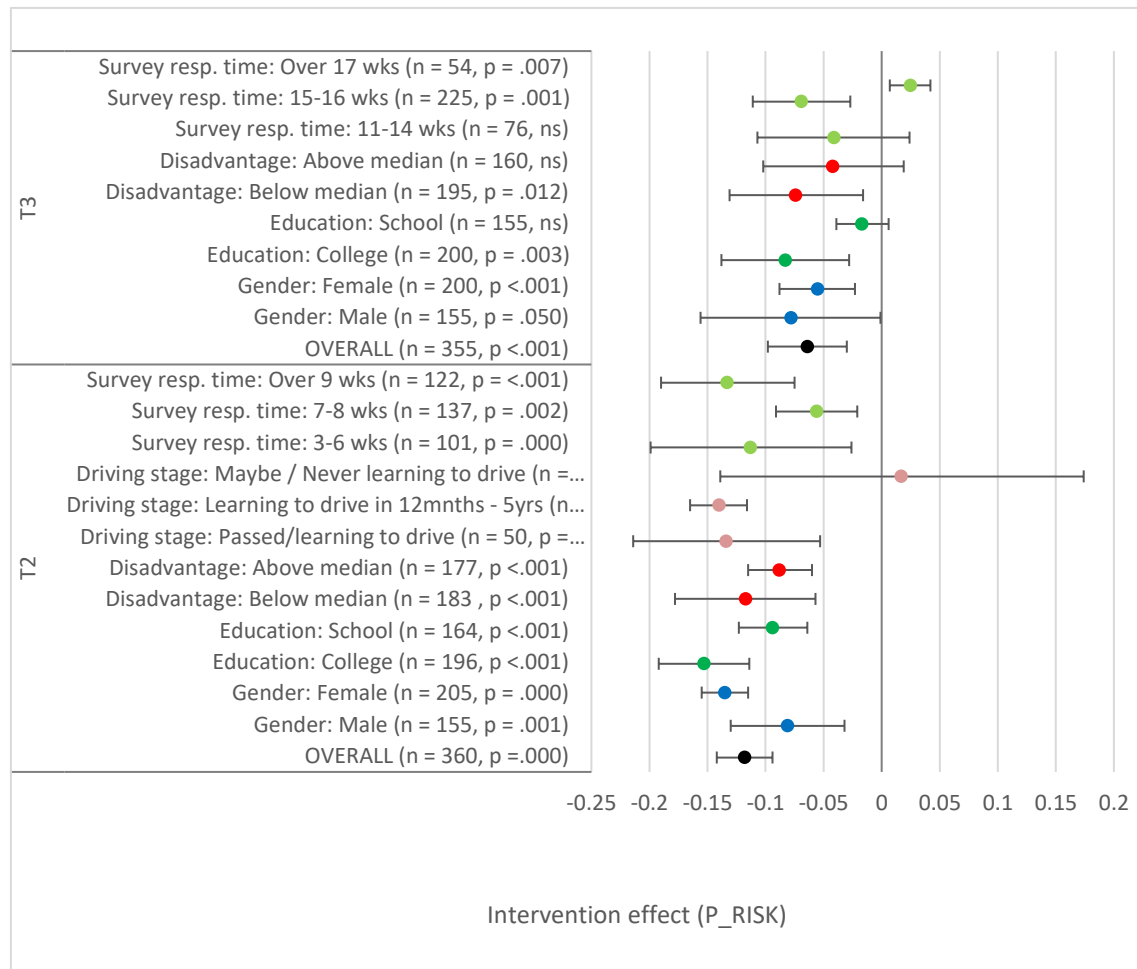


Figure G.9-2 T2 & T3 ADVS sub-group analysis

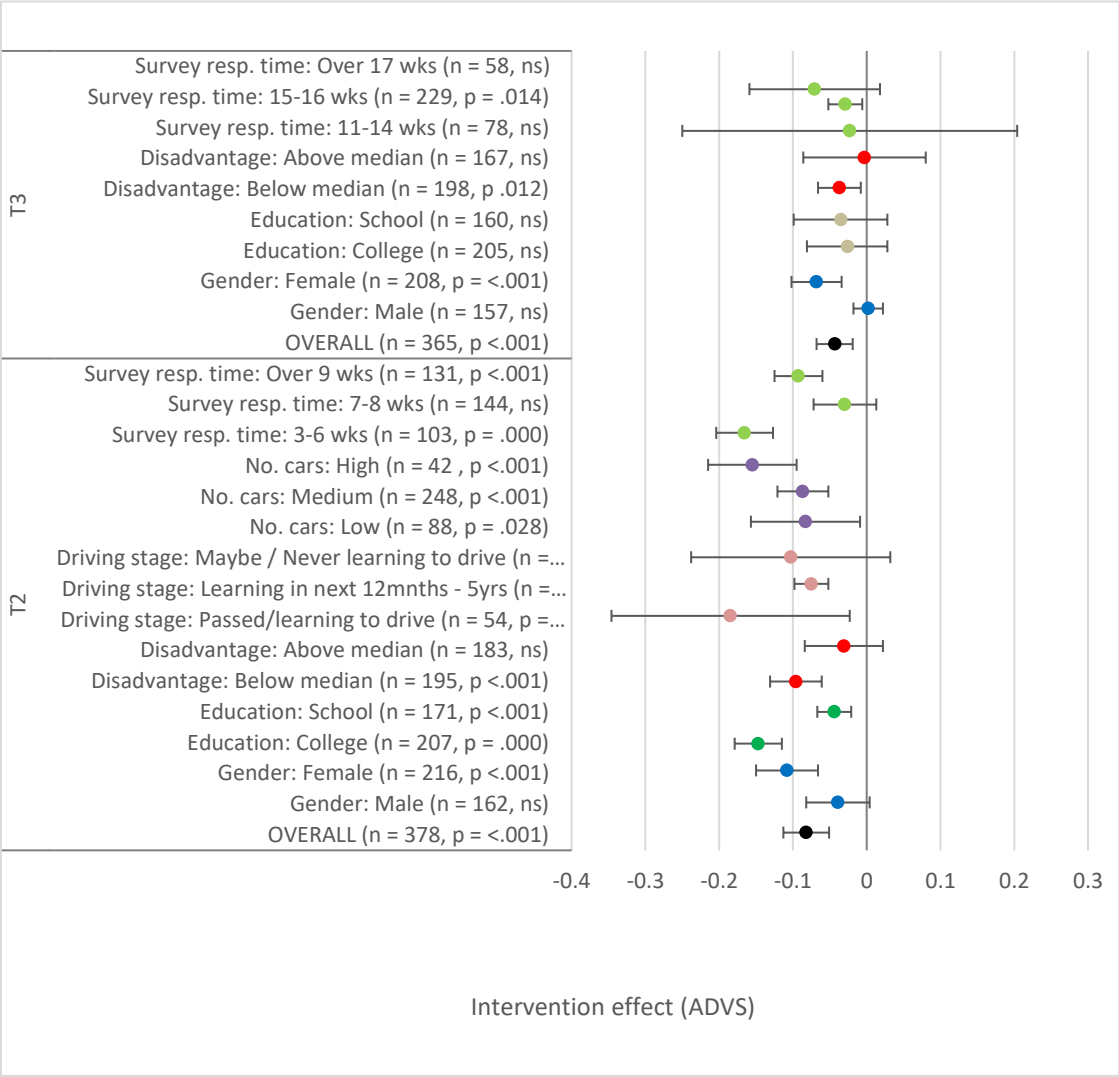


Figure G.9-3 T2 SNORM & T3 PBC sub-group analysis

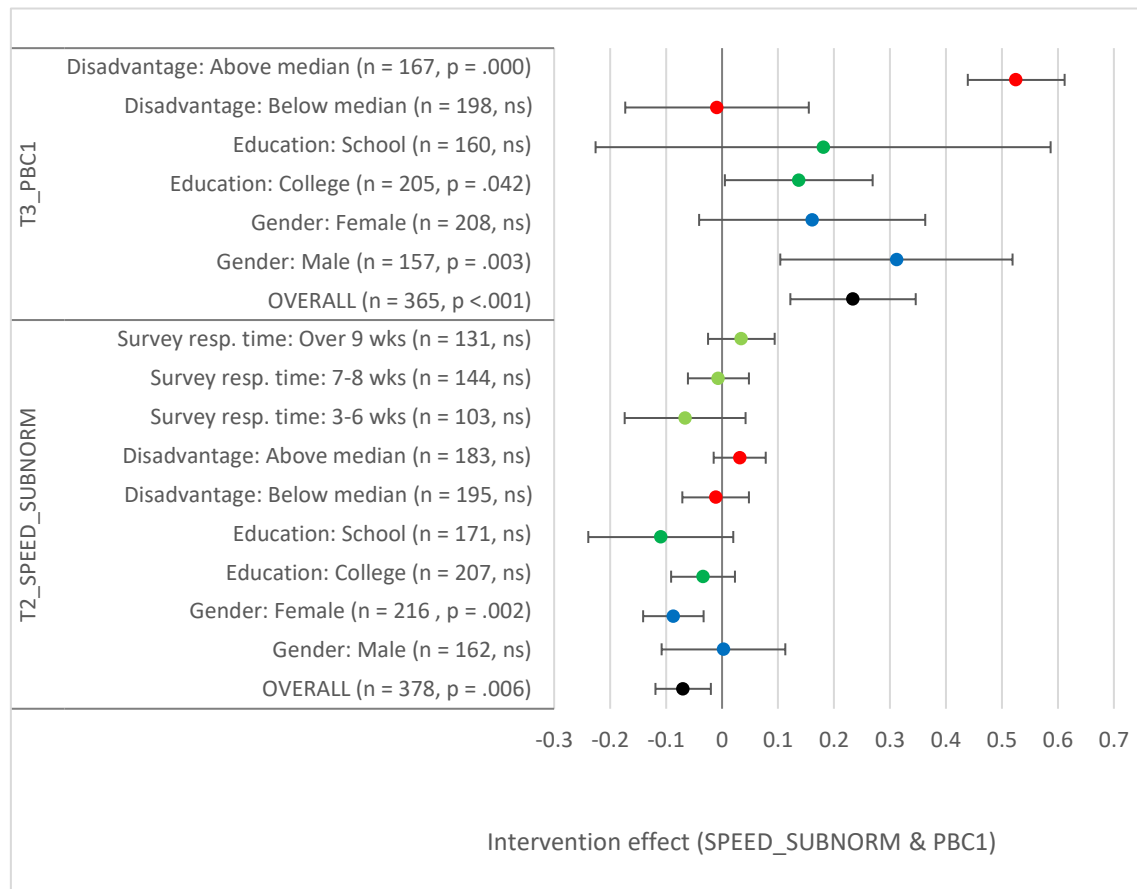
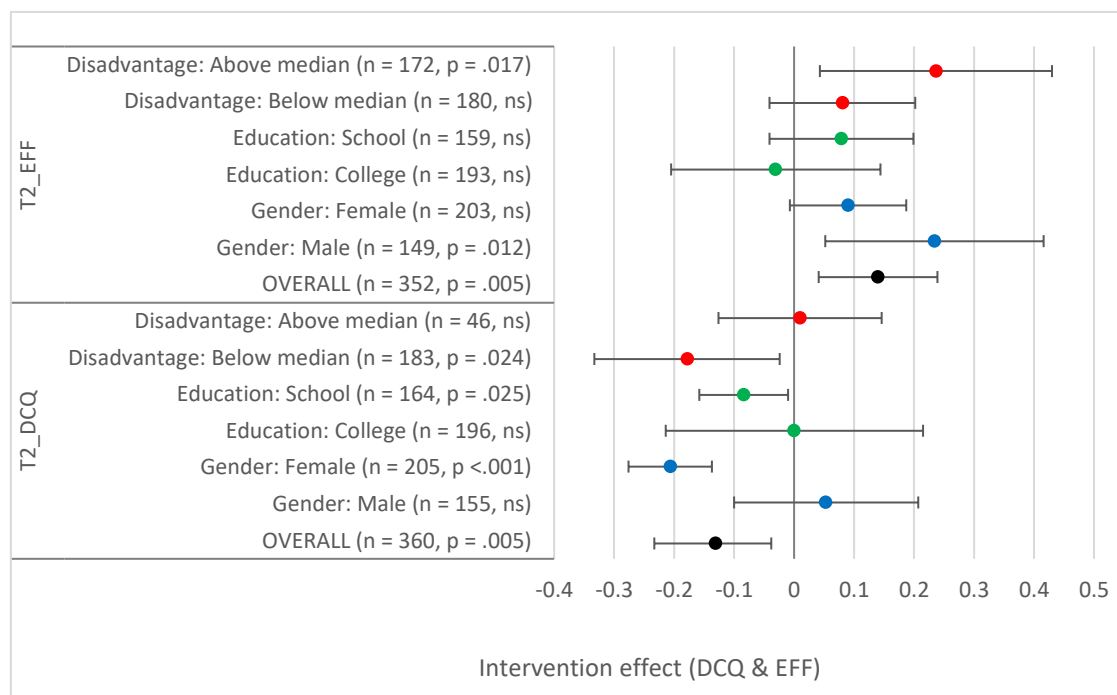


Figure G.9-4 T2 DCQ & EFF sub-group analysis



Appendix H – Paper 8 appendices

H.1 SDSA Surrey school/College recruitment information



Invitation to take part in a national research programme

Dear Senior Management Team and/or Year 12 & Year 13 Teacher/Tutors,

- Your school/college is being invited to take part in a national programme of research which will influence pre-driver education delivery across the UK from 2022 onwards;
- Participating schools/colleges who successfully complete the study will be gifted a £200 contribution towards their school/college funds;
- Information about what is involved in taking part is provided in this letter. A more detailed explanation of the study can be found in the school/college [study information sheet](#) and in a [recorded explanation of the trial](#) from the study researcher;
- To confirm whether your school/college would like to take part, please complete this short [online response form](#) or contact the Surrey study co-ordinator Mark Taylor (mark.taylor@surreycc.gov.uk).

Your school/college is being invited to take part in a national programme of research, which aims to establish the best way to use pre-driver education to support young and novice driver safety. Participating schools/colleges who successfully complete the study will be gifted a £200 contribution towards their school/college funds as a thank you for taking part in this research study of national importance.

Currently around one in ten newly qualified drivers have a collision in their first six months of solo driving. This [pre-driver theatre and workshop education research \(PdTWER\)](#) programme seeks to help pre-drivers develop effective strategies for coping with road related risk.

The research is being funded by the [UK Department for Transport](#), the [Road Safety Trust](#), the [RAC Foundation](#), the [National Fire Chiefs Council](#), [Road Safety GB](#) and [Kent Fire and Rescue Service](#) and is being run by Elizabeth Box, [Head of Research at the RAC Foundation](#) and [Doctoral Researcher at Cranfield University](#) with support from [Surrey Fire and Rescue Service](#) and [Devon and Somerset Fire and Rescue Service](#). Once the research is complete, it is expected that the programme will be rolled out to all schools across the UK from Autumn 2022.

What is involved in taking part

Schools/colleges who agree to be involved in this programme of research will be randomly assigned to one of two trial conditions:

- **Safe Drive Stay Alive (SDSA) Surrey film:** Three year 12 and/or year 13 classes to complete three surveys and be provided with the SDSA Surrey film in November 21; or
- **Control Group:** Three year 12 and/or year 13 classes to complete three surveys and receive the SDSA Surrey film for watching from mid-January 22.

There is a 50:50 chance of your school/college being asked to take part in the programme or control condition. Both groups are vitally important for the study, as without the control group, we will not know the impact the film is having on the safety of young and novice drivers.

If your school/college is assigned the SDSA Surrey film condition you will be asked to make a lesson slot(s) available for each of your three participating year 12 and/or year 13 classes to watch the online film (which will be approximately 1 hour in length), between Mon 1st Nov and Fri 12th Nov. All other year 12 and year 13 classes in the SDSA film condition school/college are welcome to watch the film in November 21 at a convenient time and will not be required to complete online surveys.

If your school/college is assigned to the control group, three year 12 and/or year 13 classes will be asked to complete three surveys and will be provided the film to watch from mid-January 22 without any further surveys required. All other year 12 and year 13 classes in your school/college who were not involved in the control surveys will also be able to watch the film from mid-January 22, without needing to fill in any online surveys.

Students from the three classes in the SDSA survey film and control conditions will be required to fill in the three surveys between the following dates:

1 st survey	Mon 20 th Sept 21 – Fri 1 st Oct 21
2 nd survey	Mon 1 st Nov 21 – Fri 12 th Nov 21
3 rd survey	Mon 6 th Dec 21 – Fri 17 th Dec 21

The surveys will be provided through an online link, each of which will take no longer than 10 minutes to complete. The first survey will include a student information sheet and consent form, which will inform students how their data will be collected and stored as part of the project. It will also inform students that their participation in the surveys is voluntary and that they can, if they wish, decide not to take part, without being penalized or disadvantaged in any way. It is important that time is made available within school hours for students to complete these surveys on their mobile devices.

How to sign up to take part

If you would like to take part in this study, please fill out the following [online response form](#) to confirm whether your school/college would like to take part. If you have any queries or would prefer to email your response, please contact mark.taylor@surreycc.gov.uk.

Once you have signed up to be involved in the trial, please block out some time in the weeks outlined for the trial to be delivered. The project team will be in touch w/c 4th October 21, once your school/college has been randomly assigned a group, to confirm dates and times for these lessons to take place. If your school is in the control group, you will not need to make time in November for the lessons and the film link will be made available to you from mid-January 22.

Further information

For more information about the trial please see the [study information sheet](#), which outlines how the study will be conducted and how data from the project will be handled. You can also [watch a short video recorded by Elizabeth Box](#), the Principal Investigator for this project, who outlines the purpose of the research, what is involved in taking part and how to sign up to the trial. If you have any further questions, please contact the Surrey study co-ordinator Mark Taylor mark.taylor@surreycc.gov.uk.

Thank you for taking the time to consider your schools/college involvement in this research. We look forward to hearing from you.

Elizabeth Box
Head of Research – RAC Foundation
Doctoral Researcher – Cranfield University



Pre-driver theatre & workshop education research

Your school/college is being invited to take part in this study

This is a national programme of research which is being supported by the UK Department for Transport, the National Fire Chiefs Council and other UK road safety charities and NGOs.

The main aim of this study is to improve the safety of young and novice drivers. The delivery of this trial is due to take place between November and December 21.

1. Why is this research taking place?

Newly qualified young drivers are at a higher-risk of death or serious injury within the first year of passing their driving test. Pre-driver education is currently delivered throughout the UK. This study is investigating how pre-driver education can improve young driver's ability to cope with road related risk.

2. Why are we being asked to take part?

You are being invited to take part in this research as a provider of 16-18 year old education in your county. Surrey Fire and Rescue Service are assisting with delivering this national level research which is taking place across three counties in England.

3. What are the benefits of taking part?

In agreeing to support this trial at your school/college you will be helping policy makers and delivers in the UK and further afield better understand young people's attitudes to road safety and how pre-driver education can help reduce the risks experienced by young and novice drivers. Any learning from this study will directly influence the future delivery of similar interventions across the UK. Schools/colleges who successful complete the study will be gifted a £200 contribution towards their school/college funds as a thank you for taking part in this research study of national importance.

Contents

1. Why is this research taking place?
2. Why are we being asked to take part?
3. What are the benefits of taking part?
4. What is involved in taking part?
5. Are there any risks with taking part?
6. Who is delivering & funding the research?
7. What happens next?

How to contact us

If you have any questions about this study, please contact: **Mark Taylor**, Children and Young People Team Manager, Surrey Fire & Rescue Service
mark.taylor@surreycc.gov.uk

4. What is involved in taking part?

Schools/colleges who agree to be involved in the trial will be randomly assigned to one of two trial conditions: Programme (provided with the Safe Drive Stay Alive (SDSA) Surrey film) or control (Carry on as normal, receiving the SDSA Surrey film in mid-January 22). There is a 50:50 chance of your school/college being asked to take part in the programme or control condition. Both groups are vitally important for the study, as without the control group, we will not know the impact the film is having on the safety of young and novice drivers.

If your school/college is assigned the SDSA Surrey film condition you will be asked to make a lesson slot(s) available for each of your three participating year 12 and/or year 13 classes to watch the online film (which will be approximately 1 hour in length), between Mon 1st Nov and Fri 12th Nov. All other year 12 and year 13 classes in the SDSA film condition school/college are welcome to watch the film in November 21 at a convenient time and will not be required to complete online surveys.

If your school/college is assigned to the control group, three year 12 and/or year 13 classes will be asked to complete three surveys and will be provided the film to watch from mid-January 22 without any further surveys required. All other year 12 and year 13 classes in your school/college who were not involved in the control surveys will also be able to watch the film from mid-January 22, without needing to fill in any online surveys.

Students in both SDSA Surrey film and control conditions will be required to fill in three questionnaires across a 6 week period, using an online link, each of which will take no longer than 10 minutes to complete.

5. Are there any risks with taking part?

All the information students provide within the surveys is confidential, and no information that

could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The research has received ethical approval from the Cranfield University Research Ethics Board (CURES/3733/2018).

Students may request to withdraw their data from this research project within 2 months of completing their first survey, after which time it will be anonymised and cannot be accessed. All data will be stored securely on Cranfield University file servers. Only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion.

6. Who is delivering & funding the research?

[Elizabeth Box](#), PhD Research Student at [Cranfield University](#) is delivering the research with the support of [Surrey Fire and Rescue Service](#), [Kent Fire and Rescue Service](#) and [Devon and Somerset Fire and Rescue Service](#). The National Fire Chiefs Council are providing the project management support for the work. [The Department for Transport](#), [the Road Safety Trust](#), [RAC Foundation](#), [National Fire Chiefs Council](#), [Kent Fire and Rescue Service](#) and [Road Safety GB](#) are jointly funding the research work being conducted for this PhD research.

7. What happens next?

If you would like your school/college to take part in this research, please fill out the following [online response form](#) or contact mark.taylor@surreycc.gov.uk to inform the project team of your decision, who will be in touch in early September 21 to discuss next steps.

H.2 Student participation information form

Student Information Sheet

Road Safety Attitudes Survey

You are being invited to take part in several surveys about your attitudes to road safety

- Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve.
- Please take the time to read the following information carefully.
- You are free to decide whether or not you would like to take part in this series of surveys, and you may request to withdraw your data from this research project within 2 months of completing the first survey.
- Please ask if anything is not clear or you would like more information.

Important things that you need to know

- We would like to hear about your attitudes to road safety.
- These surveys will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.
- This research is being completed by Elizabeth Box, a PhD Student at Cranfield University.
- As part of this research, you will be asked to fill in up to three questionnaires between now and the end of January 2022. Your school/college has also been invited to take part in a classroom session about young driver safety.



Contents

1. Why is this research taking place?
2. What is involved in taking part?
3. Why are we being asked to take part?
4. Are there any risks with taking part?
5. What are the benefits of taking part?
6. Who is delivering & funding the research?
7. What happens next?
8. More information about taking part

How to contact us

If you have any questions about this study, please contact: **Elizabeth Box**, PhD Student, Driving Research Group, Cranfield University
e.box@cranfield.ac.uk

1 of 2

1. Why is this research taking place?

Newly qualified young drivers are at a higher-risk of death or serious injury within the first year of passing their driving test. Pre-driver education is currently delivered throughout the UK. This study is investigating how pre-driver education can improve young driver's ability to cope with road related risk.

2. What is involved in taking part?

The study will involve you filling out up to three online surveys, each will take approximately 10 minutes to complete. You will be asked to fill out the surveys between now and the end of January 2022. Your teacher/ form tutor will provide you with the online link for each of the surveys. Your school/college has also been invited to take part in a classroom session about young driver safety.

3. Why are we being asked to take part?

You are being invited to take this survey because your school/college has agreed to take part in this research.

4. Are there any risks with taking part?

All the information you provide is confidential, and no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The research has received ethical approval from the Cranfield University Research Ethics Board (CURES/3733/2018). You may request to withdraw your data from this research project within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. All anonymized data will be stored securely on Cranfield University file servers.

Only anonymized data that underpins published results will be deposited securely in Cranfield University's institutional data repository, CORD, which preserves data for at least 10 years after project completion. If you have detailed questions about the processing of your data by Cranfield University, please email gdpr@cranfield.ac.uk.

5. What are the benefits of taking part?

In agreeing to take part in this survey you will be helping us to better understand young people's attitudes to road safety and how pre-driver education can help reduce the risks experienced by young and novice drivers. Any learning from this study will directly influence the future delivery of young driver education across the UK.

6. Who is delivering & funding the research?

Elizabeth Box, a PhD Research Student at Cranfield University is delivering the research. The National Fire Chiefs Council are providing the project management support for the work. The [Department for Transport](#), [Road Safety Trust](#), [RAC Foundation](#), [National Fire Chiefs Council](#), [Kent FRS](#) and [Road Safety GB](#) are jointly funding the research work being conducted for this PhD research.

7. What happens next?

If you would like to take part in this research, please complete and sign the consent form attached to the first online questionnaire.

8. More information about taking part

If you would like any more information about this research, please contact us on the details provided in the **How to contact us** section on page one of this information sheet.

H.3 Participant Road Safety Attitude Survey – T1, T2 & T3 (Control), T1 & T3 (SDSA Surrey)

No.	Question	Response options
Informed consent statement		
	<p>Aim: To explore young people's attitudes to road safety.</p> <p>This research aims to explore young people's attitudes to road safety. The survey will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.</p> <p>I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me and I have read the student information sheet, which I may keep for my records. I understand this will involve taking part in completing up to three questionnaires about my attitudes to road safety. This information will be held and processed for the following purpose(s):</p> <p>To answer the research question concerned with the nature of young people's attitudes to road safety.</p> <p>Upon taking part in the study I understand that I can, if I wish, withdraw my data within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. I understand that this anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols.</p> <p>I understand that any information I provide is confidential and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.</p> <p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project and that I can withdraw my data within 2 months of the date of completing the first survey without being penalized or disadvantaged in any way.</p> <p>I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.</p> <p>I agree to take part in the above study.</p> <p>If you would like to contact the PhD Student who is running the study to discuss this research, please e-mail Elizabeth Box (e.box@cranfield.ac.uk). If you have detailed questions about the processing of your data by Cranfield University please email gdpr@cranfield.ac.uk.</p> <p>Please note that whilst this survey has been optimised for mobile device display, it will be best displayed on a laptop or desktop</p> <ul style="list-style-type: none"> ○ I consent to take part in the survey ○ I do not consent, I do not wish to participate 	

No.	Question	Response options
About you		
Q1	What gender do you identify as? +	Male, Female, Non-binary, Prefer not to say
Q2	How old are you? +	15, 16, 17, 18, 19
Q3	What is your ethnic group? +	White; Mixed or multiple ethnic groups; Asian or Asian British; Black, African, Caribbean or Black British; Other ethnic group; Prefer not to say
Q3a	[Further segmentation of ethnic groups] +	[Further segmentation of ethnic groups as asked by Census]
Q4	What school/college do you attend?	[Selection of all schools/colleges taking part in the trial]
Q4a	[If select 'Other' in Q4] Please write the name of your school/college below	[Open text response]
Q5	What year group are you in? +	Year 12, Year 13, Other (Please state)
Q6	Who is your form teacher/tutor?	[Open text response]
Q7	What is your name?	First name, surname
About learning to drive		
Q8	Do you plan to learn to drive?	Yes, I have already passed my driving test (Please state MM/YYYY of test pass); Yes, I am currently learning; Yes, in the next 12 months; Yes, in the next 5 years; Maybe, at some point; No, never.
Q8a	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] How many months did it take you to pass your driving test (counting from your first driving practise with a driving instructor or an experienced driver?)	1-2 months, 3-4 months, 5-6 months, 7-8 months, 9-10 months, 11-12 months, over 12 months
Q8b	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] On average, how many hours of driving practise did you get each month whilst learning to drive?	Less than one hour per month, Between one hour and 2 hours per month, Between 3 hours and 4 hours per month, Between 5 and 6 hours per month, Between 7 and 8 hours per month, More than 8 hours per month
Q8c	[If 'Yes, I have already passed my driving test' or 'Yes, I am currently learning is selected'] Who did you learn to drive with? (Please select all that apply)	Driving instructor, Parents/guardians, other eligible family (over the age of 21, who have held a driving licence for at least 3 years, Eligible friends, Other (Please state)
Q9	In total, how many cars or vans are owned, or available for use, by members of your household?	None, 1, 2, 3, 4, 5 or more (Please write in the number)

No.	Question	Response options
Your attitudes and views about specific driving behaviours		
Q10	Driving whilst messaging or talking on a hand-held mobile is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q11	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q12	Driving whilst over the legal alcohol limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q13	How likely and willing would you be to drive whilst over the legal alcohol limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q14	Driving whilst feeling very tired is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q15	How likely and willing would you be to drive whilst feeling very tired?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Your attitudes and views about managing speed		
Q16	Driving over the speed limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q17	People who are important to me think that I should/should not drive over the speed limit.	Think I should – Think I should not* [7-point scale]
Q18	People who are important to me would approve/disapprove of me driving over the speed limit	Would approve – Would disapprove* [7-point scale]
Q19	How much control would you have over whether or not you would drive over the speed limit?	Complete control – No control [7-point scale]
Q20	If I wanted to driving over the speed limit would be...	Easy – Difficult* [7-point scale] [Nb. scaled this way for analysis (1 = safest response), but item not used due to difficulty with interpretation (by participants and for analysis)]
Q21	How likely and willing would you be to drive over the speed limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]

No.	Question	Response options
Q22	To what extent do you agree or disagree with the following statements?	Matrix response Decreasing the speed limit on the motorways is a good idea, Even at night-time on quiet roads it is important to keep within the speed limit, Drivers who cause accidents by reckless driving should be banned from driving for life, People should never overtake on the inside lane even if a slow driver is blocking the outside lane, In towns where there are a lot of pedestrians the speed limit should be 20mph, Penalties for speeding should be more severe Response options: Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q22a	[If 'Yes, I have already passed my driving test' is selected] How often have you kept within 30mph speed limits when driving over the last month?	Never – Nearly all the time* [7-point scale]
Q22b	[If 'Yes, I have already passed my driving test' is selected] I have kept within 30mph speed limits when driving over the last month.	Strongly disagree – Strongly agree* [7-point scale]
Your attitudes and views about general driving behaviours		
Q23	When driving, how safe do you think the following situations are?	Matrix response: Driving with 2 or more passengers, Driving between midnight and 6am, Driving at 70mph in a 60mph zone, Driving at 40mph in a 30mph zone, Driving while talking on a mobile phone, Driving a car which is over 10 years old, Driving with a blood alcohol level just above the legal limit, Driving whilst messaging on a mobile phone, Driving after smoking marijuana, Going through a red light Response options: Always safe, Mostly safe, Sometimes safe, Rarely safe* [4-point scale]
Q24	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting?	Matrix response: I will make sure I avoid reckless or impulsive actions, I will make sure I keep a safe distance from the vehicle in front, I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather, I will make sure I watch my speed carefully. Response options: Not at all – Very Much* [6-point scale]
Q25	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving.	Strongly agree – Strongly disagree [5-point scale]

Thank you for taking part in this survey.

You can find the information sheet about this study at the following [link](#), should you wish to keep this for your records.

+ Items not included in T3 survey. One additional question included on SDSA Surrey T3 surveys 'If you have any further comments to make about the SDSA21 film or this programme of research more generally please write them here' [Open text response]. * Survey items reverse coded for analysis

H.4 Participant Road Safety Attitude Survey - T2 (SDSA Surrey)

No.	Question	Response options
Informed consent statement		
	Aim: To explore young people's attitudes to road safety.	
	This research aims to explore young people's attitudes to road safety. The survey will inform PhD research which aims to find the best way to use pre-driver education to support young and novice driver safety.	
	I agree to take part in the above Cranfield University PhD research project. I have had the project explained to me and I have read the student information sheet, which I may keep for my records. I understand this will involve taking part in completing up to three questionnaires about my attitudes to road safety. This information will be held and processed for the following purpose(s):	
	To answer the research question concerned with the nature of young people's attitudes to road safety.	
	Upon taking part in the study I understand that I can, if I wish, withdraw my data within 2 months of completing the first survey. The survey data will be anonymised after all survey responses have been received and collated. I understand that this anonymized data will be stored securely on Cranfield University file servers and will be destroyed in accordance with Cranfield University Data Management Protocols.	
	I understand that any information I provide is confidential and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published.	
	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project and that I can withdraw my data within 2 months of the date of completing the first survey without being penalized or disadvantaged in any way.	
	I agree to Cranfield University recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act.	
	I agree to take part in the above study.	

If you would like to contact the PhD Student who is running the study to discuss this research, please e-mail Elizabeth Box (e.box@cranfield.ac.uk). If you have detailed questions about the processing of your data by Cranfield University please email gdpr@cranfield.ac.uk.

Please note that whilst this survey has been optimised for mobile device display, it will be best displayed on a laptop or desktop

- I consent to take part in the survey
- I do not consent, I do not wish to participate

No.	Question	Response options
About you		
Q1	What gender do you identify as?	Male, Female, Non-binary, Prefer not to say
Q2	How old are you?	15, 16, 17, 18, 19
Q3	What is your ethnic group?	White; Mixed or multiple ethnic groups; Asian or Asian British; Black, African, Caribbean or Black British; Other ethnic group; Prefer not to say
Q3a	[Further segmentation of ethnic groups]	[Further segmentation of ethnic groups as asked by Census]
Q4	What school/college do you attend?	[Selection of all schools/colleges taking part in the trial]
Q4a	[If select 'Other' in Q4] Please write the name of your school/college below	[Open text response]
Q5	What year group are you in?	Year 12, Year 13, Other (Please state)
Q6	Who is your form teacher/tutor?	[Open text response]
Q7	What is your name?	First name, surname
Q7i	Which of the following have you watched/taken part in? (Select all that apply)	DriveFit film, DriveFit workshop, Neither
Q7ii	Have you received any other road safety education in the past 3 months?	Yes, No
Q7iia	[If selected 'Yes' in Q7ii]	What road safety education have you received in the past 3 months? [Open text response]
About learning to drive		
Q8	Do you plan to learn to drive?	Yes, I have already passed my driving test (Please state MM/YYYY of test pass); Yes, I am currently learning; Yes, in the next 12 months; Yes, in the next 5 years; Maybe, at some point; No, never.
Q8a	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] How many months did it take you to pass your driving test (counting from your first driving practise with a driving instructor or an experienced driver?)	1-2 months, 3-4 months, 5-6 months, 7-8 months, 9-10 months, 11-12 months, over 12 months

No.	Question	Response options
Q8b	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] On average, how many hours of driving practise did you get each month whilst learning to drive?	Less than one hour per month, Between one hour and 2 hours per month, Between 3 hours and 4 hours per month, Between 5 and 6 hours per month, Between 7 and 8 hours per month, More than 8 hours per month
Q8c	[If 'Yes, I have already passed my driving test' – 'Yes, in the next 5 years' is selected] Who did you learn to drive with? (Please select all that apply)	Driving instructor, Parents/guardians, other eligible family (over the age of 21, who have held a driving licence for at least 3 years, Eligible friends, Other (Please state)
Q9	In total, how many cars or vans are owned, or available for use, by members of your household?	None, 1, 2, 3, 4, 5 or more (Please write in the number)
Your attitudes and views about specific driving behaviours		
Q10	Driving whilst messaging or talking on a hand-held mobile is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q11	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q12	Driving whilst over the legal alcohol limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q13	How likely and willing would you be to drive whilst over the legal alcohol limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q14	Driving whilst feeling very tired is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]
Q15	How likely and willing would you be to drive whilst feeling very tired?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Your attitudes and views about managing speed		
Q16	Driving over the speed limit is...	Matrix response Harmful – Beneficial, Negative – Positive, Wise – Foolish*, Pleasant – Unpleasant* [7-point scale]

No.	Question	Response options
Q17	People who are important to me think that I should/should not drive over the speed limit.	Think I should – Think I should not* [7-point scale]
Q18	People who are important to me would approve/disapprove of me driving over the speed limit.	Would approve – Would disapprove* [7-point scale]
Q19	How much control would you have over whether or not you would drive over the speed limit	Complete control – No control [7-point scale]
Q20	If I wanted to driving over the speed limit would be...	Easy – Difficult* [7-point scale] [Nb. scaled this way for analysis (1 = safest response), but item not used due to difficulty with interpretation (by participants and for analysis)]
Q21	How likely and willing would you be to drive over the speed limit?	Matrix response Likely – Unlikely*, Very Willing – Not very willing* [7-point scale]
Q22	To what extent do you agree or disagree with the following statements?	Matrix response Decreasing the speed limit on the motorways is a good idea, Even at night-time on quiet roads it is important to keep within the speed limit, Drivers who cause accidents by reckless driving should be banned from driving for life, People should never overtake on the inside lane even if a slow driver is blocking the outside lane, In towns where there are a lot of pedestrians the speed limit should be 20mph, Penalties for speeding should be more severe Response options: Strongly agree, agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q22a	[If 'Yes, I have already passed my driving test' is selected] How often have you kept within 30mph speed limits when driving over the last month?	Never – Nearly all the time* [7-point scale]
Q22b	[If 'Yes, I have already passed my driving test' is selected] I have kept within 30mph speed limits when driving over the last month.	Strongly disagree – Strongly agree* [7-point scale]
Your attitudes and views about general driving behaviours		
Q23	When driving, how safe do you think the following situations are?	Matrix response: Driving with 2 or more passengers, Driving between midnight and 6am, Driving at 70mph in a 60mph zone, Driving at 40mph in a 30mph zone, Driving while talking on a mobile phone, Driving a car which is over 10 years old, Driving with a blood alcohol level just above the legal limit, Driving whilst messaging on a mobile phone, Driving after smoking marijuana, Going through a red light Response options: Always safe, Mostly safe, Sometimes safe, Rarely safe* [4-point scale]

No.	Question	Response options
Q24	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting?	Matrix response: I will make sure I avoid reckless or impulsive actions, I will make sure I keep a safe distance from the vehicle in front, I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather, I will make sure I watch my speed carefully. Response options: Not at all – Very Much* [6-point scale]
Q25	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving.	Strongly agree – Strongly disagree [5-point scale]
Thank you for taking part in this survey.		
You can find the information sheet about this study at the following link , should you wish to keep this for your records		

* Survey items reverse coded for analysis

H.5 Survey measures

Measure	Acronym	No. items	Scale	Question*	Cronbach Alpha		
					T1	T2	T3
Primary outcome measures							
All intentions (Excluding alcohol)	INT_ALL	8	1:7	[Scaled mean of INT_MOB, INT_FATIGUE & INT_SPEED) [Unlikely - Likely] [Not at all willing – Very willing]	0.79	0.86	0.88
Mobile phone use intentions	INT_MOB	2	1:7	How likely and willing would you be to drive whilst messaging or talking on a hand-held mobile phone	0.90	0.82	0.91
Drink driving intentions	INT_ALCO	2	1:7	How likely and willing would you be to drive whilst over the legal alcohol limit	0.70	0.71	0.86
Driving whilst fatigued intentions	INT_FATIGUE	2	1:7	How likely and willing would you be to drive whilst feeling very tired	0.77	0.86	0.87
Speeding intentions	INT_SPEED	2	1:7	How likely and willing would you be to drive over the speed limit	0.90	0.92	0.91
Secondary outcome measures							
All attitudes (Excluding alcohol)	ATT_ALL	16	1:7	[Scaled mean of ATT_MOB, ATT_FATIGUE, ATT_SPEED) [Harmful – Beneficial], [Negative – Positive] [Foolish - Wise], [Unpleasant - Pleasant]	0.89	0.91	0.93
Mobile phone use attitudes	ATT_MOB	4	1:7	Driving whilst messaging or talking on a hand-held mobile is...	0.81	0.83	0.88
Drink driving attitudes	ATT_ALCO	4	1:7	Driving whilst over the legal alcohol limit is...	0.66	0.75	0.90
Driving whilst fatigued attitudes	ATT_FATIGUE	4	1:7	Driving whilst very tired is...	0.87	0.91	0.92
Speeding attitudes	ATT_SPEED	4	1:7	Driving over the speed limit is...	0.89	0.89	0.94

Measure	Acronym	No. items	Scale	Question	Cronbach Alpha		
					T1	T2	T3
Additional secondary outcome measures							
Subjective norms associated with speeding	SNORM	2	1:7	People who are important to me [think that I should/should not] / [would approve/disapprove of me] drive/ing over the speed limit [Think I should not – Think I should] [Would disapprove – would approve]	0.80	0.80	0.81
Perceived behavioural control associated with speeding	PBC	1	1:7	How much control would you have over whether or not you would driver over the speed limit [Complete control – No control]	-	-	-
Attitudes to Driving Violations Scale	ADVS	7	1:5	To what extent do you agree or disagree with the following statements...Decreasing the speed limit on motorways is a good idea; Even at night-time on quiet roads it is important to keep within the speed limit; Drivers who cause accidents by reckless driving should be banned from driving for life; People should driver slower than the speed limit when it is raining; Cars should never overtake on the inside lane even if a slow driver is blocking the outside lane; In towns where there are a lot of pedestrians the speed limit should be 20mph; Penalties for speeding should be more severe [Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree]	0.64	0.70	0.73
Perception of risk scale	P_RISK	10	1:4	When driving, how safe do you think the following situations are...Driving with 2 or more passengers; Driving between midnight and 6am; Driving at 70mph in a 60mph zone; Driving at 40mph in a 30mph zone; Driving while talking on a mobile phone; Driving a car which is over 10 years old; Driving with a blood alcohol level just over the legal limit; Driving whilst messaging on a mobile phone; Driving after smoking marijuana; Going through a red light. [Rarely Safe, Sometimes safe, Mostly safe, Always safe, .]	0.66	0.79	0.74

Measure	Acronym	No. items	Scale	Question	Cronbach Alpha		
					T1	T2	T3
Driver coping questionnaire scale	DCQ	4	1:6	Think of a particularly stressful driving situation, such as having a collision, being stuck in a traffic jam or having to drive for a long time in poor visibility and heavy traffic. How much do you think you would engage in the following activities when driving is difficult, stressful or upsetting...I will make sure I avoid reckless or impulsive actions; I will make sure I keep a safe distance from the vehicle in front; I will make sure that I deliberately slow down when I meet a difficult traffic situation or bad weather; I will make sure I watch my speed carefully [Very much – Not at all]	0.82	0.86	0.88
Efficacy	EFF	1	1:5	To what extent do you agree or disagree with the following statement: As a driver, I am confident that I will meet the challenge of maintaining safe driving behaviours and managing my personal risk whilst driving [Strongly agree – Strongly disagree]	-	-	-

* Survey measures displayed as scaled for analysis

H.6 Sub-group analysis - Intentions

Figure H.6-1 T2 Fatigue sub-group analysis

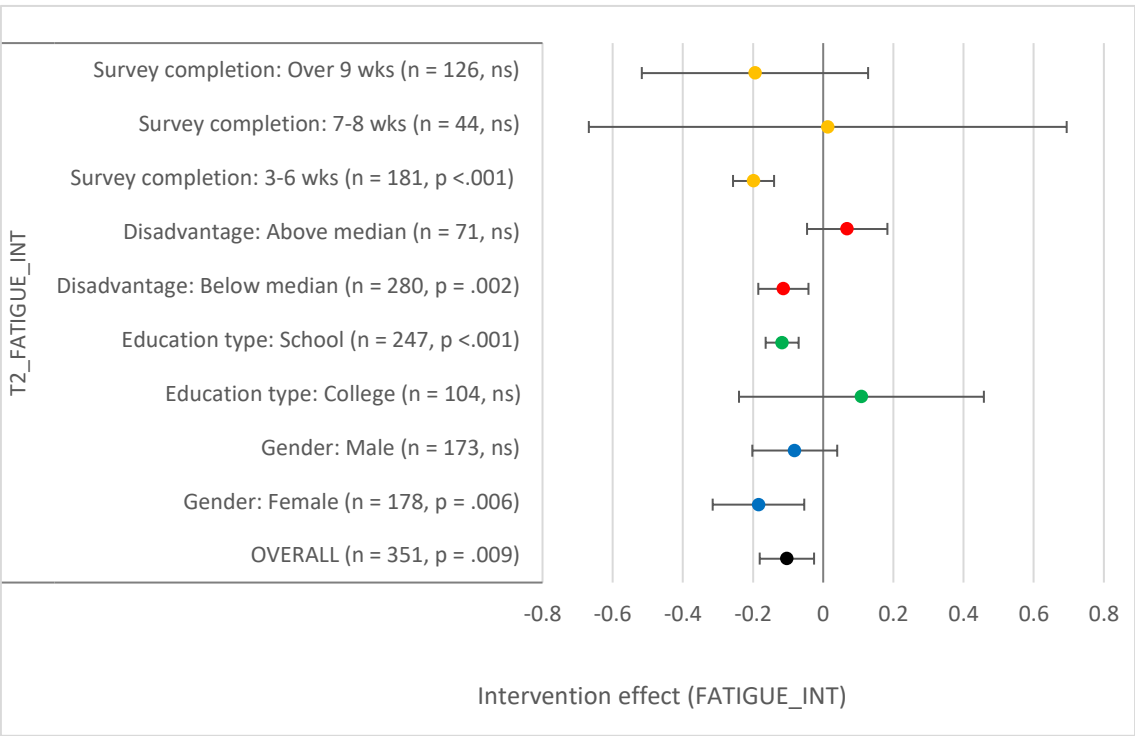
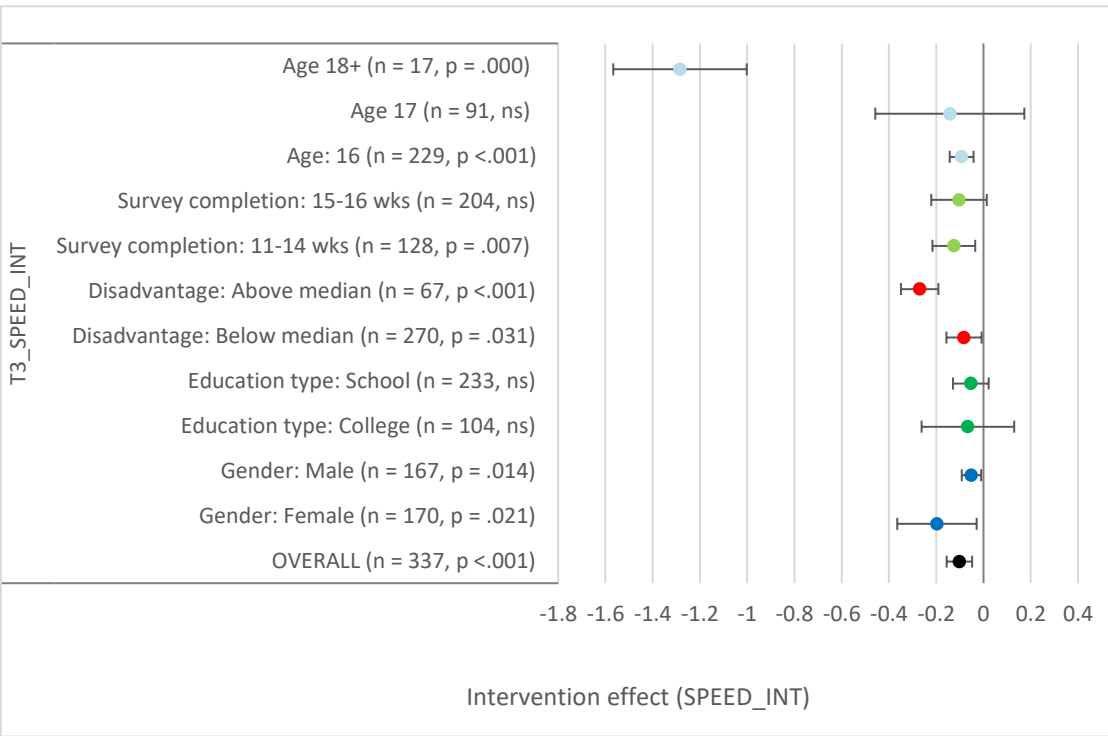


Figure H.6-2 T3 Speed sub-group analysis



H.7 Sub-group analysis – Attitudes

Figure H.7-1 T2 All attitude sub-group analysis

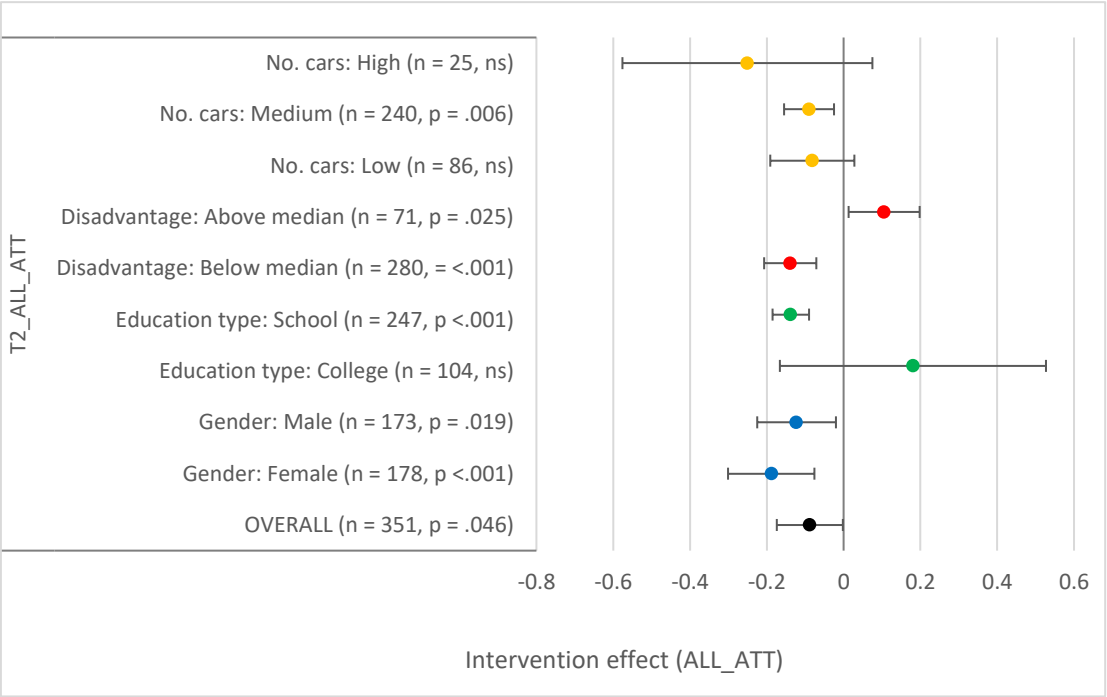


Figure H.7-2 T2 Mobile phone use sub-group analysis

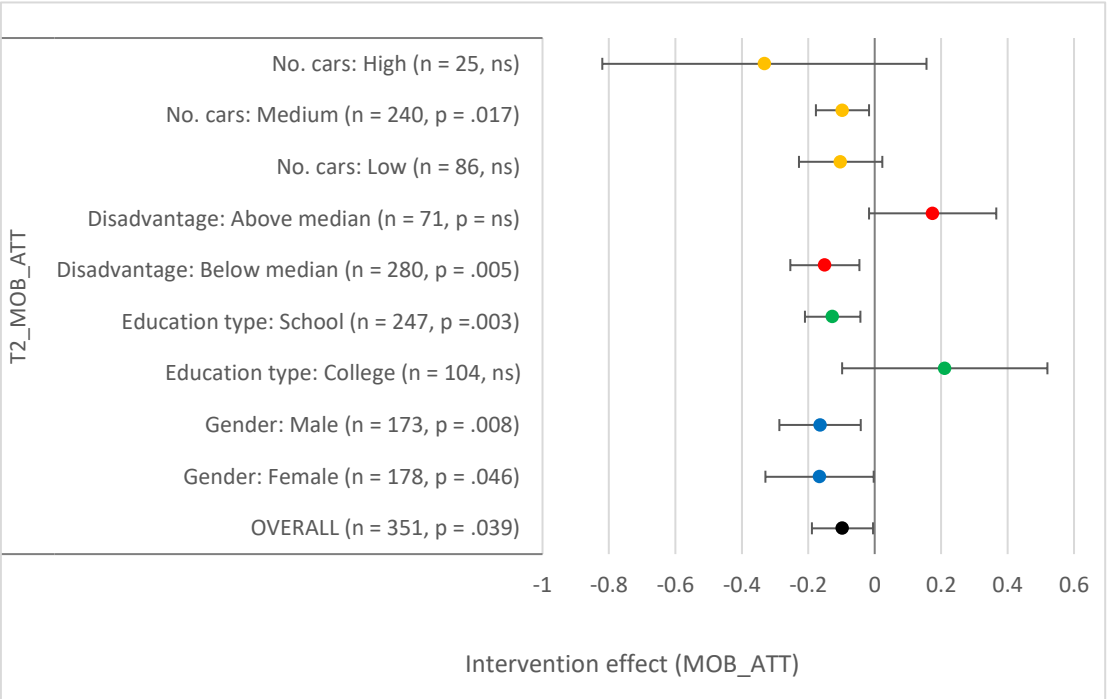


Figure H.7-3 T2 Drink driving sub-group analysis

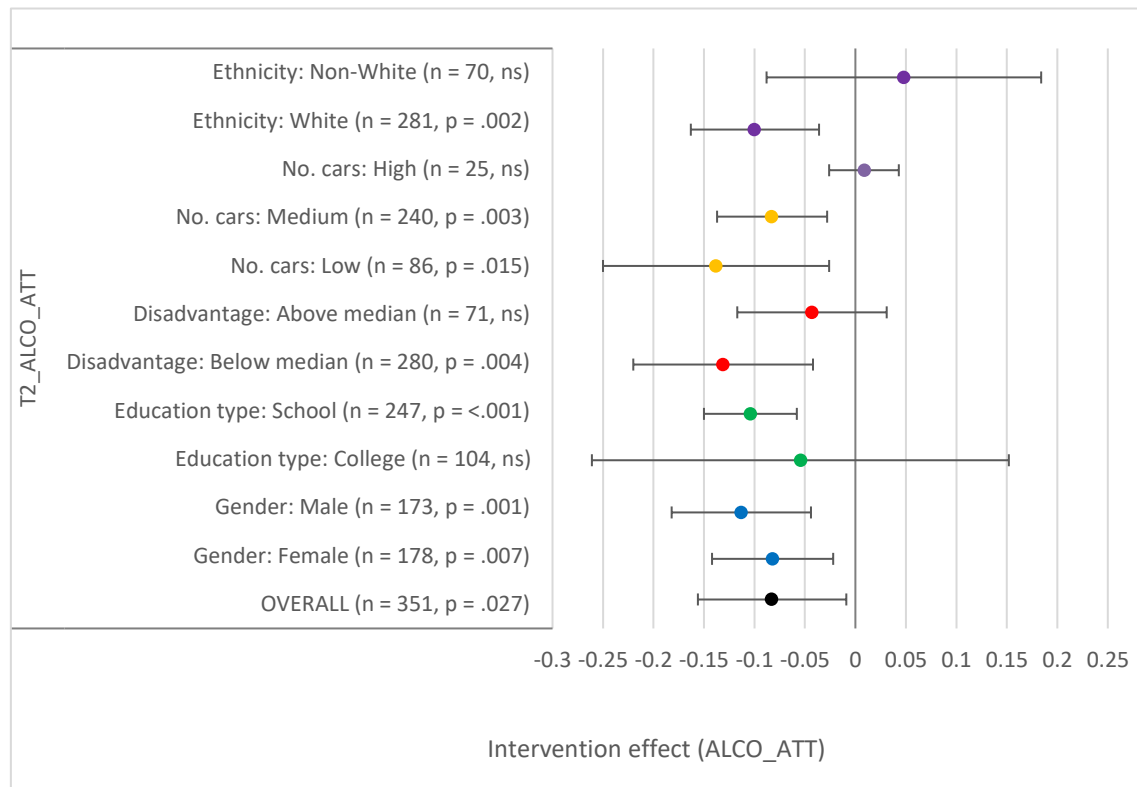


Figure H.7-4 T2 Speed sub-group analysis

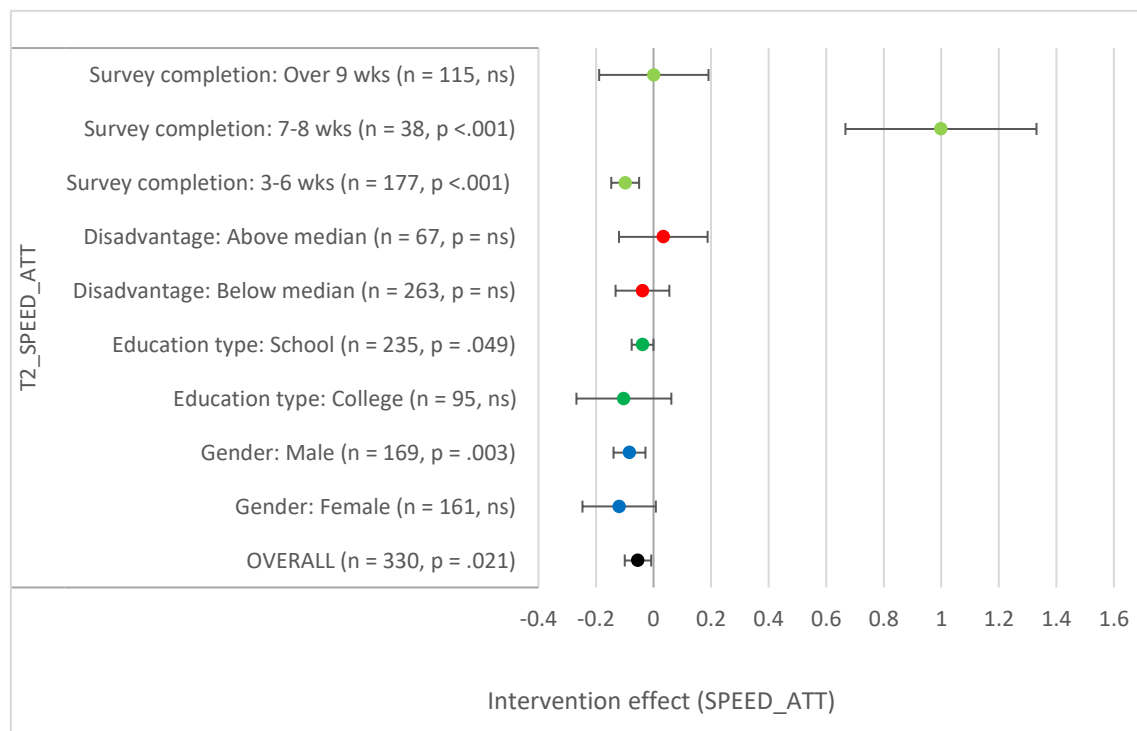
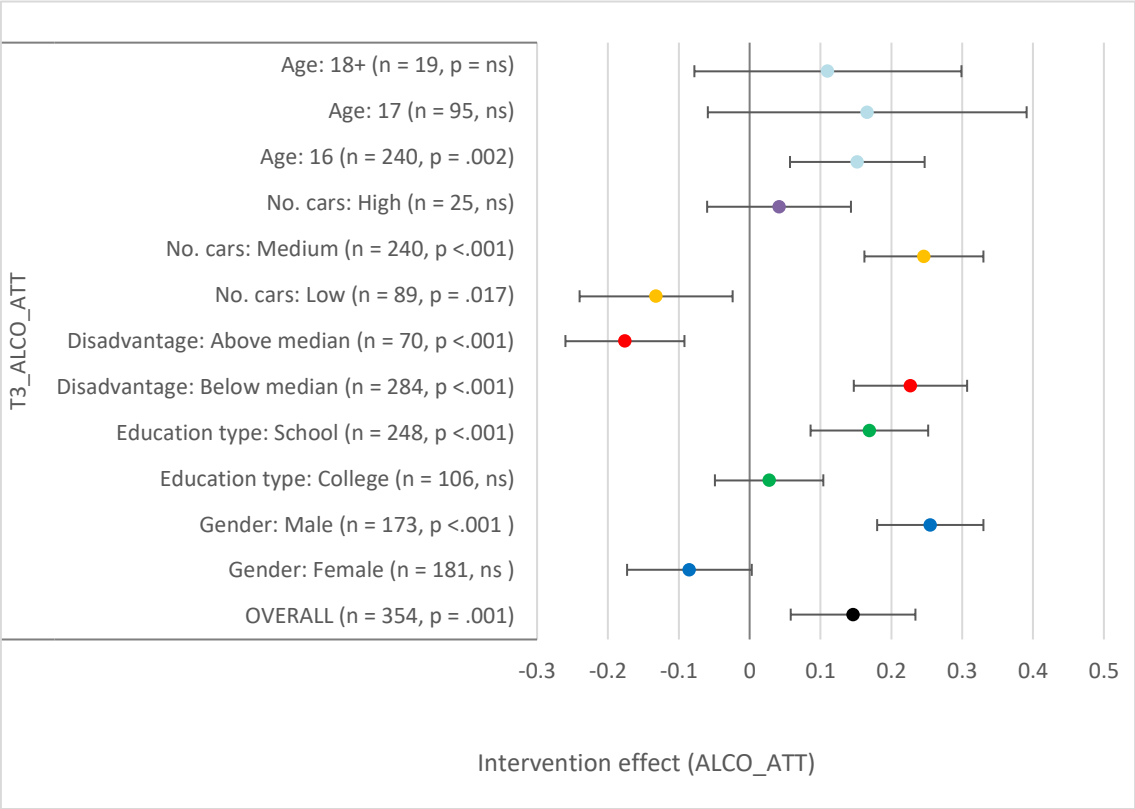


Figure H.7-5 T3 Drink driving sub-group analysis



H.8 Sub-group analysis – Other measures

Figure H.8-1 T2 Perceived Behavioural Control (PBC) sub-group analysis

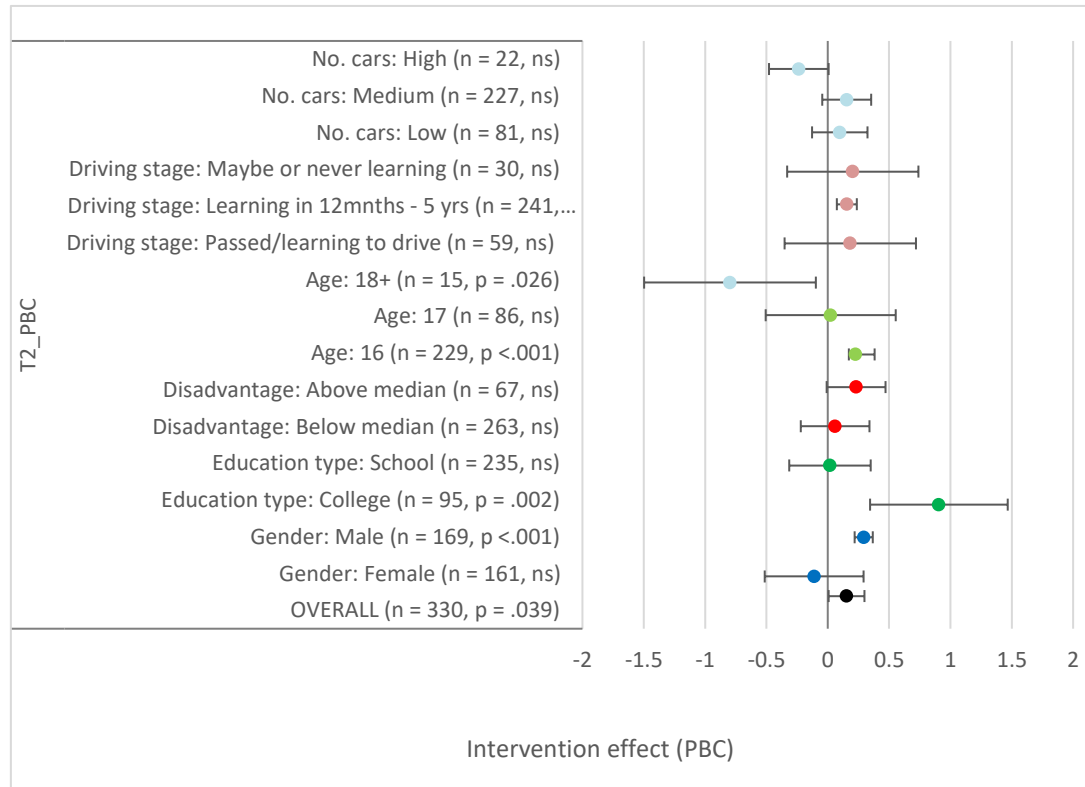


Figure H.8-2 T2 Attitudes to Driving Violations Scale (ADVS) sub-group analysis

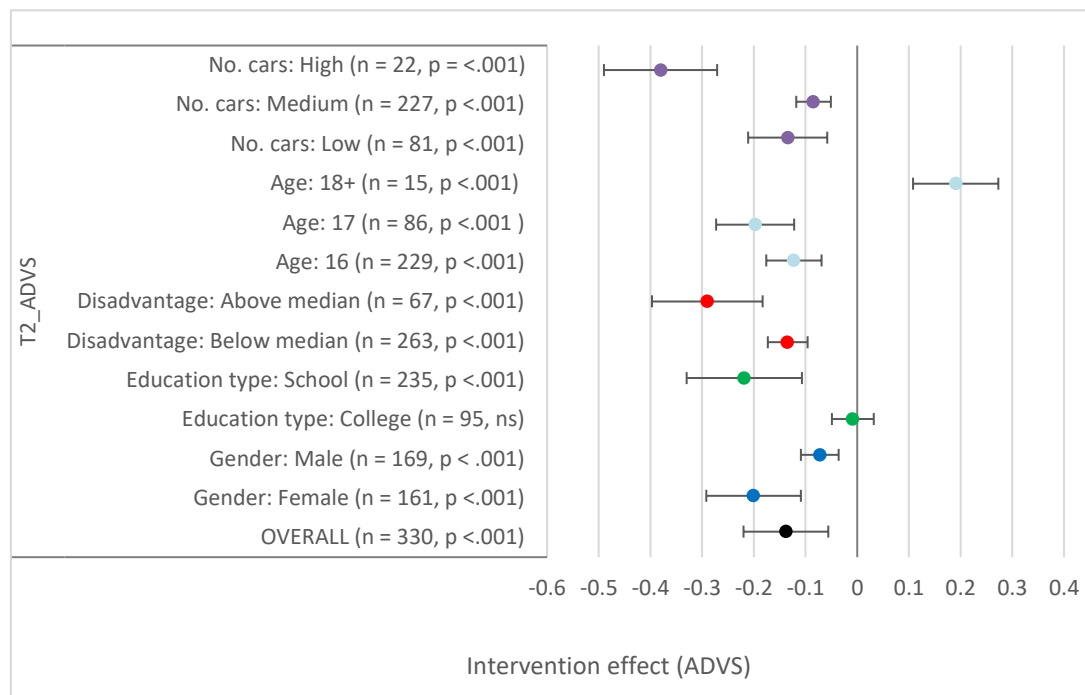


Figure H.8-3 T2 Efficacy sub-group analysis

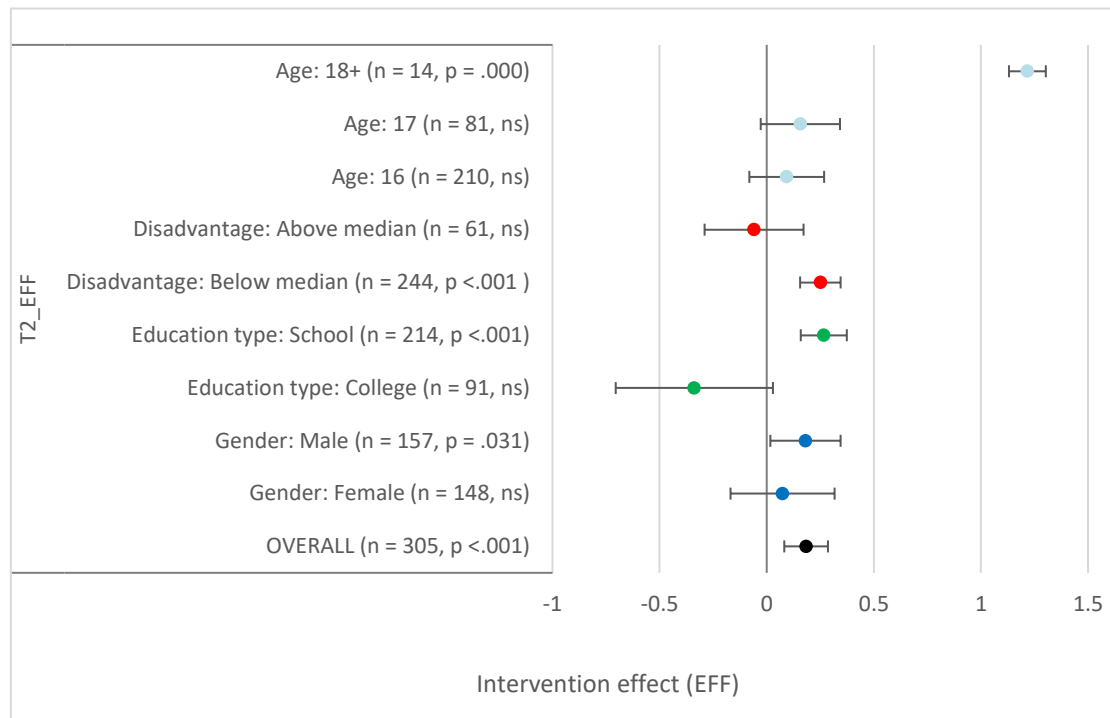
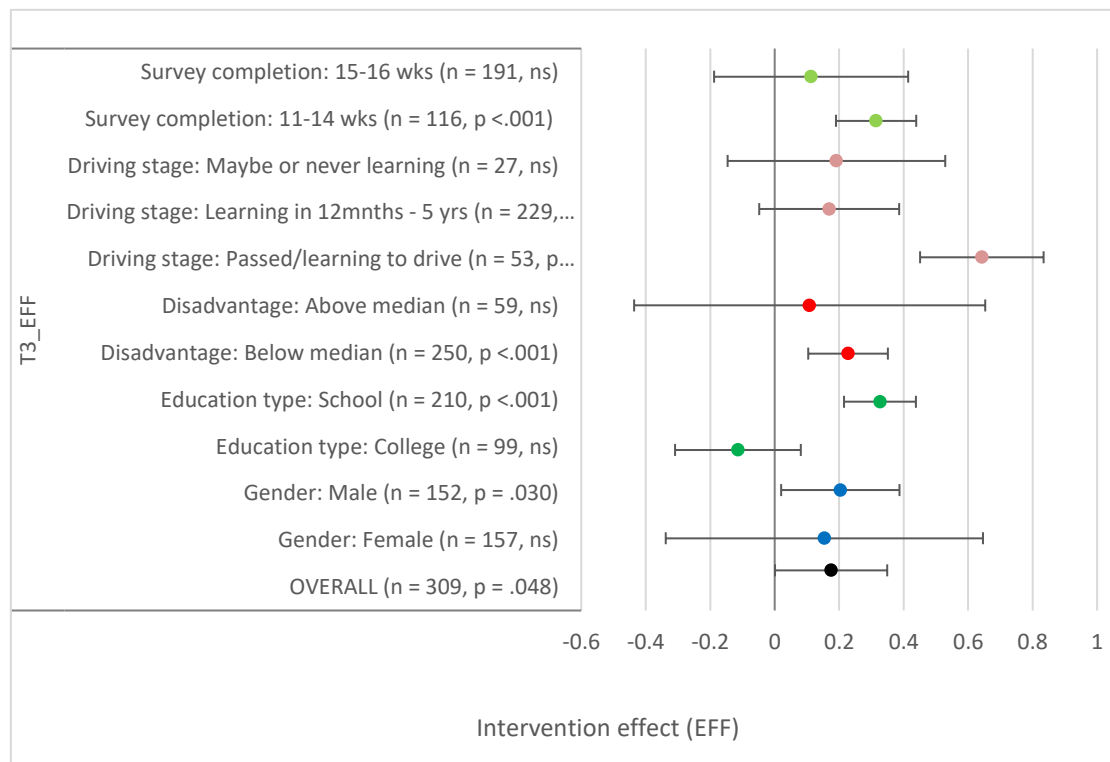


Figure H.8-4 T3 Efficacy sub-group analysis



Appendix I – Paper 9 appendices

I.1 Process evaluation Plan for PdTWER Intervention

Component	Process evaluation Question	Data Sources	Tools/Procedures
Fidelity	<i>To what extent was the intervention implemented consistently and as planned?</i>	<ul style="list-style-type: none"> - Students - Facilitators - Teachers - PdTWER Delivery Board 	<p>Fidelity of implementation will be assessed using an observation procedure.</p> <ul style="list-style-type: none"> - Google analytics - T2 student website use - Vimeo Analytics – Film downloads by school/college - Workshop Delivery – random sample observation - T2 facilitator logbook - T2 facilitator questionnaire - T2 facilitator focus groups - T2 teacher questionnaire - Field notes - Interview notes - Minutes of meetings - Emails - Reflections - Classroom observations
Dose delivered	<i>To what extent were the units (film & workshop) within the intervention implemented?</i>	<ul style="list-style-type: none"> - Students - Facilitators - Teachers - PdTWER Delivery Board 	<ul style="list-style-type: none"> - Vimeo Analytics – Film downloads by school/college - T2 student questionnaire - T2 student focus groups - T2 teacher questionnaire - T2 facilitator questionnaire - T2 facilitator focus group - T2 facilitator logbook - Intervention observations - Documentation of PdTWER delivery board and facilitator activities

Component	Process evaluation Question	Data Sources	Tools/Procedures
Dose received	<i>Did students enjoy and engage with the PdTWER intervention? Were teachers and facilitators satisfied with the intervention? Where the PdTWER delivery board satisfied with the intervention?</i>	<ul style="list-style-type: none"> - Students - Facilitators - Teachers - PdTWER Delivery Board 	<ul style="list-style-type: none"> - T2 student website use: Google analytics on frequency and duration of website use - T2 student questionnaire - T2 student focus groups - T2 facilitator questionnaire - T2 facilitator focus groups - T2 facilitator logbook - T2 teacher questionnaire - Field notes - Interview notes - Minutes of meetings - Emails - Reflections - Classroom observations
Reach	<i>What % of students within the intervention schools was the programme delivered to?</i>	<ul style="list-style-type: none"> - Students 	<ul style="list-style-type: none"> - T2 student questionnaire
Recruitment	<i>What procedures were followed to recruit schools and participants (students, teachers and facilitators) to the PdTWER intervention?</i>	<ul style="list-style-type: none"> - PdTWER Delivery Board - Teachers 	<ul style="list-style-type: none"> - £200 contribution to school/college funds for successful completion of study
Context	<i>What were the barriers and facilitators to implementing the PdTWER intervention?</i>	<ul style="list-style-type: none"> - Students - Facilitators - Teachers - PdTWER Delivery Board 	<ul style="list-style-type: none"> - T2 student questionnaire - T2 student focus group - T2 teacher questionnaire - T2 facilitator logbook - T2 facilitator questionnaire - Field notes - Interview notes - Minutes of meetings - Emails - Reflections - Classroom observations

I.2 Student process evaluation survey questions – DriveFit

Your views on the film and workshop		
No.	Question	Response options
Q26	To what extent do you agree or disagree that the DriveFit film was...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Boring*, Surprising, Shocking*, Worrying*, Frightening* Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q27	To what extent do you agree or disagree that the DriveFit workshop was...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Boring*, Surprising, Shocking*, Worrying*, Frightening* Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q28	To what extent do you agree or disagree that the DriveFit programme (film & workshop) you have taken part in...	Matrix response: Has provided you with new insights, Has been beneficial to you personally, Has covered ideas that you see yourself doing, Has highlighted changes that you need to make, Will make a difference to your decisions and behaviours as a driver or passenger Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q29	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit programme (film & workshop)	Matrix response: I feel that I have benefited from watching the DriveFit film, I feel that I have benefited from taking part in the DriveFit workshop, I am now more aware of my responsibilities as a driver/future driver, I am now more aware of my responsibilities as a passenger, The DriveFit programme has changed how I think about being a driver, I plan to take the learning from the DriveFit programme and apply it to how I behave as a driver/future driver Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q30	Please indicate the extent to which you agree with the following statements about your planned use of the DriveFit website and your expected sharing of the information from the DriveFit programme	Matrix response: I plan to visit the DriveFit website at least once, I expect to visit the DriveFit website more than once, I plan to share the DriveFit website with my parents/guardians, I plan to share the DriveFit website with my friends, I plan to share information about/from the DriveFit programme via social media Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]

No.	Question	Response options
Q31	If you have any further comments to make about the DriveFit programme please write them here.	[Open text response]
Taking part in a focus group		
Q32	Would you like to take part in a focus group, run by the DriveFit researcher, to discuss your views on and experiences of the DriveFit programme?	Yes, No

* Survey items reverse coded for analysis

I.3 Student process evaluation survey questions – SDSA Surray

No.	Question	Response options
Your views on the film and workshop		
Q26	To what extent do you agree or disagree that the SDSA film was...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Boring*, Surprising, Shocking*, Worrying*, Frightening* Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q27	To what extent do you agree or disagree that the SDSA film you have watched...	Matrix response: Has provided you with new insights, Has been beneficial to you personally, Has covered ideas that you see yourself doing, Has highlighted changes that you need to make, Will make a difference to your decisions and behaviours as a driver or passenger Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q28	Please indicate the extent to which you agree or disagree with the following statements about the SDSA film	Matrix response: I feel that I have benefited from watching the SDSA film, I am now more aware of my responsibilities as a driver/future driver, I am now more aware of my responsibilities as a passenger, The SDSA film has changed how I think about being a driver, I plan to take the learning from the SDSA film and apply it to how I behave as a driver/future driver Response options: Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree [5-point scale]
Q29	If you have any further comments to make about the SDSA film please write them here.	[Open text response]
Taking part in a focus group		
Q30	Would you like to take part in a focus group, run by the PdTWER programme researcher, to discuss your views on and experiences of the SDSA film?	Yes, No

* Survey items reverse coded for analysis

I.4 Teacher process evaluation survey questions – DriveFit film

No.	Question	Response options
About your students		
Q1	What is the name of your school/college?	[Choice text]
Q1a	[If Other chosen in Q1] Please write the name of your school/college below	[Open text response]
Q2	What courses are your students taking?	Academic (i.e., A levels), Vocational (i.e., BTEC), Academic and Vocational, Other (Please state) [Open text]
Q3	To your knowledge, has your class received any other road safety education over the past 6 months?	Yes, No, Don't know
Q3a	What road safety education have they received in the past 6 months?	[Open text response]
Q4	How many students have watched the film today?	[Open text response]
Your views on pilot study information and set up		
Q5	How easy did you find it to access and play the DriveFit film in your class?	Very easy – Not at all easy [5-point scale]
Q6	To what extent do you agree or disagree with the following statement 'The information provided ahead of the delivery of the DriveFit film was clear and easy to understand'?	Strongly agree – strongly disagree [5-point scale]
Q7	Please provide any further comments below on improvements which could be made to support the delivery of the DriveFit film	[Open text response]
Your views on the DriveFit film		
Q9	To what extent do you agree or disagree that your students found the DriveFit film...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Amusing, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q10	On a scale of 1-10 to what extent did the film hold the classes attention?	Dial option: 0 = did not hold classes attention at all; 10 = Maintained very high levels of attention*
Q11	To what extent were the information, hints and tip(s) provided in the film pitched at the right level for your students?	[Very much so – Not at all] [7-point scale]

No.	Question	Response options
Q12	Are there any improvements that could be made to the film to increase accessibility and inclusivity, particularly for SEN students?	[Open text response]
Q13	What aspects of the curriculum (if any) does the DriveFit film help fulfil for this age group	[Open text response]
Q14	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit workshop	Matrix response: I feel that my students have benefited from watching this film I think my students are more aware of their responsibilities as drivers/future drivers I think my students are more aware of their responsibilities as passengers I think that the learning from the workshop will help support safer behaviours amongst my students I would recommend the DriveFit film to my colleagues I would support disseminating information about the DriveFit to parents/guardians
Q15	If you have any further comments to make about the DriveFit workshop please write them below	[Open text response]
Thank you for providing your comments on the DriveFit programme. If you have any further comments that you would like to raise with the DriveFit Team please contact [Devon and Somerset Fire and Rescue Service co-ordinator email address].		

I.5 Teacher process evaluation survey questions – DriveFit workshop

No.	Question	Response options
About your students		
Q1	What is the name of your school/college?	[Choice text]
Q1a	[If Other chosen in Q1] Please write the name of your school/college below	[Open text response]
Q2	How many students took part in the DriveFit workshop today?	[Open text response]
Your views on pilot study information and set up		
Q3	How easy did you find it to set up and support the running of the DriveFit workshop in your class?	Very easy – Not at all easy [5-point scale]
Q4	To what extent do you agree or disagree with the following statement 'The information provided ahead of the delivery of the DriveFit workshop was clear and easy to understand'	Strongly agree – strongly disagree [5-point scale]

No.	Question	Response options
Q5	To what extent do you agree or disagree with the following statement: "Students were able to fill in their post-workshop online questionnaires without any difficulty"	Strongly agree – strongly disagree [5-point scale]
Q6	Please provide any further comments below on improvements which could be made to support the delivery of the DriveFit workshop	[Open text response]
Your views on the DriveFit workshop		
Q7	To what extent do you agree or disagree that your students found the DriveFit workshop...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring*, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q8	On a scale of 1-10 to what extent did the workshop hold the classes attention?	Dial option: 0 = did not hold classes attention at all; 10 = Maintained very high levels of attention* [10-point scale]
Q9	To what extent were the exercise provided in the workshop pitched at the right level for your students?	[Very much so – Not at all] [7-point scale]
Q10	Are there any improvements that could be made to the workshop to increase accessibility and inclusivity, particularly for SEN students?	[Open text response]
Q11	What aspects of the curriculum (if any) does the DriveFit workshop help fulfil for this age group	[Open text response]
Q12	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit workshop	Matrix response: I feel that my students have benefited from taking part in the DriveFit workshop I think that the learning from the workshop will help support safer behaviours amongst my students I would recommend the DriveFit workshop to my colleagues I would support disseminating information about the DriveFit programme (film and workshop) to parents/guardians
Q13	If you have any further comments to make about the DriveFit workshop please write them below	[Open text response]

No.	Question	Response options
Your views on the DriveFit programme (Film and workshop)		
Q14	On a scale of 1-10, how would you rate the...	Matrix response: DriveFit film, DriveFit workshop, DriveFit Film & Workshop combined 1 = poor, 10 = Excellent [10-point scale]
Q15	What did you like and/or dislike about the DriveFit programme as a whole?	[Open text response]
Thank you for providing your comments on the DriveFit programme. If you have any further comments that you would like to raise with the DriveFit Team please contact [Devon and Somerset Fire and Rescue Service co-ordinators email address]		

I.6 Teacher process evaluation survey questions – SDSA Surrey film

No.	Question	Response options
About your students		
Q1	What is the name of your school/college?	[Choice text]
Q1a	[If Other chosen in Q1] Please write the name of your school/college below	[Open text response]
Q2	What courses are your students taking?	Academic (i.e., A levels), Vocational (i.e., BTEC), Academic and Vocational, Other (Please state) [Open text]
Q3	To your knowledge, has your class received any other road safety education over the past 6 months?	Yes, No, Don't know
Q3a	What road safety education have they received in the past 6 months?	[Open text response]
Q4	How many students have watched the film today?	[Open text response]
Your views on pilot study information and set up		
Q5	How easy did you find it to access and play the SDSA film in your class?	Very easy – Not at all easy [5-point scale]
Q6	To what extent do you agree or disagree with the following statement 'The information provided ahead of the delivery of the SDSA film was clear and easy to understand'	Strongly agree – strongly disagree [5-point scale]
Q7	Please provide any further comments below on improvements which could be made to support the delivery of the SDSA film	[Open text response]

No.	Question	Response options
Your views on the SDSA film		
Q9	To what extent do you agree or disagree that your students found the SDSA film...	Matrix response: Credible, Useful, Interesting, Important, Informative, Enjoyable, Surprising, Boring, Shocking, Worrying, Frightening [Strongly agree – Strongly disagree] [5-point scale]
Q10	On a scale of 1-10 to what extent did the film hold the classes attention?	Dial option: 0 = did not hold classes attention at all; 10 = Maintained very high levels of attention
Q11	To what extent were the information, hints and tip(s) provided in the film pitched at the right level for your students?	[Very much so – Not at all] [7-point scale]
Q12	Are there any improvements that could be made to the film to increase accessibility and inclusivity, particularly for SEN students?	[Open text response]
Q13	What aspects of the curriculum (if any) does the SDSA film help fulfil for this age group	[Open text response]
Q14	Please indicate the extent to which you agree or disagree with the following statements about the DriveFit workshop	Matrix response: I feel that my students have benefited from watching this film I think my students are more aware of their responsibilities as drivers/future drivers I think my students are more aware of their responsibilities as passengers I think that the learning from the workshop will help support safer behaviours amongst my students I would recommend the DriveFit film to my colleagues I would support disseminating information about the DriveFit to parents/guardians
Q15	If you have any further comments to make about the DriveFit workshop please write them below	[Open text response]
Thank you for providing your comments on the SDSA film. If you have any further comments that you would like to raise with the SDSA Surrey team please contact [Surrey Fire and Rescue Service co-ordinator email address].		

I.7 Qualitative Process evaluation questions

I.7.1 Delivery partners - DriveFit

Delivery partner: Devon and Somerset Fire and Rescue Service

Intro: Purpose of program evaluation is to monitor and document program implementation to aid in understanding of specific elements and programme outcomes. I have 11 questions to go through, which covers the fidelity, dose planned/delivered received, recruitment and context of the programme. We have 1hr for the call, I don't expect it to take the full hour.

Given the survey phase is not yet complete, I expect that we will revisit these questions in February on completion of the trial work, but it is good to discuss these points now, whilst it is in our minds. I would ask you both to be as honest as possible. Whilst I have been involved in the design and delivery of this intervention, it's important that you respond honestly to the questions, to ensure we learn the lessons from this research. Are you happy for me to record the session? This will be used for transcription processes only and will not be shared? Happy to proceed?

Background Qs: Age category (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 – 69), no. years in role related to pre-driver and young driver education

Q1. To what extent was the intervention implemented consistently and as planned? (Fidelity)

- Did you have any feedback from the schools/colleges about how they watched the film – in terms of watch format (individually, as a class, as a school – Exeter outlier)?

Q2. To what extent were the units (film & workshop) within the intervention implemented? (Dose)

- Did you have any feedback from schools/colleges about delivering one, but not the other component of the intervention, or in the wrong order?

Q3. Did students enjoy and engage with the DriveFit intervention overall? (Dose received)

- To what extent were participants present at intervention activities engaged in the activities?
- How did participants react to specific aspects of the intervention?
- Did you get any feedback from the class about the film – or a sense of how they responded to it?
- What about engagement with the workshop? Did you get a sense that there was both initial and continued use of the material and ideas presented in the workshop and the film?
- Did you receive any feedback directly from teachers about how they felt the intervention went?

Q4. To what extent were you satisfied with the intervention? (Dose received)

- What worked well?
- What didn't work so well?
- What elements are worth repeating in future?
- What improvements would you suggest?

Q5. What were the barriers to recruiting schools/colleges to the trial? (Recruitment)

Q6. What planned and actual procedures were used to encourage continued involvement of schools/colleges? (Recruitment)

Q7. What were the barriers to maintaining involvement of schools/colleges in the intervention (Recruitment)

Q8. What supported/facilitated implementing the DriveFit intervention? (Context)

Q9. What were the barriers to implementing the DriveFit intervention? (Context)

Q10. What are your thoughts about rolling out a programme like DriveFit in future?

Q11. Do you have any further comments?

I.7.2 Facilitators - DriveFit

Intro: Purpose of program evaluation is to monitor and document program implementation to aid in understanding of specific elements and programme outcomes. I have 9 questions to go through, which covers the fidelity, dose planned/delivered received, recruitment and context of the programme. We have 1hr for the call, I don't expect it to take the full hour. I would ask you both to be as honest as possible. Whilst I have been involved in the design and delivery of this intervention, it's important that you respond honestly to the questions, to ensure we learn the lessons from this research. Are you happy for me to record the session? This will be used for transcription processes only and will not be shared? Happy to proceed?

Background Qs: Age category (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 – 69) and number of years working in facilitation and experience working with this group.

Q1. To what extent was the intervention implemented consistently and as planned? (Fidelity)

- To what extent was training provided as planned?
- What variations of workshop delivery were there (numbers and formats?)
- Did you have any feedback from the schools/colleges about how they watched the film – in terms of watch format (individually, as a class, as a school)?

Q2. To what extent were the units (film & workshop) within the intervention implemented? (Dose)

- To what extent were all materials (written and audio-visual) designed for use in the intervention used?
- To what extent was all of the intended content covered?
- To what extent were all the strategies and activities used?
- Did all schools/colleges that you engaged with say that they had watched the film ahead of the workshop? Did you get a sense of how far ahead they watched the film? Were there some individuals that didn't watch the film. How common was this? What percentage would you say?
- Was there any variation/adaptions in the workshops delivered (in terms of content or time spent with the class)

Q3. Did students enjoy and engage with the DriveFit intervention overall? (Dose received)

- To what extent were participants present at intervention activities engaged in the activities?
- How did participants react to specific aspects of the intervention?
- Did you get any feedback from the class about the film – or a sense of how they responded to it?
- What about engagement with the workshop? Did you get a sense that there was both initial and continued use of the material and ideas presented in the workshop and the film?

- Did you receive any feedback directly from teachers about how they felt the intervention went?

Q4. To what extent were you satisfied with the intervention? (Dose received)

- What worked well?
- What didn't work so well?
- What elements are worth repeating in future?
- What improvements would you suggest?

Q5. What were the barriers to maintaining involvement of schools/colleges in the intervention (Recruitment)

Q6. What supported/facilitated implementing the DriveFit intervention? (Context)

Q7. What were the barriers to implementing the DriveFit intervention? (Context)

Q8. What are your thoughts about rolling out a programme like DriveFit in future?

Q9. Do you have any further comments?

I.7.3 Delivery partners – SDSA Surrey

Delivery partners: Surrey Fire and Rescue Service

Intro: Purpose of program evaluation is to monitor and document program implementation to aid in understanding of specific elements and programme outcomes. I have 11 questions to go through, which covers the fidelity, dose planned/delivered received, recruitment and context of the programme. We have 1hr for the call, I don't expect it to take the full hour. Given the survey phase is not yet complete, I expect that we will revisit these questions in February on completion of the trial work, but it is good to discuss these points now, whilst it is in our minds. I would ask you both to be as honest as possible. Whilst I have been involved in the delivery of this intervention trial, it's important that you respond honestly to the questions, to ensure we learn the lessons from this research. Are you happy for me to record the session? This will be used for transcription processes only and will not be shared? Happy to proceed?

Background Qs: Age category (25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65 – 69), no. years in role related to pre-driver and young driver education

Q1. To what extent was the intervention implemented consistently and as planned? (Fidelity)

- Did you have any feedback from the schools/colleges about how they watched the film – in terms of watch format (individually, as a class, as a school – Exeter outlier)?

Q2. To what extent was the film delivered as planned? (Dose)

- Did you have any feedback from schools/colleges about how the film was consumed (e.g., split in two – I had this feedback from at least one schools/college).

Q3. Did students enjoy and engage with the SDSA21 intervention overall? (Dose received)

- Did you get any feedback from the class about the film – or a sense of how they responded to it?
- Did you receive any feedback directly from teachers about how they felt the film went?

Q4. To what extent were you satisfied with the film? (Dose received)

- What worked well?
- What didn't work so well?

- What elements are worth repeating in future?
- What improvements would you suggest?

Q5. What were the barriers to recruiting schools/colleges to the trial? (Recruitment)

Q6. What planned and actual procedures were used to encourage continued involvement of schools/colleges? (Recruitment)

Q7. What were the barriers to maintaining involvement of schools/colleges in the intervention (Recruitment)

Q8. What supported/facilitated implementing the SDSA film? (Context)

Q9. What were the barriers to implementing the SDSA film? (Context)

Q10. What are your thoughts about rolling out SDSA in future?

Q11. Do you have any further comments?

I.8 Process evaluation survey measures - DriveFit

Measure	Acronym	No. items	Scale	Question*	Cronbach Alpha		
					T1	T2	T3
Cognitive film rating	COG_FILM	5	1:5	To what extent do you agree or disagree that the DriveFit film / workshop was... Credible; Useful; Interesting; Important; Informative [Strongly agree – Strongly disagree]	-	0.92	-
Cognitive workshop rating	COG_WRKSHP	5	1:5		-	0.92	-
Emotion film rating	EMO_FILM	3	1:5	To what extent do you agree or disagree that the DriveFit film was... Shocking; Worrying; Frightening [Strongly disagree – Strongly agree]	-	0.80	-
Emotion workshop rating	EMO_WRKSHP	3	1:5		-	0.85	-
Face validity score	FCVALD	6	1:5	Please indicated the extent to which you agree or disagree with the following statements about the DriveFit programme (film & workshop): I feel that I have benefited from watching the DriveFit film; I feel that I have benefited from taking part in the DriveFit workshop; I am now more aware of my responsibilities as a passenger; The DriveFit programme has changed how I think about being a driver; and I plan to take the learning from the DriveFit programme and apply it to how I behave as a driver/future driver. [Strongly agree – Strongly disagree]	-	0.90	-

* Survey measures displayed as scaled for analysis

I.9 Process evaluation survey measures – SDSA Surrey

Measure	Acronym	No. items	Scale	Question*	Cronbach Alpha		
					T1	T2	T3
Cognitive film rating	COG_FILM	5	1:5	To what extent do you agree or disagree that the DriveFit film / workshop was... Credible; Useful; Interesting; Important; Informative [Strongly agree – Strongly disagree]	-	0.89	-
Emotion film rating	EMO_FILM	3	1:5	To what extent do you agree or disagree that the DriveFit film was... Shocking; Worrying; Frightening [Strongly disagree – Strongly agree]	-	0.77	-
Face validity score	FCVALD	6	1:5	Please indicated the extent to which you agree or disagree with the following statements about the DriveFit programme (film & workshop): I feel that I have benefited from watching the DriveFit film; I feel that I have benefited from taking part in the DriveFit workshop; I am now more aware of my responsibilities as a passenger; The DriveFit programme has changed how I think about being a driver; and I plan to take the learning from the DriveFit programme and apply it to how I behave as a driver/future driver. [Strongly agree – Strongly disagree]	-	0.79	-

* Survey measures displayed as scaled for analysis

I.10 DriveFit fidelity feedback from facilitators and deliverers

Theme	Comment(s)
Consistency of delivery	<p>"I think we tried, we had a plan that we tried to stick to." (FAC1)</p> <p>"we've been consistent in the delivery of the content." (FAC1)</p> <p>"you saw my facilitation style, which I'm sure is very different to [FAC1]. I think I sometimes struggle with keeping things the same. So, I tried quite hard to make sure I did that because I like to riff and kind of really respond to the group. And, you know, not that I didn't do that during the sessions, but I was just much more aware of having to stick to the structure, which was fine. But it was something that I find a bit of challenge." (FAC2)</p>
Interaction between delivery team for scheduling	<p>"So I think that the planning was fine." (FAC1)</p> <p>"it was quite easy for [FAC1] to hand a school over to me, for me to then liaise with them, everything that was complicated and then had everything back over to [DEL1]. I think that was all worked quite well." (FAC2)</p> <p>"I think we made the right call, that I had contact with the top layer of people that I initially contacted sort of the heads of departments, heads of student experience or whatever and they kept in contact with those involved with the sessions...it was a two pronged approach that seemed to work quite nicely." (DEL1)</p>
Impacts on planned sessions	<p>"So, I think although COVID, I think, did impact on certain things, I don't think it was either a cancellation or it wasn't. It wasn't like they cut them [students] by half kind of thing." (FAC2)</p>
Inconsistency of materials provision	<p>"I observed two or three times, just before we were starting, the teachers were handing out booklets and postcards at the same time" (FAC1)</p> <p>"I think the only session where I felt like there was something that was inconsistent was where they'd already given out the booklets and postcards, so they weren't available to them." (FAC2)</p>
Inconsistency in workshop delivery formats	<p>"The scheduling and the consistency of delivery was a bit skewed purely because a number of the schools hadn't acknowledged that they could have up to four or five workshops. A number of the schools said they couldn't get, you know, couldn't schedule that amount of workshops. A number of schools wanted to combine student groups either into two groups of two groups or three groups of four groups...Some of the schools took what they perceived to be the easier option of just lumping them all together." (FAC1)</p>
Inconsistency in teacher engagement	<p>"And I think the other clear inconsistency was around the level of engagement of the teacher. And I think that does have a big impact on the session. I think there were definitely instances where it felt like the teacher was coaching students to try and get them to give certain answers to make the school look rather than really just letting the kids respond. But it's the experience that's not that's not unsurprising. If a school has a has a big name and they will want it to look good." (FAC2)</p>
Mobile phone availability	<p>"So the two that didn't have access to the phone, they were paired with somebody else." (FAC1)</p>
Viewing of film ahead of the workshop	<p>"there is always the risk that somebody was not in or unwell or wasn't there when they showed the film." (FAC1)</p>
Survey timing and variability in student completion	<p>"It was on the 10 plus rather than the seven plus, I felt the survey" (FAC2)</p> <p>"Some not completing at all, some classes where everyone was completing, some seen conferring with friends "with the person that's next to them saying, Oh, what have you put for this one?" (FAC1)</p> <p>"There has been a repetitive question with teachers asking for exactly which students have done things, so they can go to those students and say, you need to do the follow up. And I totally understand your reasons for not being able to do that and they understand those reasons. But I think that might be part of the reason we haven't got enough of the same students [throughout the study measurements]." (DEL1)</p>

I.11 DriveFit dose received student survey responses

Figure I.11-1 Cognitive response to DriveFit film and workshop ($n = 186$)

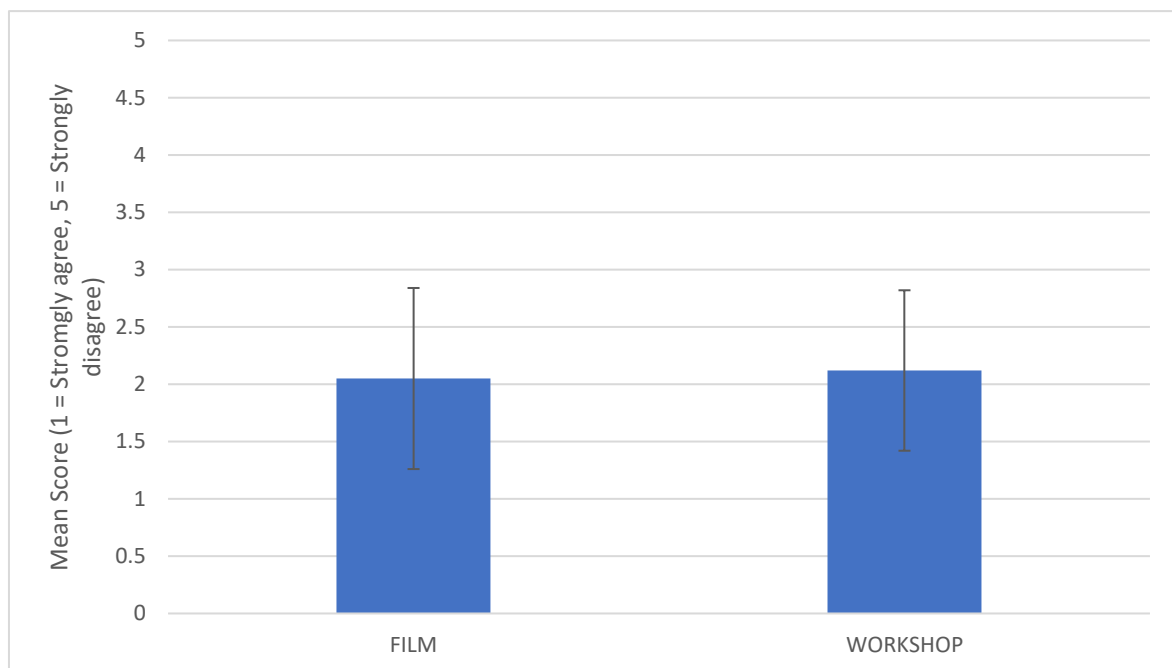


Figure I.11-2 Individual component cognitive response to DriveFit film and workshop ($n = 186$)

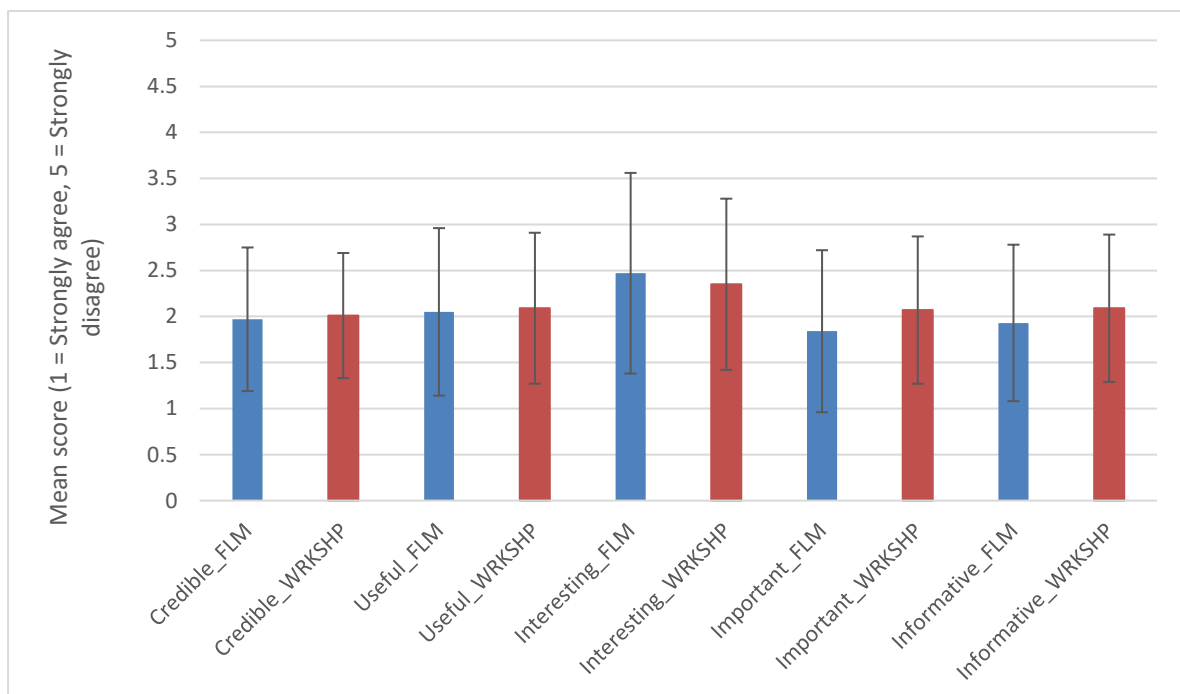


Figure I.11-3 Emotional response to DriveFit film and workshop (*n* = 186)

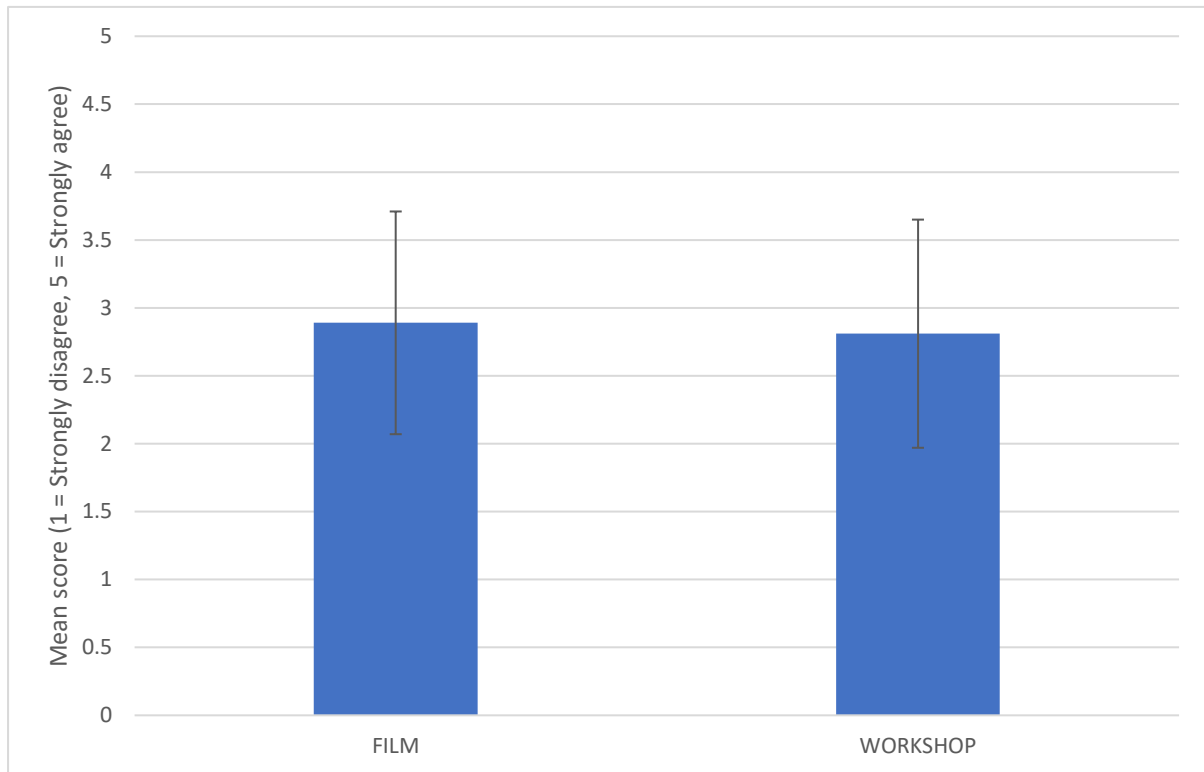


Figure I.11-4 Individual component emotional response to DriveFit film and workshop (*n* = 186)

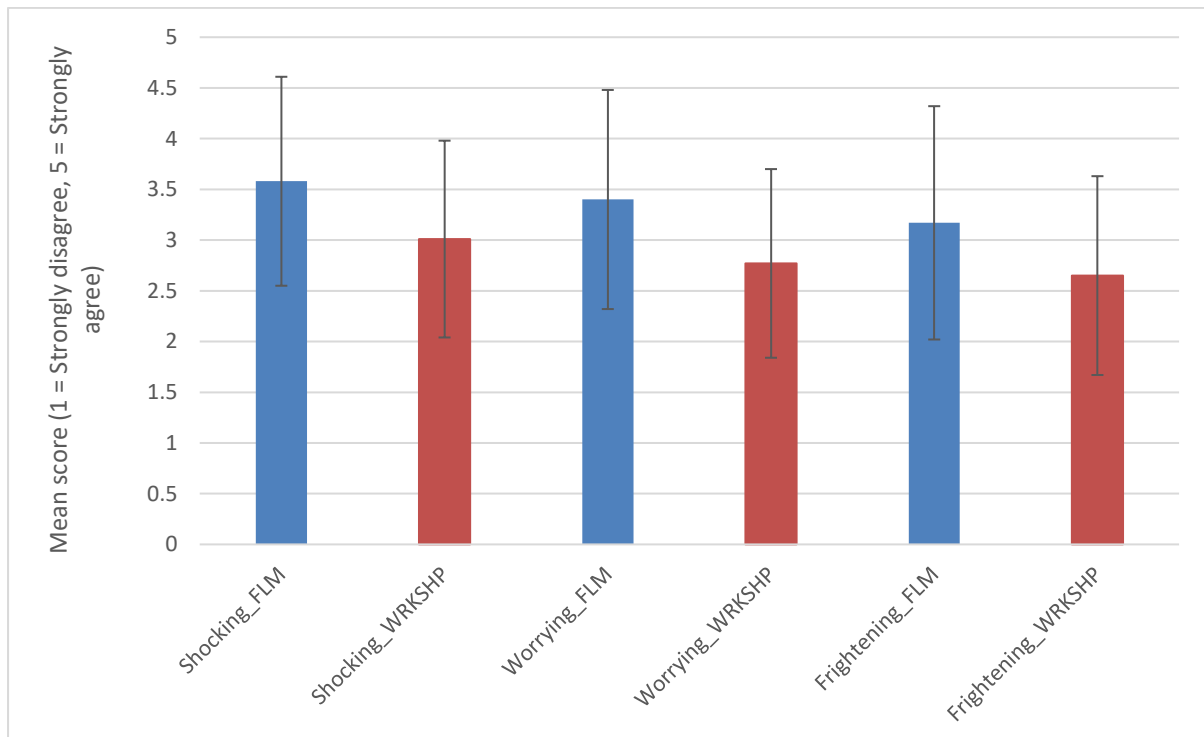
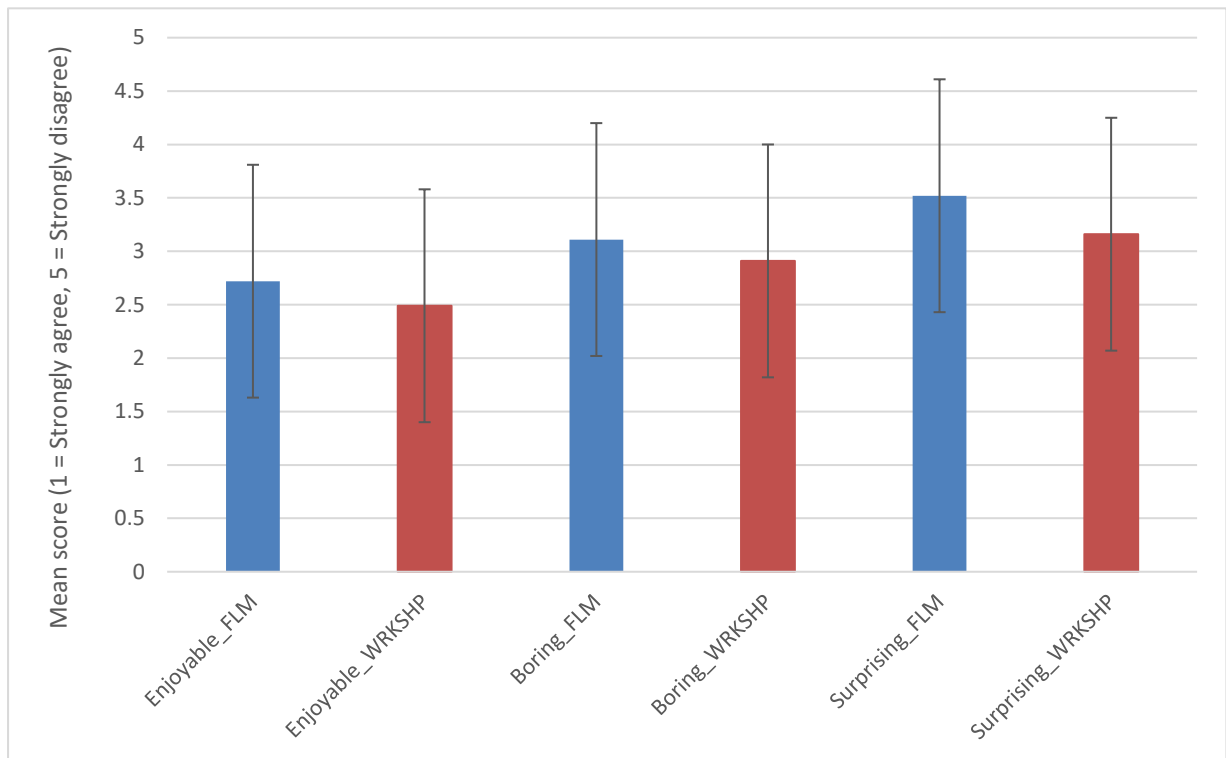


Figure I.11-5 Individual component other emotional response to DriveFit film and workshop (n = 186)*



* Nb. 'Boring_FILM' and 'Boring_WRKSH' has not been reverse coded (i.e., so that lower scores equate to more beneficial outcomes). This rescaling has not been done for ease of presentation of the results alongside the 'other' emotions.

Figure I.11-6 Face Validity of DriveFit intervention (n = 186)

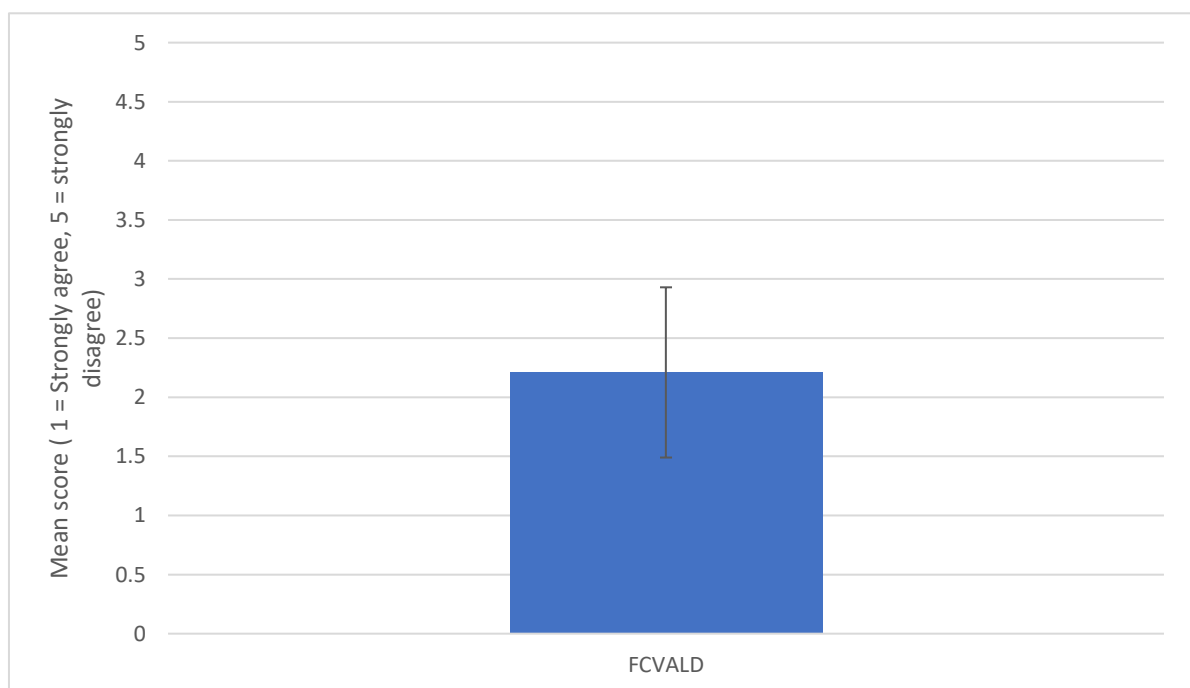


Figure I.11-7 Estimated Marginal Means of COG_FILM by gender and education

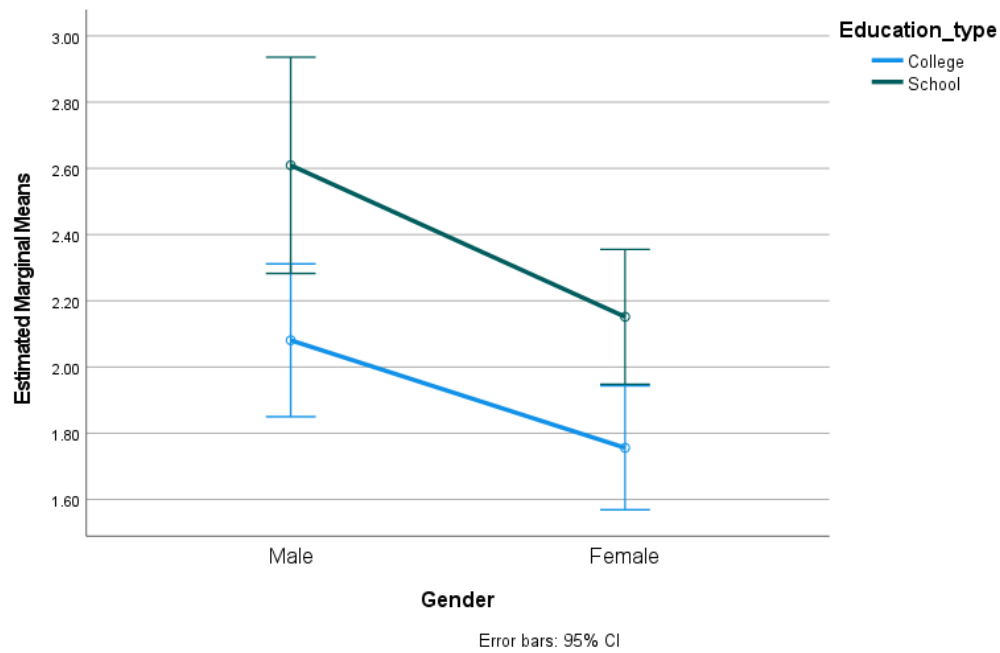


Figure I.11-8 Estimated Marginal Means of COG_WRKSHP by gender and education

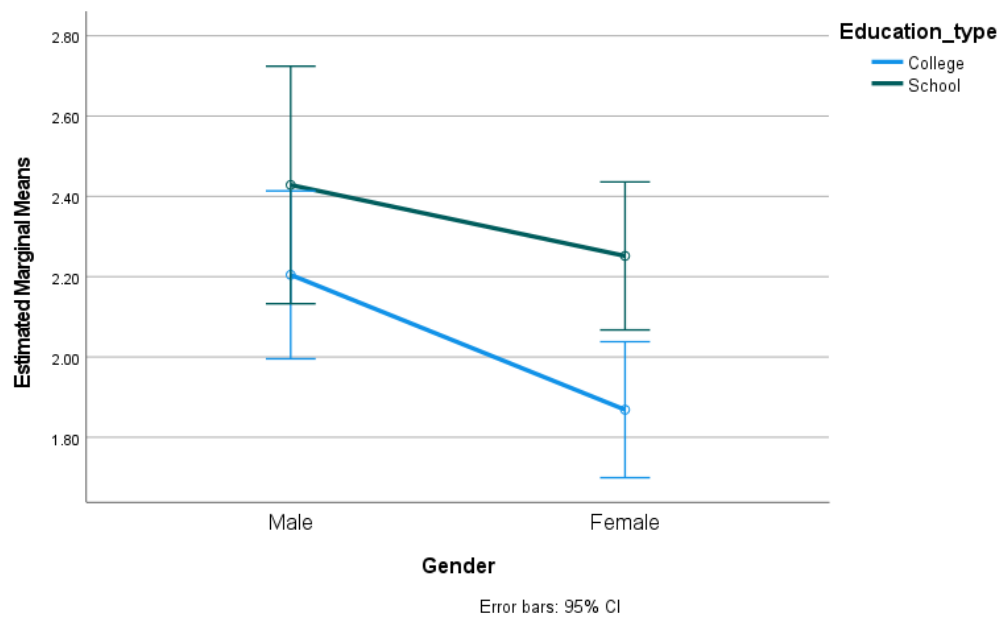


Figure I.11-9 Estimated Marginal Means of EMO_FILM by gender and education

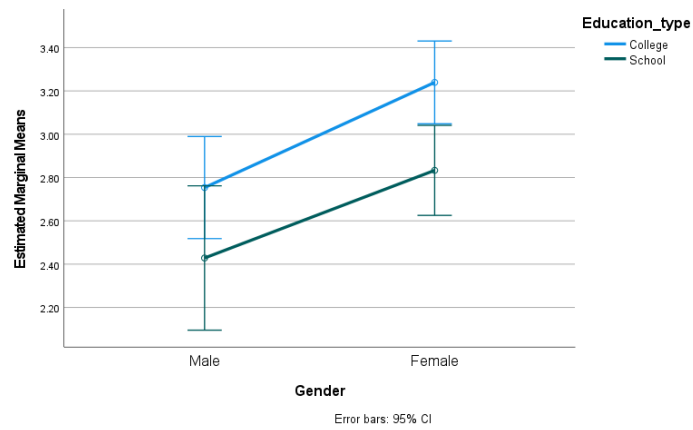


Figure I.11-10 Estimated Marginal Means of EMO_WORKSHOP by gender and education

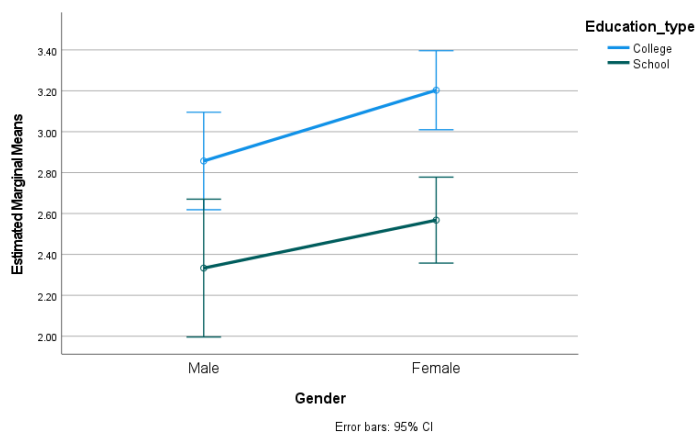


Figure I.11-11 Estimated Marginal Means of FCVALD by gender and education

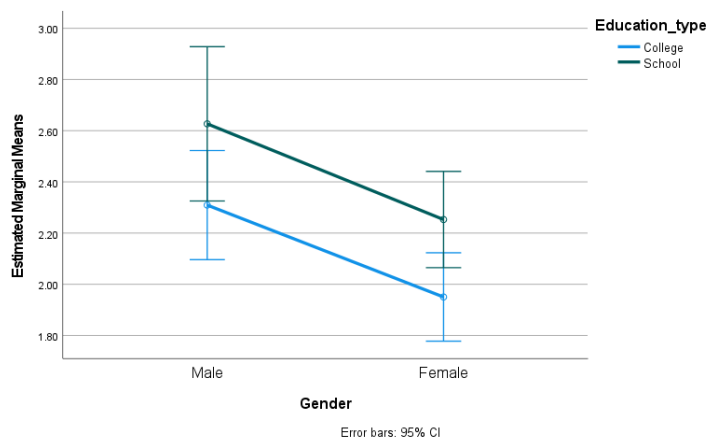


Table I.11-1 Expected use of DriveFit website and sharing of DriveFit content (n = 186)

*Q. To what extent do you agree or disagree with the following statements about your planned use of the DriveFit website and your expected sharing of the information from the DriveFit programme?**

Question	Mean	SE
I expect to visit the DriveFit website more than once	2.26	0.07
I plan to visit the DriveFit website at least once	2.93	0.08
I plan to share the DriveFit website with my friends	2.96	0.08
I plan to share the DriveFit website with my parents/guardians	2.97	0.07
I plan to share information about/from the DriveFit programme	3.26	0.08

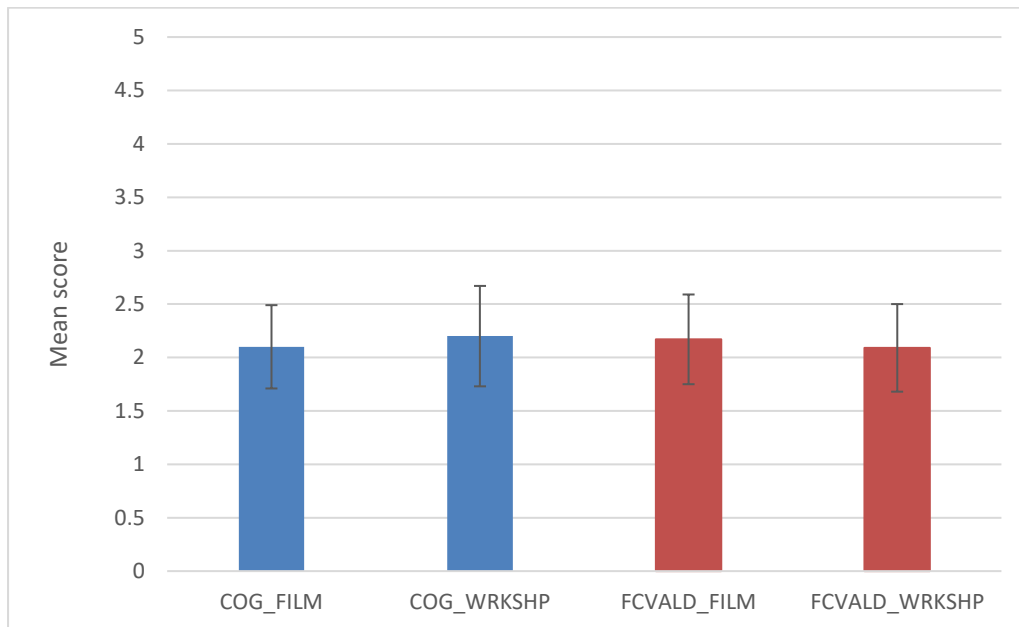
* Nb. Scale 1 = Strongly agree, 5 = Strongly disagree

Table I.11-2 Student open text comments on DriveFit intervention (n = 6)

Theme	Comment(s)
Already covered information aware of	<i>"DriveFit was a good an informative programme, but it covered many areas that I already was aware of."</i> <i>"I knew all of the information before participating. This was not helpful therefore."</i>
Not engaging or fun	<i>"I think it is really important and beneficial but somehow make it more engaging and fun for the students, rather than sitting and watching people talk for an hour."</i>
Appreciation for facilitators	<i>"Tell [FAC1] he did a great job presenting."</i>
Dislike for the programme	<i>"thought DriveFit programme was useless, waste of time and a bit s**t."</i>
Dislike for the programme format	<i>"So many generic questions that often overlap."</i>

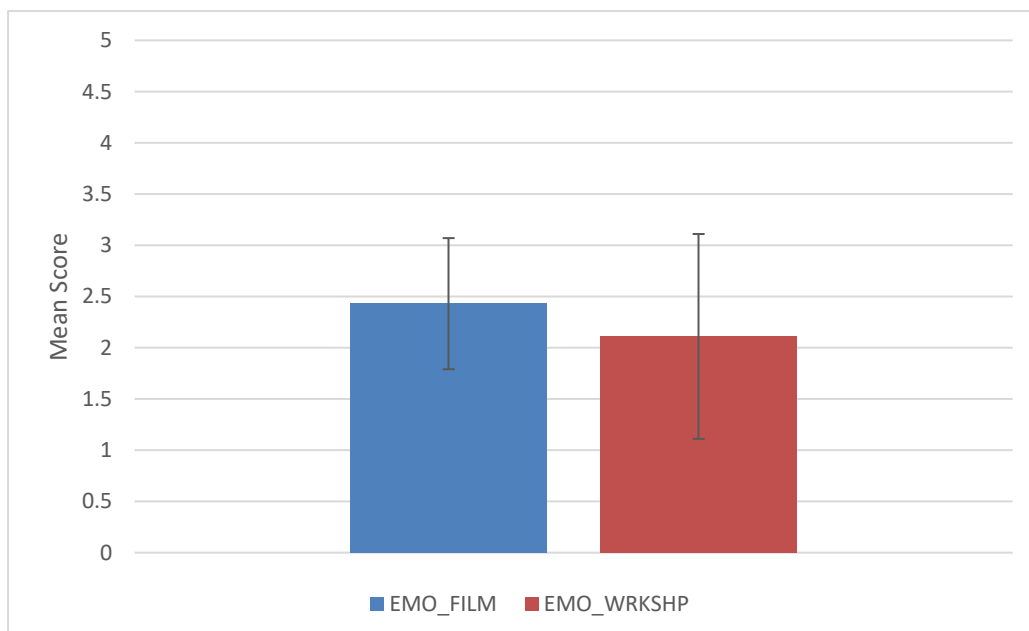
I.12 DriveFit dose received teacher survey responses

Figure I.12-1 Teacher cognitive and face validity rating of the DriveFit film and workshop (Film: $n = 23$, Workshop: $n = 12$)*



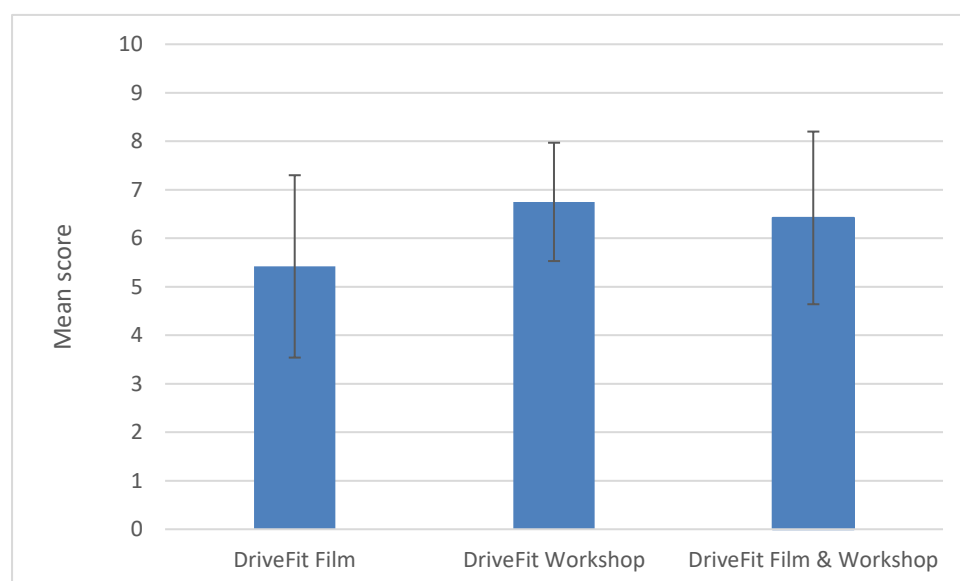
* Nb. 1 = Strongly agree, 5 – Strongly disagree

Figure I.12-2 Teacher emotional rating of the DriveFit film and workshop (Film: $n = 23$, Workshop: $n = 12$)*



* Nb. 1 = Strongly disagree, 5 – Strongly agree

Figure I.12-3 Teacher overall rating of the DriveFit programme (n = 12)*



* Nb. Scale: 1 = poor, 10 = Excellent

Figure I.12-4 Teacher reported likes/dislikes about the DriveFit programme (n = 9)

Theme	Details
Likes	
Resource provision	<i>"Booklet support."</i>
Active learning engagement	<i>"Gooding to get the students involved with the online polls and questions backed up with what was covered in the film." "Camilla from the DriveFit workshop was great with our learners and she engaged them really well."</i>
Dislikes	
Not engaging	<i>"Although it had lots of good information, students found the film uninteresting. The format did not grab their attention and felt like it was people talking at them. The workshop helped them recall the information they had seen in the film and allowed them then chance to discuss, but they did not find it challenging." "It was hard to gain the students attention." "Students found the film boring – even though we paused it many times to discuss points, the sleep section was too long and they lost interest."</i>
Preference for previous interventions which include shock factor	<i>"It seemed to be particularly watered down in terms of shock factor from previous incarnations I have been involved in. Sometimes that strikes a chord with the learners (appreciate that it can be too much for others)." "Not as shocking as the Learn2Live, needed to be more impactful for the students to be more engaged and take things away. Film was too long and lost the students attention. Workshop was more engaging but felt like more recapping the film rather than new information." "The impact of the live Learn2Live event is the personal stories, but this programme lacked this element."</i>
Session length and timing	<i>"Very difficult to manage over the period of time in question."</i>

I.13 DriveFit does received facilitator and deliverer feedback

Table I.13-1 Facilitator and deliverer feedback on dose received

Theme	Comment(s)
Teacher satisfaction	<p><i>"I hardly heard anything, actually, which I took as a good sign and I didn't start interfering because [the facilitator] clearly had it under control...[the facilitator] seemed to organize it very well...so from that side of things I think it was a smooth cascade."</i> (DEL1)</p> <p><i>"I think most of the feedback we've had along the way has been apologies from them because...this time of the year for them, when they're running into doing student assessments, doing mock exams and then editing COVID, as well as being a scheduling nightmare for them. So mostly the feedback we've had I've had certainly has been them being very apologetic for either not getting back to me or us or just apologies for messing us around in terms of scheduling. And then most of the other feedback is that they've been really grateful when we've been able to accommodate what they've been trying to ask for."</i> (FAC1)</p> <p><i>"they appreciate[d] being part of it, that young people [were] taking stuff away from it. I think it was more just a thanks. Appreciate it [response from teachers]. But also, I think part of that might be because they've got bigger fish to fry at the moment. And I think that's why responses from the teachers got harder and harder as we as we went through."</i> (FAC2)</p>
Facilitator satisfaction with the intervention	<p><i>"I wasn't particularly convinced about the film itself. I think there were and I think there were ways that could be improved, but that's more personal."</i> (FAC2)</p> <p><i>"I think it felt a little kind of expert heavy. And also all the experts where were white, older and four or five of them were men and which I think was a bit I'm kind of was really aware of as I was watching it. And I think it was just very information heavy for that age group. And the first question I had while I was watching it, as I was wondering whether or not any young people had been part of the process of making the film, which, you know, obviously I wasn't I wasn't around. So I don't know. But. And that was kind of the main thing to me. And I think and I think the the visuals in the draft booklet are great, but because they're not necessarily shown through the film, it's so if I think about visual anchors to information, you wouldn't have the visual anchor to different parts of information. So then when you get the drawings, it's hard to link that to the video itself. I mean, just because it's quite long, it's, you know, I mean, it's hard to keep anyone engaged for longer than 10 minutes."</i> (FAC2)</p> <p><i>"I think it's really good that we're trying to move away from the, you know, shock and awe. Here's a smashed up car. Don't drink, right? I think that's great."</i> (FAC2)</p> <p>Would have been better face to face as <i>"It is hard to engage people online."</i> (FAC2)</p> <p><i>"I think it was great that it was like a human interaction, like, you know, we were there, we were asking them to do things. I think it worked well that they seen the film beforehand. I think the topic was engaging something they'll talk about. And I like the fact that it was interactive, which is meant to meet her and that they were. Yeah. Mm hmm. So, I think that will work pretty well."</i> (FAC2)</p>
Deliverer satisfaction	<p><i>"I was really impressed with the Mentimeter...it just added something. If it hadn't been there, I think the engagement would have been significantly lower...It clearly go people going."</i> (DEL1)</p> <p><i>"I wouldn't have liked to have been in that [facilitator] position...if you get a hard crowd, when if you're not there in person, it's difficult to manage"</i> (DEL1)</p> <p><i>"I did have concerns from the very onset from the very start...this was new so we they really had to buy into it in order to promote it."</i> (DEL2)</p>

Theme	Comment(s)	
	<i>"I was worried at the beginning that there would be a detrimental effect on my relationship with them [schools]...but so far, I feel that actually I have developed some better relationships with people...it certainly hasn't. seem to have had a negative effect." (DEL1)</i>	
Student satisfaction	<i>Value offered by multiple approaches (i.e., "I guess the different elements were sort of the polling element versus the discussion element versus the kind of the noting down piece at the end.") (FAC2)</i>	
Student film recall	<i>"It was really mixed. I think people remembered the kind of highlight bits. So, you know, the person who's in VR and that came up a lot...It wasn't super broad, like there weren't lots of different bits that people remembered from the film." (FAC2)</i> <i>"I think trying to get them to think back to the film. I think some of them struggled with that." (FAC2)</i>	
Student engagement with workshop activities	If-then plan	<i>"So yeah, I think they were definitely engaging" (FAC1)</i> <i>"we would definitely get in properly crafted statements coming back in the feedback." (FAC1)</i> <i>"the interactive bits, I think they were engaging with the mentee meeting and they were engaging with the document as well." (FAC1)</i>
	MentiMeter	<i>"But yeah, the MentiMeter stuff was certainly the bit that I felt they were most engaged with." (FAC2)</i>
	General	<i>"I think overall engagement levels were fine. I think there's always a difficulty engaging online when you're a group face-to-face. In terms of the activities, they seemed to make sense to them, it probably felt a bit repetitive, but I think that's probably part of it was meant to be because that's part of the actual planning piece. I think at times it was quite hard to keep them on focus, on track. But again, a lot of that was dependent on how engaged the teacher was. So, yes, overall, I thought it was good." (FAC2)</i>

I.14 DriveFit context facilitator and deliverer feedback

Table I.14-1 Barriers and facilitators to the DriveFit programme identified by facilitators and intervention deliverers

Theme	Comment(s)
Barriers	
Teachers	
Interference with intervention delivery	<p><i>"And in one of the schools, a teacher kept saying horror stories about people who had crashed, which was quite challenging. I mean, ironically, it probably ended up making them more engaged in the second part writing the statements." (FAC2)</i></p> <p><i>"I think it is difficult because teachers worked with them every day. And so I didn't want to come across as hard on teachers, but quite often they don't. They struggle to see different situations in different ways. And there is an element of wanting your group to look good and in a certain way. But there's also a massive generational difference. You know, I think for a lot of the teachers, drink driving would have been the biggest risk. But young people don't drink nearly as much as and certainly my generation generations before me and the distractions are different. And I think there's also different awareness around risk. But when you when you put that in a classroom with a teacher who thinks a certain way, then that that changes." (FAC2)</i></p> <p><i>"the responses and the feedback were more aligned to that teacher's paraphrasing rather than what we'd asked initially." (FAC1)</i></p>
Unsupportive of workshop session	<p><i>"I had one group interesting enough from [school] where the teacher literally just sat in the corner. And that group was like, really was really hard to get them engaged, whereas the ones where the teacher had gone. Right. OK, come on now, who's got this? You know what? You know, what have you got? Or was spotlighting individuals to give feedback...So actually, they were much more engaged in that. But I would say that the teachers not being very supportive were quite few and far between." (FAC1)</i></p>
Time constraints in considering intervention information	<p><i>"I know that teachers are busy and the coordinators are busy in the schools and there's a things with me about how much they read or took on board." (FAC1)</i></p>
Scheduling sessions	<p><i>"COVID aside, I think we still have we would have had some issues still scheduling... but it wouldn't have been as hard as it's been. I mean, the scheduling around all of that has been I mean, the scheduling is being the most onerous part of the whole process, to be honest." (FAC1)</i></p>
Students	
Student's driving status	<p><i>"I think there was a thing where when we were in the classroom where no one was driving, it was a bit like it's I think it felt quite hard for them to really get their heads around it." (FAC2)</i></p>
Student interest and engagement	<p><i>"that age group it is quite hard to work with because they really don't want to be there. And if they're college, they're generally not there most of the time. And you could always tell a difference between a school and a college. If they're still in school, then they generally seem to have slightly better focus." (FAC2)</i></p>
Delivery logistics	
Time of day	<p><i>"if you did it first thing in the morning, I students were coming in in dribs and drabs. They were they were less engaged and the same as if you did it at the end of the day. Towards the end of the day, they were less engaged...it was super dependent on time of day." (FAC1)</i></p>
Administration of the trial	<p><i>"I think if I'm brutally honest, it would have been helpful if we had all the information in a Google doc, where we could all log in and see the same thing...it felt like a lot of emails flying around" Said this would have helped co-ordinate information to the schools...I don't think we could have foresaw what we needed." (DEL1)</i></p>

Theme	Comment(s)
Technical issues	<i>"And technical set up like where I was smaller [on the screen] and not loud enough." (FAC2)</i> <i>"tech has been a bit glitchy." (FAC1)</i>
Larger workshop groups	<i>"I think it's much harder when you've got bigger multiple groups because you just really get no engagement whatsoever, no interaction because it's just too big to being able to have a decent level of interaction. I think it's an imperative." (FAC2)</i>
Workshop design	
Online versus face-to-face delivery	<i>"So a challenge was working online on things as well as on Zoom is when you put slides up because they can't see you. So I tried to take the slides down as much as possible to be able to see because it feels much more, it's much easier to engage them in that way. So generally, I always put the slides back up for the instructions, but there was one [slide] that I noticed that I generally didn't show." (FAC2)</i>
Use of online resources	<i>"[barcodes] take you to different places...If I was running it, I would put them in the back of the draft booklet to give it to them." (FAC2)</i>
Task structuring	<i>"one task that being broken up three or four times with different instruction" (FAC2)</i>
Repetition of sessions for facilitators	<i>"I think the challenge for me, for me and I'm going to make the assumption for [FAC2] was that on the other day where we had, you know, like four or five runs you when you're delivering the same thing each time it is just it's just repetitive." (FAC1)</i>
Facilitators	
Teachers	
Buy-in to deliver interventions	<i>"they are the key to all of it." (DEL1)</i> <i>"We've got to have that buy-in." (DEL1)</i>
Having a 'point person' in schools/colleges to engage with	<i>"I think having a teacher, a teacher champion, someone that is dedicated to making sure it happens in the school is really important and by and for all the other teachers, I think. I don't know how I saw the letters that went out, but I was quite late to that and it wasn't always clear on what information the teachers did or didn't have. But. Yeah, I think. I think having direct facilitated contact is great because it really helps them to understand what's happening, because otherwise they are, they end up getting stressed." (FAC2)</i> <i>Having a "point-person" in the school was described as very helpful. (FAC1)</i>
Engaged to support workshops	<i>"I can't speak for [Facilitator 2] [the biggest differentiator] was definitely when the teacher was more supportive and engaged in the class." (FAC1)</i> <i>"the more the teachers were supportive and engaged, the better the group." (FAC1)</i> <i>"I think there's any one school which was [school name]. And they were very well engaged. But yeah, I think it is more dependent on the teacher than the content." (FAC2)</i>
Students	
Student interest and engagement	<i>"I think there's any one school which was [school name]. And they were very well engaged." (FAC2)</i>
Delivery logistics	
Following up with schools/colleges to book sessions	<i>"chasing people has definitely helped." (FAC1)</i> <i>"Once we had them scheduled, it was fine." (FAC1)</i>
Small number of facilitators delivering the programme	<i>"[having only two facilitators] almost certainly helped from a consistency perspective." (FAC1)</i>
Existing deliverer relationships with schools/colleges	<i>"Quite simply, our previous engagement and relationship with the colleges and the tutors." (DEL2)</i>

Theme	Comment(s)
Online data collection	<i>"Yeah, just too much data"</i> recognised as an issue for trials generally. (DEL2) Discussing a previous research project <i>"and the schools hated it [responding using pen and paper] and it nearly wrecked our relationships with them all. And we've spent years building those relationships back up, which is why I was nervous about this. And I just I haven't really had the feeling that's had such a bad effect because it has been linked and online and just a bit easier to manage in that way."</i> (DEL1)
Workshop design	
Online workshop delivery	<i>"as long as you've got the teachers engaged in the room. Doing it in the online space is probably the best way to deliver it...The main reason for that is if you were trying to do it, face to face the scheduling alone would be an absolute nightmare"</i> <i>"I've been wondering, you know, would I have liked to have been in the room with them? Yeah, of course they would, because that's what we love doing. But, you know, actually realistically. We've been able to deliver what we have because we've been doing it in our own space."</i> (FAC1)
Workshop interactivity	<i>"The interactive bits are definitely the best where they're doing something."</i> (FAC1)

I.15 DriveFit context teacher feedback

Table I.15-1 Teacher suggested improvements for DriveFit film (n = 9)

Improvement	Comment(s)
Increase level of interactivity with the film especially given film length	<i>"A little more interactive, questions throughout to add discussion."</i> <i>"I think the delivery of the film was good. I think it was too long for the learners some of them were getting a bit fidgety the longer it went on. May other than the one pause point pause after each topic to discuss which would break it up and make it more interesting."</i> <i>"More stops to discuss topics – 1 per guest."</i> <i>"The film is rather long even with stops at various points throughout the film. The audience was made up of Level 2 learners – some of whom were interested, but had a short attention span. It wasn't possible to show the entire video in the session as there was insufficient time/took too long."</i>
Sound technical issues	<i>"I found the sound level of the film very quiet, even on the loudest setting on the smart board at times it was hard to hear, students who watched it on Chrome books and headphones also struggled."</i> <i>"Sound quality was poor and could consider posting as a different file format rather than web based."</i> <i>"Sound was a bit low."</i>
Pre-intervention organisation and timing	<i>"A longer lead in time to give more time to organise and get the information to the students about the sessions they were allocated to. This was probably made more difficult as the screening of the film fell right after the half-term break."</i> <i>"I wasn't aware of information ahead of delivery of the film."</i>

Table I.15-2 Teacher suggested improvements for DriveFit workshop (n = 4)

Improvement	Comment(s)
Technical issues	<i>"Not all students had access to mobile phones."</i> <i>"Our Wi-Fi struggled to maintain a quality feed."</i>
Organisational problems	<i>"It may have just been missed on our part, but we were unaware of the need for a microphone for the workshop which led to one group not being able to have the workshop delivered and needing to be rearranged."</i> <i>"It would have been useful to have known in advance the names of those students who had completed the initial survey."</i>

Table I.15-3 Teacher suggested improvements to DriveFit film to support accessibility and inclusion ($n = 9$)

Improvement	Comment(s)
Reduce talking and length of film	<i>"A lot of talking. Make use of infographics, videos or animations for visual learners."</i> <i>"Move away from just discussion."</i> <i>"The conversations held were not really pitched at the student's level. They struggled to keep engaged in the conversations."</i> <i>"Short duration. Greater impact."</i>
Increase 'hard hitting' content	<i>"I think it maybe should have been a bit more 'hard hitting' maybe a conversation with a parent whose child had been in a car accident etc."</i> <i>"The learners enjoyed the previous year's presentation where they were introduced to an accident."</i>
Increase diversity	<i>"Inclusion of diversity in the film and discussion."</i>
Increase complexity of information	<i>"Some students drive mopeds so have some knowledge – more comparisons needed and advanced information."</i>
Address technical issues	<i>"The link for the subtitled film did not work."</i>

I.16 SDSA Surrey dose received student survey responses

Figure I.16-1 Student positive cognitive rating of the SDSA film ($n = 161$)

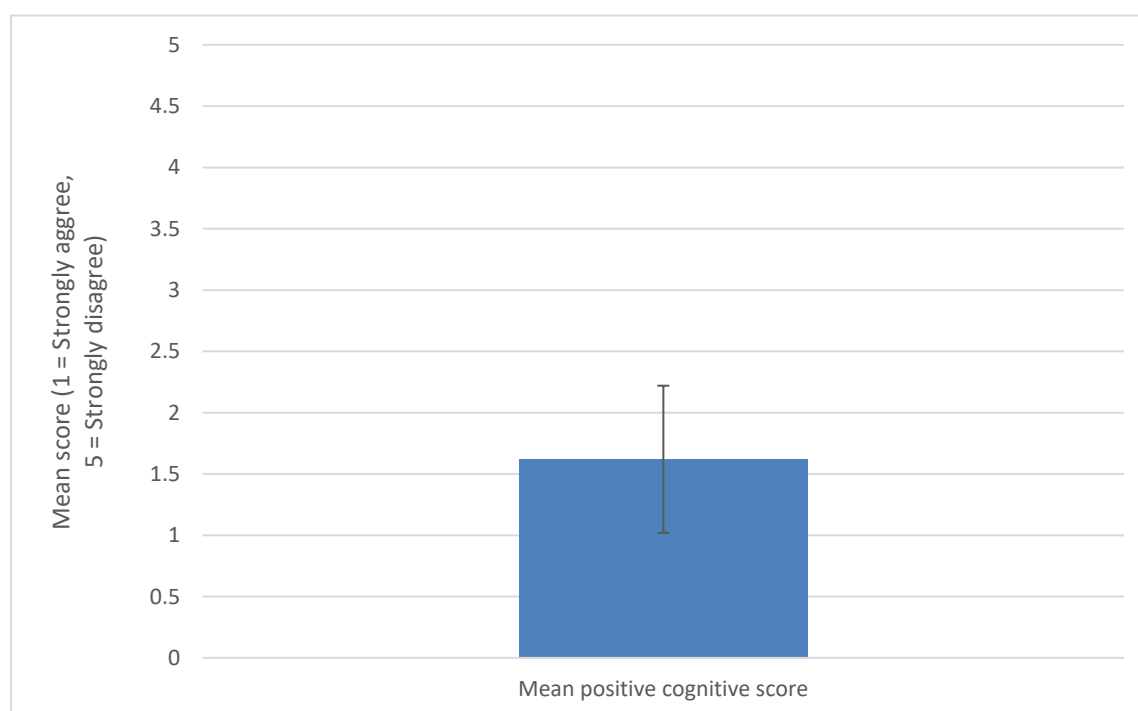


Figure I.16-2 Individual component cognitive response to SDSA Surrey film ($n = 161$)

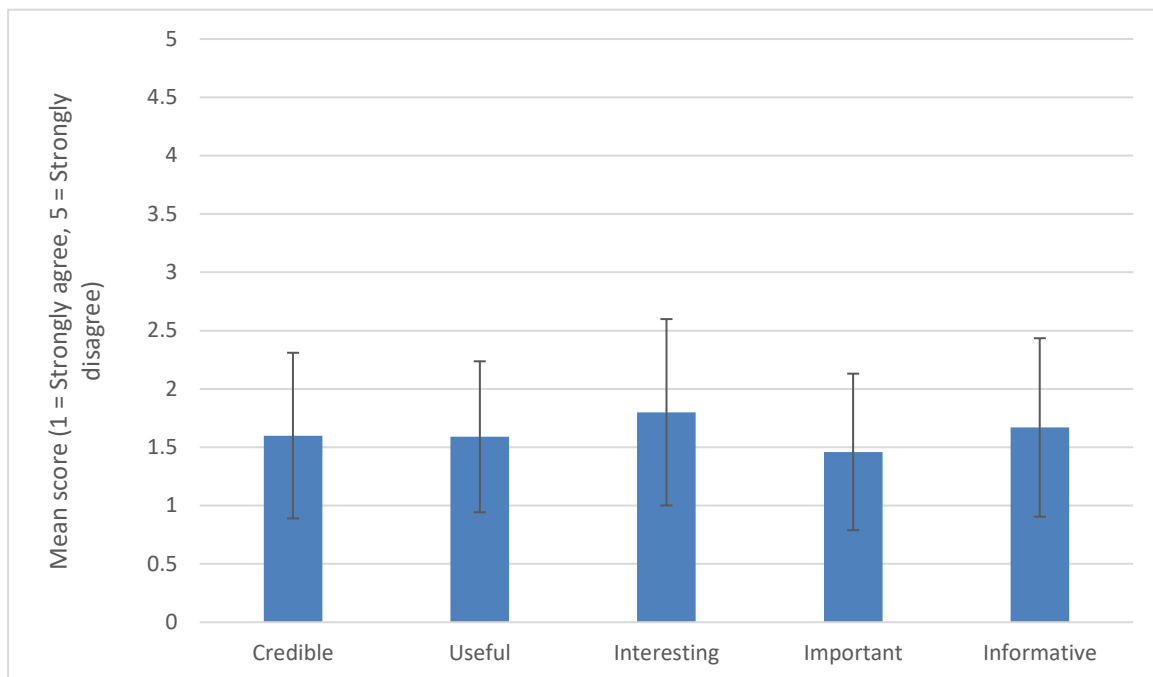


Figure I.16-3 Student negative emotional rating of the SDSA film ($n = 161$)

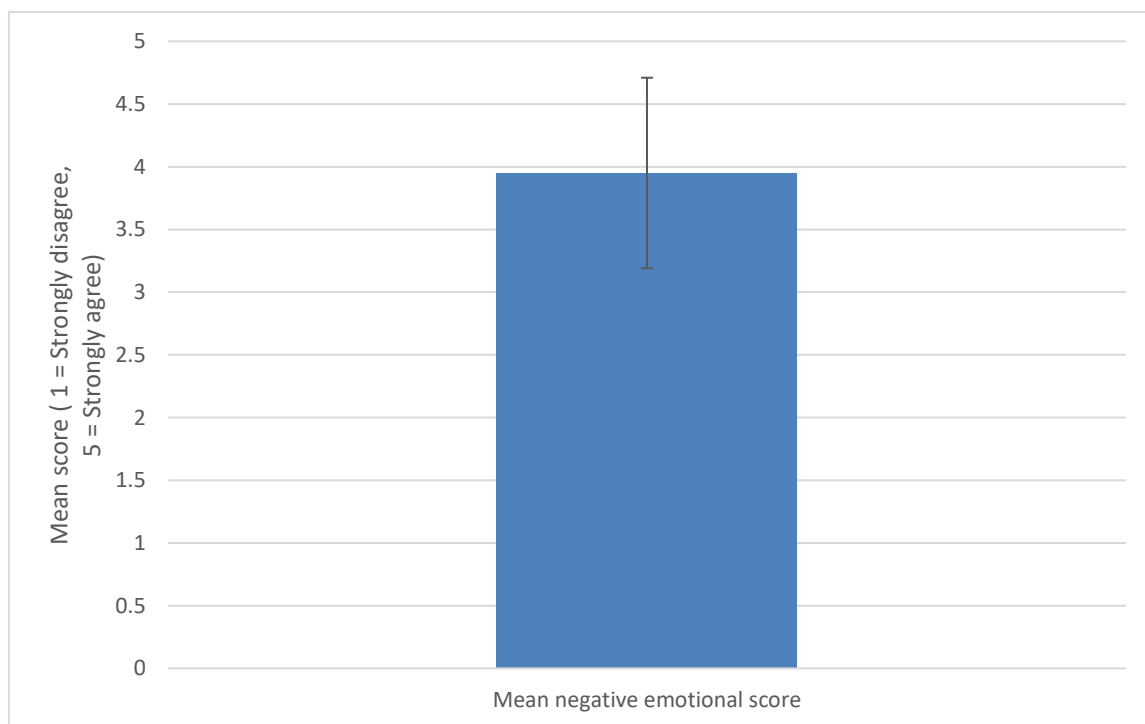


Figure I.16-4 Individual component negative emotional response to SDSA Surrey film (n = 161)

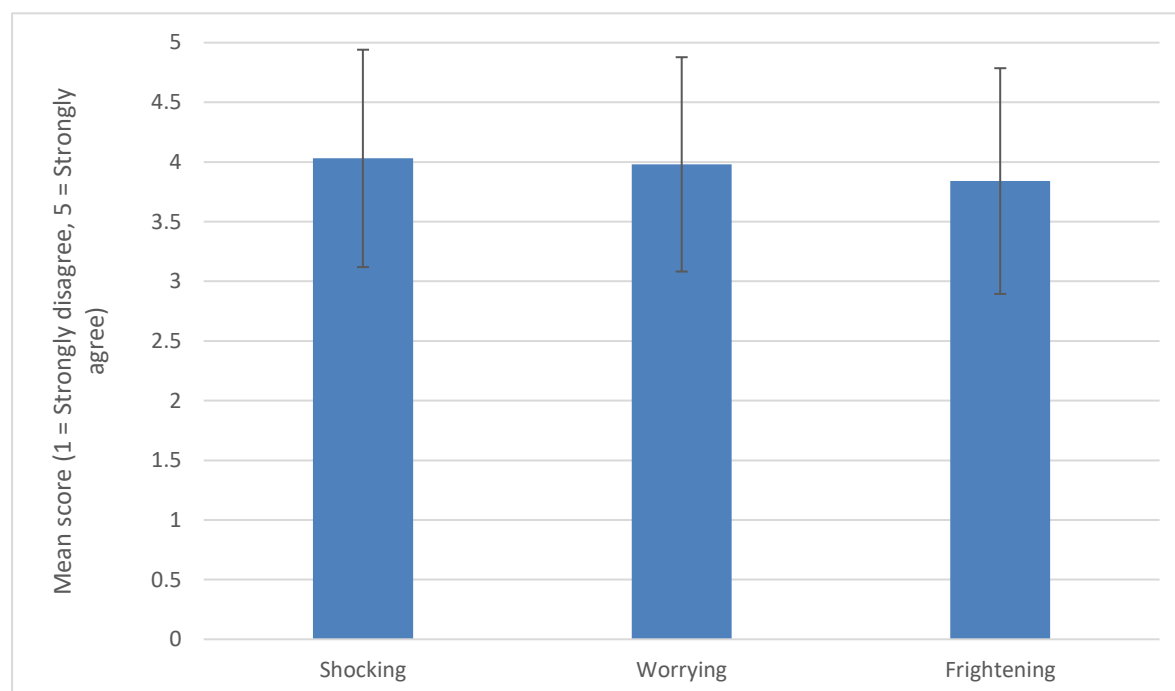
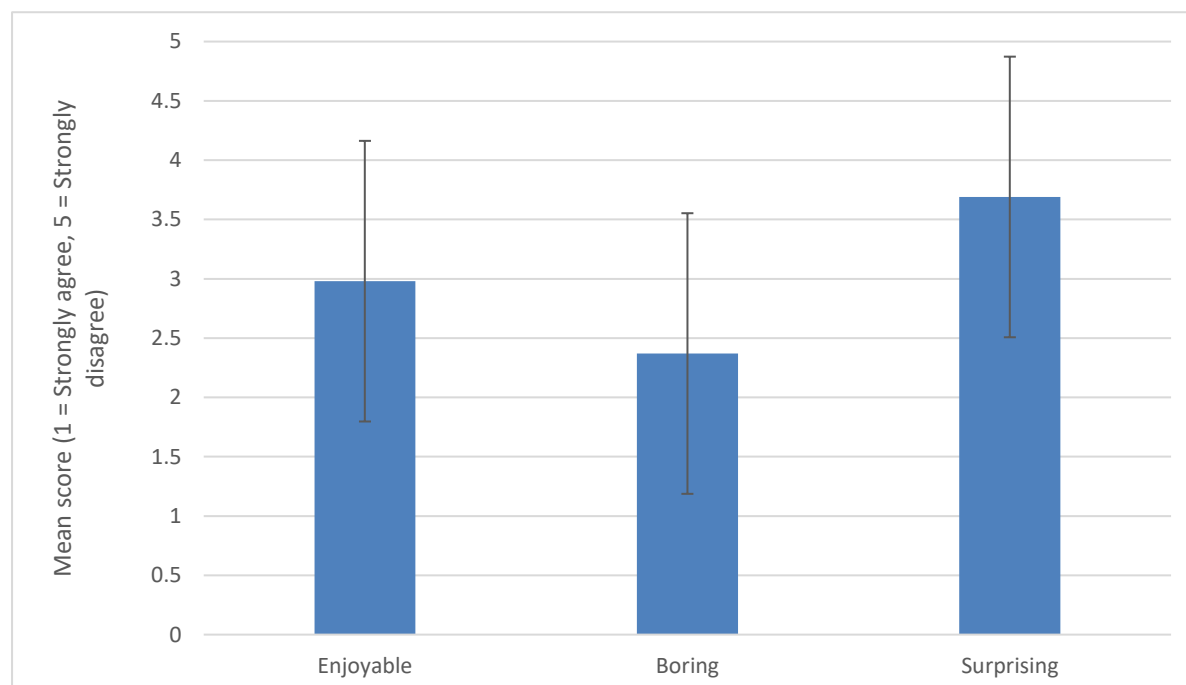
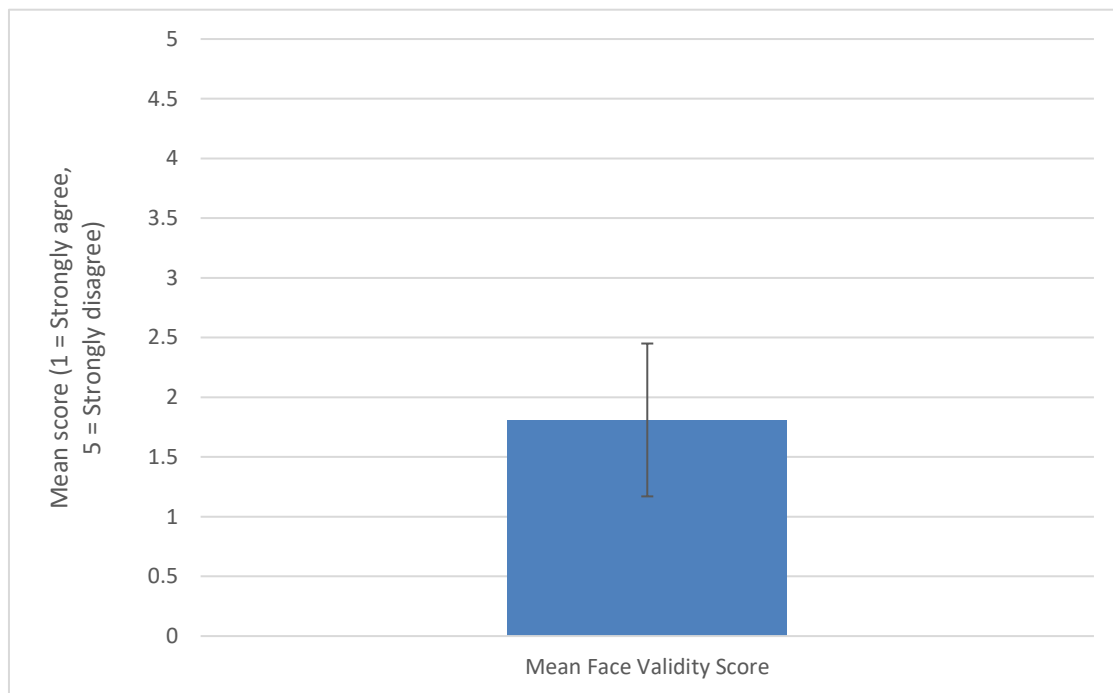


Figure I.16-5 Individual component other emotional response to SDSA Surrey film (n = 161)*



* Nb. 'Boring' has not been reverse coded (i.e., so that lower scores equate to more beneficial outcomes). This rescaling has not been done for ease of presentation of the results alongside the 'other' emotions.

Figure I.16-6 Student face validity rating for the SDSA film ($n = 161$)



I.17 SDSA Surrey dose received teacher survey responses

Figure I.17-1 Teacher positive cognitive and face validity rating of the SDSA film ($n = 20$)

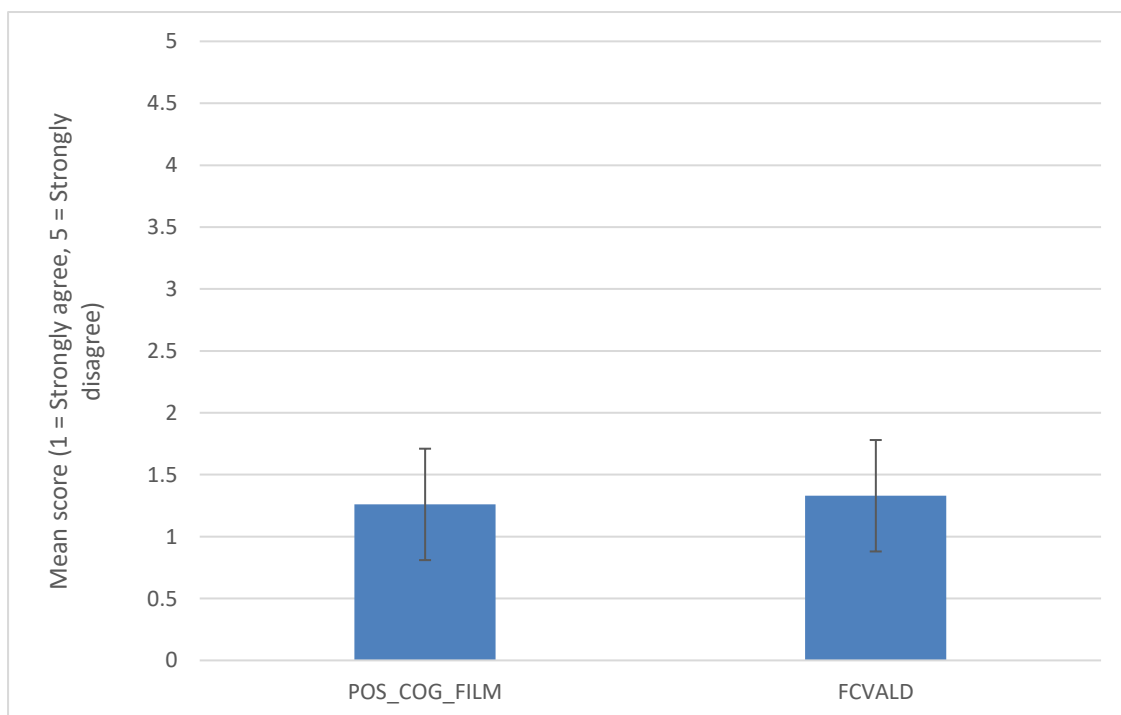


Figure I.17-2 Teacher negative emotional rating of the SDSA film ($n = 20$)

