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Empowering Young Drivers with Road Safety Education

Practical guidance emerging from
the Pre-driver Theatre and Workshop
Education Research (PdTWER)

Dr Elizabeth Box

November 2023

The Royal Automobile Club Foundation for Motoring Ltd is a transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and their users. The Foundation publishes independent and authoritative research with which it promotes informed debate and advocates policy in the interest of the responsible motorist.

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About the Author

Dr Elizabeth Box is an accomplished transport researcher and commissioner with two decades of experience. She has an excellent track record in influencing and contributing to road safety policy outcomes at the national level.

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About this Report

This report has been developed to summarise the key research findings from the Pre-driver Theatre and Workshop Education Research (PdTWER) project which ran from September 2019 to March 2023. The research identified several results of interest to practitioners developing and delivering road safety education. Further information about the project can be found at the project microsite (www.racfoundation.org/collaborations/pre-driver-theatre-workshop-education-research-pdtwer). The DriveFit film and workshop aimed at pre-driving-age young people designed by Dr Elizabeth Box, as part of the PdTWER project, won a prestigious Prince Michael International Road Safety Award in 2023 <https://www.racfoundation.org/media-centre/drivefit-pre-driver-education-intervention-wins-a-prestigious-prince-michael-international-road-safety-award>.



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Disclaimer

This report has been prepared for the RAC Foundation by Dr Elizabeth Box. Any errors or omissions are the author's sole responsibility. The report content reflects the views of the author and not necessarily those of the research funding organisations.

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List of Abbreviations

BCT	behaviour change technique
DSVA	Driver and Vehicle Standards Agency
efficacy message	a message which enables a recipient to believe that they can perform the recommended response
fear appeal	a persuasive strategy that uses fear to motivate attitudes or behaviours by highlighting potential negative consequences or threats associated with a specific action or inaction; often used interchangeably with 'threat appeal'.
GDL	graduated driver licensing
implementation intentions	a tool for enhancing the effectiveness of interventions which aims to bridge the intention–action gap, involving encouraging automatic responses to anticipated situational cues, typically using an “IF... THEN” format
negatively framed	a communication approach that emphasises potential negative consequences, risks, or threats associated with a specific action or behaviour
PdTWER	Pre-driver Theatre and Workshop Education Research
positively framed	an approach to messaging that employs humour and other persuasive techniques to highlight the benefits, positive outcomes, or desirable aspects of a specific action or behaviour
RSE	road safety education
Safe System	Safe System has a long-term goal for a road traffic system which is eventually free from death and serious injury. It is based on the underlying principles that human beings make frequent mistakes which lead to collisions, the human body by nature has a limited ability to sustain collision forces with known tolerance to injury thresholds and it is a shared responsibility to take appropriate actions to secure safe road use, safe vehicles, safe speeds, safe roads and effective post-crash response.
SDSA	Safe Drive Stay Alive
threat appeal	a persuasive approach that employs the presentation of threats or potential harm to influence individuals' attitudes or behaviours, often used in advertising or public health campaigns to discourage action or promote protective actions; often used interchangeably with 'fear appeal'.
TPB	Theory of Planned Behaviour
TRL	Transport Research Laboratory

Foreword

This report is a call to action for all involved in road safety education for young people.

Our success to date in driving improved road safety has been based on the three Es – engineering, enforcement and education. Underpinning them all is a fourth E – evidence.

It makes sense to encourage young people approaching what we might think of as ‘driving age’ to start to engage with the risks involved; they might soon be driving themselves, they might be out in cars driven by their recently qualified friends. What’s the best way to make a positive and lasting impression? One thing is very clear – it is not by using a ‘shock and tell’ approach based around testimonials.

Those of us involved in road safety all have our stories to tell – of lives ruined or cut short, of the painful, tragic consequences of events that need not – should not – have happened. They can act as a call to arms for those involved in making the case for safer roads. But the fact is they are not of themselves a good way of getting young people on board.

The good news is that the evidence shows there are ways of engaging young people – read on to find out more about how that can be done.

Education alone is not the silver bullet that’s going to make our roads safe, and pre-driver education within that is only one element of a necessarily broad suite of things we need to be doing. But it does have its part to play, and as with all the other elements of our road safety approach it needs to be done well, based on the evidence of what works best.

In a world where young drivers are bombarded with numerous influences we must take on board the learning from behavioural and psychological research, as recognised in this report, to create programmes that genuinely resonate and reflect the realities young people face.

The DriveFit intervention case study included in this report (a Prince Michael International Road Safety Award winner) demonstrates that thoughtful design and assessment can yield positive results. While the improvements may be modest, they represent the important incremental steps that lead us towards safer outcomes for this at-risk group.

Our approach to road safety education has been evolving and improving for many years. That journey needs to carry on. We know that it is not enough to impart information about risks; we must also empower young and pre-drivers with cognitive skills, hazard perception abilities, and the capacity to make safe choices in the face of challenges such as distractions, peer influence, and fatigue.

I hope readers will find this report both persuasive and valuable in helping them find better ways to help young people become better, safer drivers.



Steve Gooding
Director, RAC Foundation

Executive Summary

The purpose of this report is to provide a resource for practitioners involved in the promotion of road safety, particularly road safety education (RSE) for pre-driving age young people. The report comprises four main elements:

- a caution, generally, about how much weight can be borne by education alone in promoting responsible road-user behaviours – in particular for how long lessons are likely to be remembered after an event;
- an exploration of why educational interventions based on ‘shock and tell’ are less effective – indeed potentially counterproductive – than an alternative approach based on encouraging young people to discuss and debate the issues themselves;
- potential topics to be addressed in educational interventions for pre-driving age young people; and
- key considerations in the shaping and design of interventions.

The role of road safety education

Education is a well-recognised component of road safety delivery. It is important because road users need to understand what is expected or required of them, and to be aware of the consequences of failing to comply. However, education is not a panacea. For many years programmes have been running to educate pre-driving age young people about the importance of adopting safe driving behaviours and the potentially devastating consequences of not doing so. This has typically included ‘theatre’-style testimonial provisions aimed at students in Years 11, 12 and 13, where emergency services, road traffic victims and bereaved family members outline the consequences associated with poor road traffic behaviours. It is vitally important to establish whether such an approach is effective in encouraging safer behaviours, and if not, what would be a better way of doing so.

The research documented in this report set out to answer these questions, through a comprehensive review of the existing research literature concerning the effectiveness of testimonial-style theatre interventions, an evaluation of the content and behaviour change techniques (BCTs) within existing provisions, a comparison study in six schools to evaluate the impact of an existing provision, and a cluster randomised controlled trial in 22 schools to test the relative effectiveness of a different approach.

The effectiveness of RSE, especially for young and novice drivers, often falls short of expectations owing to its failure to address critical age and experience factors. RSE typically focuses on knowledge and consequences – simply imparting information about risks has proven insufficient to drive lasting behavioural change. It is also clear that classroom education has to compete with other more compelling influences, such as the observed behaviour of drivers (including parents), and can act only as a complement to the important need for cognitive (not necessary driving) skill development (i.e. hazard perception skills and competency/capacity building). Overall, the effectiveness of RSE, especially in the pre-driver stage, is a topic of ongoing research and evaluation, with a need for more robust data to inform future interventions.

The impact of shock and tell performances

The Pre-driver Theatre and Workshop Education Research, which ran between September 2019 and March 2023, sought to establish how educational interventions could be structured and delivered to offer meaningful support in enhancing the safety of young and pre-drivers. This involved the design and piloting of a pre-driver educational workshop, the impact of which was tested against a more traditional theatre-style event using a cluster randomised controlled trial and comparison study at a number of schools/colleges in Devon and Surrey.

The research found that whilst participants might exhibit strong reactions on the day of a theatre event, neither the risk of becoming a victim of a road crash nor the risk of regret from having caused an incident made a material, lasting impression. This is in keeping with a body of published research that documents how 'threat' and 'fear' appeals can be counterproductive, particularly for young males. Such approaches can prompt defensive or even hostile reactions. A young audience is also more likely to experience optimism bias about their own capability and the scale of their risk exposure.

Topics to include in pre-driver education

A comprehensive approach to enhancing young driver safety requires a focus on the evidence-based preventative actions that pre- and young drivers can take. The initial phase of learning to drive is marked by inherent risks, largely as a result of the inexperience of this at-risk group and the incomplete maturity of the teenage brain. Therefore interventions should emphasise strategies for maximising the benefits afforded by the learning-to-drive process, including the acquisition of substantial driving experience. Furthermore, the cultivation of essential cognitive skills, such as hazard perception and learning to avoid distractions, is important, particularly because training can enhance these skills in young drivers effectively. A holistic approach that acknowledges the multifaceted factors influencing young driver safety, including vehicle choice and telematics feedback on driving behaviours, is essential to ensure a comprehensive road safety initiative. Additionally, addressing distraction-related collisions, particularly those resulting from mobile phone use and the influence of passengers, is of utmost importance. Furthermore, fatigue management, avoiding impairment from alcohol and drugs, and controlling speeding behaviours all play vital roles in fostering safe young drivers. Finally, involving young people themselves in the design of interventions is vital, to ensure that they are relevant. The insights gained from focus groups and target audience beliefs can inform the design of interventions, making them more impactful.

Key considerations in shaping the design of interventions

Road safety interventions should be based on research evidence and behavioural theory rather than intuition and personal knowledge. There are several important steps that should be taken as part of the intervention design process:

- incorporating psychological theory;
- conducting background research to understand the problem;

- setting clear aims and objectives;
- using a logic model;
- considering how interventions are framed (i.e. in terms of fear-based appeals vs positive reinforcement);
- thinking about the timing of intervention implementation;
- using BCTs;
- using ‘implementation intentions’;
- making learning an active process (i.e. not the passive absorbing of information);
- taking a ‘resilience education’ approach; and
- co-designing, testing, and piloting interventions.

It is vitally important that the effectiveness of an intervention is evaluated (an outcome evaluation), alongside establishing whether the intervention was delivered as intended and positively received by those involved (a process evaluation). The results from either one of these two different kinds of evaluations cannot be used to deduce the results of the other.

The DriveFit intervention case study presented in section 5.2 provides a worked example of these principles of good intervention design. DriveFit was designed to improve the attitudes and intentions of 16- to 18-year-olds toward safe road use using the Theory of Planned Behaviour as its underlying theoretical framework. The intervention consists of a film and an online workshop, aimed at engaging students and promoting safe driving behaviours. This report describes how the intervention underwent a pilot phase, leading to several improvements, and it shares the results of a cluster randomised controlled trial (cRCT) that showed small but significant improvements in risk intentions, attitudes and other measures. The report also includes insights from the process evaluation, providing valuable feedback for the design of future interventions.

Overall, this report underscores the imperative need for the transformation of RSE which targets pre-driving age youth. While education retains its vital role, it must undergo an evolution that involves adopting evidence-based strategies and implementing a considered approach to designing and assessing interventions. The recommendations and insights presented in the sections that follow offer a pathway for the advancement of RSE, with the ultimate goal of bolstering the safety of young and pre-drivers.

1. Introduction



Road traffic collisions continue to pose a significant challenge to public safety, both in the UK and further afield. Whilst road safety education (RSE) is undoubtedly an important part of the safe system, it is crucial to understand its relative importance in comparison to other collision prevention measures. When designed and delivered using an evidence-based approach, there is the potential for RSE to support safer road user behaviours and reduce the devastating impacts of road traffic collisions.

This report has been written with practitioners in mind. Research evidence and recommendations are presented to support practitioners as they make decisions about the commissioning, design and delivery of RSE programmes and resources. This report outlines the role and potential of RSE for improving young and novice driver safety. It describes the role of RSE, the impact of 'shock and tell' performances, topics appropriate for inclusion within pre-driver education, and key considerations for the design of interventions – in every case drawing on the findings of the now complete Pre-driver Theatre and Workshop Education Research (PdTWER) project.

The PdTWER ran between September 2019 and March 2023. It was initiated as a result of a growing interest from RSE deliverers and the wider road safety community about how best to deliver interventions that contribute towards safer driving amongst younger drivers. The project was funded by the RAC Foundation, the National Fire Chiefs Council, Road Safety GB, the Road Safety Trust, the Department for Transport, and Kent Fire and Rescue Service. It evaluated the effect of various pre-driver education approaches on pre-driver attitudes and intentions. Overall the research sought to understand how educational interventions could be structured and delivered to enhance the safety of young and pre-drivers.

2. The Role of Road Safety Education



Whilst RSE is commonly implemented, its effectiveness often falls short of expectations, as its delivery frequently fails to meet safety objectives. For young and novice driver education in particular this is due, in part, to interventions failing to address critical age and experience factors. The current preoccupation of RSE with knowledge-based and consequence-focused learning also neglects the need for skill development (e.g. hazard perception skills and competency/capacity building). In addition, simply imparting information about risks has proven insufficient to generate lasting behavioural change.

Pre-driver education is one type of RSE and, although there is no one accepted definition of the demographic targeted, pre-driver interventions are typically delivered to young people between the ages of 16 and 18 who have not passed their driving test but may be learning to drive. Given the significant health risks posed by driving to young people, intervening at this age is common (Deighton & Luther, 2007). It is considered appropriate from a developmental perspective, because an association between sensation-seeking, deviant behaviour and attitudes towards risky behaviour has also been found, applying to those aged between 11 and 16, peaking at age 14 (Waylen & McKenna, 2008).

Attitudes held at the pre-driver and learner stage have also been described as 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 the involvement of novice drivers in crashes. This is particularly important given the well-documented risks associated with speeding and distracted driving during the early months of driving licensure. Rowe et al. (2016) suggest that interventions with small effects can be particularly desirable if targeted at the right time for pre-drivers (i.e. around the point of licensure for independent driving).

However, evidence for the ability of pre-driver intervention delivery to effect positive change has not been universal. One UK study found that whilst baseline attitudes in pre-drivers did not predict violations in fully qualified drivers, 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, given the absence of robust evaluation data from randomised trials, driver education and training should be considered as an area of research, rather than a ready-to-deploy public health intervention.

Pre-learner interventions in the UK, often delivered in schools and colleges, are typically led by local authorities, road safety partnerships and 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 or by taking part in interactive workshops – or a combination of the two (e.g. Cutello et al., 2020b; Poulter & McKenna, 2010). Commonly, interventions 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), and are largely designed and delivered using a ‘fear appeal’ approach.¹

¹ Fear appeals use fear to motivate attitudes or behaviours by highlighting potential negative consequences or threats associated with a specific action or inaction.

3. The Impact of Testimonial ‘Shock and Tell’ Performances



Fear-inducing interventions, often presented in testimonial-style performances, are both prevalent and contentious. While the health communication literature offers a mixed perspective on the effectiveness of fear appeal strategies, the prevailing consensus among behavioural scientists and health promotion professionals is that caution should be exercised when using threat appeals.² Although threat appeals can capture attention (Lewis et al., 2007), they do not consistently lead to behavioural change (Carey et al., 2013). In certain circumstances where specific conditions are met (such as the use of efficacy statements,³ addressing issues that have severe consequences that individuals are very vulnerable to, and focusing on one-time behaviours rather than repeated ones, particularly with a predominantly female audience) they can yield an impact. However, it is noteworthy that they can actually stimulate an increase in risky behaviours (Carey et al., 2013; Lennon & Rentfro, 2010).

² a persuasive approach that employs the presentation of threats or potential harm to influence individuals' attitudes or behaviours, often used in advertising or public health campaigns to discourage action or promote protective actions.

³ a message which enables a recipient to believe that they can perform the recommended response.

In fact, these approaches are often counterproductive for males, leading to defensive reactions, avoidance of threatening information, and a general rejection of the message, as seen in other areas of public health (Brown & Locker, 2009; Hastings, 2002). Males also tend to perceive the material as less applicable to themselves (Lewis et al., 2007) – a significant consideration given the prevalence of young male drivers in road safety casualty statistics. Young pre-driver audiences are also more likely to experience ‘optimism bias’ (White et al., 2011) – the tendency to overestimate the likelihood of positive events and underestimate the likelihood of negative events – which in turn also has an impact on their reaction to materials which include information about death.

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. Strong graphic threat messages have been found to have a greater effect on discouraging behaviour in the context of unfamiliar issues (e.g. muscle disorders resulting from a lack of physical exercise) than familiar issues (e.g. drink driving) (De Pelsmacker et al., 2011). A study by Leshner et al. (2010) investigating disgust conditions (e.g. in anti-tobacco advertising) found that using a disgusting image and threat appeal reduced the reception of the audio message provided by TV advertisements. Such findings indicate the importance of designing messages that secure optional message engagement and processing. How the message is received and processed plays a pivotal role. Messages that strike a balance between not being overly arousing (as in the case of fear appeals) nor overly disengaging (as in purely factual presentations) have been shown to lead to optimal message processing (Rhodes, 2017). Despite evidence that threat appeals – when applied in a road safety context – have many shortcomings, audiences often rate the value of threat appeals highly when asked. This shows that it is important not to regard support for interventions as a measure of their effectiveness.

Increasingly, research is finding that positive emotional appeals are an effective tool, particularly when it comes to the pre- and young driver audience. This approach involves depicting and modelling safe driving behaviours and the positive outcomes that result from adhering to such behaviours. It may include elements of humour, content that fosters empathy, role modelling, hope and compassion. Such strategies have proven more effective than fear appeals in reducing risky driving behaviours, particularly among high-risk young drivers (Feenstra et al., 2014), thereby enhancing the relevance of risk information and engagement with it (Cutello et al., 2020a).

3.1 Pre-driver Theatre and Workshop Education Research project findings

Several studies were conducted as part of PdTWER to contribute to the evidence on the effect of negatively framed pre-driver interventions. The findings from this research are outlined below.

3.1.1 Content and behaviour change techniques in testimonial performances

One study evaluated the content of six pre-driver testimonial performances in the UK⁴ and established the presence of behaviour change techniques (BCTs) within the interventions (Michie et al., 2013). A thematic analysis of six performances was conducted through transcribing and coding a total of 7.5 hours of audio and video recordings. BCT techniques were coded in accordance with the 93-item BCT Taxonomy (Michie et al., 2013). Four main themes were established, as follows.

Misleading information about risks

Performance content across all six interventions was strongly skewed towards providing information about road risks. All performances focused strongly on four of the ‘fatal five’ risk factors (i.e. speeding, failure to wear a seatbelt, drink/drug driving, and distraction/inattention). There was less of a focus on the fifth, fatigue. There were also occasions where inaccurate descriptions or information were provided, and some performance content actually undermined enforcement deterrents (e.g. by providing, in one instance, a case study example of how one offender with 12 penalty points had successfully pleaded hardship to keep their driving licence).

Despite the lack of evidence available to support the assumption, provision of information is often assumed to be important for achieving behaviour change (e.g. Michie & Johnston, 2012, Bojesen & Rayce, 2020). Young driver collisions have not in fact been found to result from a lack of knowledge about risky driving (Gibbons & Gerrard, 1995), and several driving interventions which have tried to increase knowledge or change attitudes have been found to result in relatively few behavioural effects (e.g. drink driving behaviours: Mann et al., 1986; Sheppard & Stoveken, 1993). Mayhew and Simpson (2002) recommended that interventions should instead address the age and experience factors that are most related to crash risk. Whilst information provision can act as a reminder about good driving habits, it is not common for information provision alone to lead to behavioural change. Interventions designers should thus carefully consider how information is used so that it can best support beneficial outcomes for young drivers.

Graphic descriptions of trauma

All six performances that were evaluated used actual collision stories to illustrate various safety learning issues. The consequences of road traffic collisions (health, emotional and social) were heavily emphasised within all performances reviewed. 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, and graphic descriptions and images of crashes were also used, to varying degrees, throughout the six performances evaluated. In one performance,⁵ 36 images of crash scenes in the aftermath of collisions

⁴ Learn2Live (Cornwall, Dorset, Devon & Somerset), Safe Drive Stay Alive (Surrey), Safe Drive Stay Alive (East Sussex), Safe Drive Stay Alive (Lancashire), No Turning Back (Kent), Learn and Live (Cleveland)

⁵ Learn and Live (Cleveland)

were presented on screen, equating to an average of one new image every six seconds. As already outlined, given the limited evidence for the effectiveness of this approach, future intervention delivery should carefully consider the nature and tone of the message delivered.

Emergency service experiences

All performances used emergency service experiences as a core component. The emotional anguish suffered by emergency service workers in the aftermath of road traffic collisions was emphasised, with the ongoing mental and emotional effects for emergency service personnel pervading the entire performance content. Theoretically, the relationship between emotion and behaviour is not clear, and is poorly understood according to the threat appeal literature (Carey et al., 2013). Various theories imply that emotion does not have a direct effect on behaviour, and making a causal link between fear and behaviour has therefore been described as over-simplistic (Carey et al., 2013). Whilst likely to be memorable for attendees of performances, the public retelling of highly emotional professional stories in the interventions within this review are more likely to be beneficial as part of the reflective practice of the individuals speaking and are less likely to have a persuasive impact on the attitudes, intentions or behaviours of the attendees (Perloff, 1993).

In the performances evaluated, the importance of the speakers being 'real' (i.e. not actors) was mentioned on several occasions by speakers when covering content about road risks. By way of contrast, Moon and Fowler (2008: 236), in their framework for the use of stories within higher education and professional development, state that it is important not to dismiss the role of fiction, describing fiction within nurse education "*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*". Given the potential value of 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.

Promoting self-ownership of safety

All performances included the promotion of actions to support safety. 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. The development of plans to support an individual in their pursuit to translate goals into action has been found to be important for supporting behavioural change (Gollwitzer, 1999).

Speaking out and taking action, whether as a driver or a passenger, was also touched on in some of the performances. Peer passengers increase the risk of fatal crashes within young and novice drivers, owing to the increased distraction that they cause and peer pressure to behave recklessly (Chen et al., 2000; Ehsani et al., 2015; Ouimet et al., 2015; Simons-Morton et al., 2005). Consequently, a developing body of research has sought to understand whether peer passengers can be positively harnessed to improve young driver safety (Buckley & Watling, 2018). There may be potential for future interventions to support and encourage peer passengers to speak up and promote safer road user behaviours, provided the intervention is evidence-based and the protective strategies employed outweigh the proven negative consequences of having peer passengers within vehicles, especially during early licensure. There is a weight of evidence supporting the

value of graduated driver licensing (GDL) (e.g. Williams, 2017), which typically includes some level of restrictions on passenger and night-time driving to reduce the prevalence of peer passengers, casting doubt on the efficacy of any approach that promotes the presence of peer passengers.

The promotion of evidence-based road safety actions was not generally forthcoming in the performances evaluated. In future, pre-driver educational interventions should seek to promote the actions that research evidence has found to support young driver safety, such as a 12-month minimum learning period (Mayhew et al., 2014b; Senserrick & Williams, 2015), which could be voluntarily taken up in the absence of regulation and hazard prediction training (Crundall, 2016).

This study also evaluated the BCTs present within the performance analysed. Only 23 of the 93 BCTs in the BCT Taxonomy were identified as potentially present in the six interventions reviewed. The BCTs used were largely negatively framed and spanned 12 of the 16 groups in the taxonomy. Seven BCTs, from four groups, were present in all the performances beyond all reasonable doubt. These were:

- 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.

For further details on the BCTs included in the performances please see Appendix A. Whilst BCTs were present in the performances evaluated, there was a heavy focus on natural consequences (e.g. information about health consequences). The analysis conducted demonstrates that there is significant potential for interventions to employ a broader range of evidence-based BCTs, particularly those that have been identified as likely to be successful with this target audience (i.e. Self-monitoring of behaviour and Self-monitoring of outcomes of behaviour (BCT 2.3 & 2.4), Feedback on behaviour (BCT 2.2), Instruction on how to perform the behaviour (BCT 4.1), Goal setting (behaviour & outcomes) (BCT 1.1 & 1.3), Review behaviour goal(s) (BCT 1.5) and Social support (unspecified & practical) (BCT 3.1 & 3.2)) (Sullman, 2017). Future interventions should also aim to include a broader range of high-potential BCTs. This might include:

- providing content to support individuals in developing self-efficacy and/or perceived behavioural control through the use of tools such as ‘implementation intentions’;
- using BCTs shown to be effective for this target audience;
- addressing factors most associated with crash risk (e.g. age and experience, Mayhew & Simpson, 2002); and
- being mindful of how such content can support delivering safety improvements, which in turn 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 and most likely to secure beneficial improvements in road safety attitudes and intentions. The purpose of RSE must be to prevent collisions, not to tick boxes that education has been done or to warn young people of risks.

3.1.2 Safe Drive Stay Alive Surrey comparison study

Safe Drive Stay Alive (SDSA) Surrey ⁶ was evaluated as part of the PdTWER research, using a comparison study. The responses of 16- to 18-year-old students ($n = 188$) from six schools in Surrey were analysed and compared to comparison control students ($n = 210$) from 11 schools in Devon. The study 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) (see section 5.1 for a description of the Theory of Planned Behaviour, which was used as the basis of this evaluation). 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 (Intentions – fatigue; Attitudes – speed, drink driving, mobile phone use, all; Other – attitudes to driving violations) and 1 out of 16 study measures at T3 (Intentions – speed). The largest beneficial effects were for attitudes at T2, but these were not detectable at T3. There were also detrimental effects of the intervention for 3 out of 16 study measures at T2 (Alcohol intentions, Efficacy, and Perceived behavioural control) and 2 out of 16 study measures at T3 (Drink driving attitudes and Efficacy). Participants already expressed safe views at baseline (T1), which left minimal room for improvement. This study confirms the findings of previous research, that testimonial education interventions typically deliver small self-reported effects which diminish over time (e.g. Poulter & McKenna, 2010). SDSA Surrey did not deliver the same extent of improvement in attitudes and intentions, or over as long a period of time, as that secured by the newly designed, positively framed DriveFit study (see section 5.2).

Despite the lack of evidence for significantly large and lasting behavioural effects from pre-driver testimonial interventions, interventions like SDSA Surrey remain popular with deliverers, teachers and students alike, although the process evaluation conducted for this study found that students indicated that the performance had negative emotional effects (shocking, worrying or frightening). Given the negative emotional effects and the smaller effect on measures related to behaviour, the conclusion of this research overall has been that practitioners should aim to design and deliver interventions that more closely resemble DriveFit (see section 5.2) and are less like SDSA Surrey.

⁶ Established in 2005, Safe Drive Stay Alive Surrey (SDSA) is an annual series of live educational performances featuring a sequence of films and live speakers, designed to make young people aware of their responsibilities as drivers and passengers, and to positively influence their attitudes. From <https://roadsafetygb.org.uk/news/safe-drive-stay-alive-15-years-on-does-it-work/>

4. Topics to Include in Pre-Driver Education



A comprehensive approach to improving young driver safety should aim to support both cognitive development and behavioural modifications. The various factors that contribute to the disproportionately high involvement of young drivers in road collisions, such as cognitive skill deficits, social influence, inexperience, distraction and risky driving behaviours, are outlined in this chapter. These insights were used to develop the DriveFit intervention (see Section 5.2) and can be used to support the design of other pre-driver and young driver interventions.

To improve young driver safety, available research evidence suggests five main areas for preventative focus:

1. Maximising the learning-to-drive process:

- acquiring sufficient driving experience
- gaining necessary cognitive skills

2. Making decisions that support safety:

- optimising vehicle choice
- receiving telematics feedback on driving behaviours

3. Maintaining focus – reducing in-vehicle distraction:

- limiting mobile phone use
- reducing passenger distractions

4. Fitness to drive:

- managing fatigue
- avoiding drink and drug impairment

5. Controlling the journey:

- managing speed

4.1 Maximising the learning-to-drive process

Learning to drive is often seen as an important rite of passage for young people, but it can be fraught with risks, especially during the initial stages of driving. Inexperience, coupled with the fact that the teenage brain is still developing, can lead to unsafe driving behaviours and a higher likelihood of collisions. Consequently it is important that interventions explore strategies for maximising the learning-to-drive process to support safer young drivers.

4.1.1 Getting sufficient driving experience

Inexperience is a major contributor to unsafe driving behaviours and collisions among young drivers. The first six months post licensure are the riskiest, and it is commonly recommended that new drivers accumulate as much experience as possible during this period (Cassarino & Murphy, 2018). Exposure to different road environments and various driving situations is crucial.

GDL programmes, where they have been implemented, have significantly increased driving safety under controlled conditions (Cassarino & Murphy, 2018). The most stringent forms of GDL (i.e. strict night-time limits and passenger limits) have been associated with reductions in fatal crashes in this age group ranging from 17% to 63% (Williams, 2017). Parental involvement also plays a pivotal role in how young drivers, particularly males, operate on the roads (Taubman – Ben-Ari et al., 2017). Additional support and guidance for parents can enhance the learning-to-drive process (Cassarino & Murphy, 2018).

GETTING SUFFICIENT DRIVING EXPERIENCE

Key message: Learning to drive for 12 months and securing over 100 hours of supervised practice in varied circumstances and with a mixture of professional and private practice will make young drivers better and safer drivers. Moreover, taking these actions should increase the chance of learners passing first time.

Preventative messages

Learn to drive for 12 months: Driving can take time and require 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.

Get a minimum of 100 hours practice or more before taking the test: Set the goal of getting two hours of driving practice every week for 12 months: one hour of professional driving instruction and one hour of private practice. This could be skewed to more professional practice to start with, and more private practice as the learning progresses. Professional lessons are important for ensuring correct technique.

Get a variety of driving practice: Drive at different times of day and 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 unfamiliar driving situations. Young drivers could use a certain day each week to think about their driving practice for the next week. Learners can record (weekly) whether they have met their learning-to-drive goals, to examine how well they are meeting these goals, and how they can engage with family members/supervising drivers to support their driving practice.

Overcome the barriers to getting the practice needed before taking the driving test: Ask learners to think about the challenges and barriers to meeting their practice goals (e.g. wanting to pass sooner, feeling the pressure to pass quickly, lack of time and money, having no car for private practice etc.), and help them to develop action plans about how to overcome these challenges.

4.1.2 Gaining necessary cognitive skills

Cognitive skills, such as visual search abilities, hazard perception capabilities and the inhibition of distractions, are critical for safe driving (Cassarino & Murphy, 2018). The inability to anticipate or detect potential hazards can have a significant impact on crash involvement. One study (Olsen et al., 2007) found that after six months of driving experience there were notable improvements in eye-glancing behaviour. Novice drivers with less than 1,000 miles of experience tend to exhibit anticipatory responses similar to learner drivers (Kinnear et al., 2013), underscoring the need for on-road driving experience as a means of supporting hazard perception development. Fortunately, training can also enhance these skills in young drivers. Hazard perception training has been found to bring inexperienced drivers up to the same standard as experienced drivers within a few weeks to four months (Cassarino & Murphy, 2018).

GAINING NECESSARY COGNITIVE SKILLS

Key message: Improving hazard perception skills makes young people better and safer drivers.

Preventative messages

Hazard perception skills matter: Hazard perception is important for the safety of all drivers, as well as younger more inexperienced drivers.

Practice, practice, practice: Hazard perception training has been found to bring inexperienced drivers up to the same standard as experienced drivers within a few weeks to four months.

Getting access to materials: Materials can be accessed via the Driver and Vehicle Standards Agency (DVSA) Driving Safer for Life website, and young drivers can also practice when they are a passenger in a car.

4.2 Making decisions that support safety

In recent years, the traditional focus on individual factors in the context of young driver safety has been complemented by a more holistic approach, as advocated by Cassarino and Murphy (2018) in their paper 'Reducing young drivers' crash risk: Are we there yet? An ecological systems-based review of the last decade of research'. An ecological systems approach recognises that various interconnected elements (e.g. the social and the wider environment) influence the behaviour and safety outcomes of young drivers.

4.2.1 Vehicle choice

Research has shown that the age and condition of a vehicle are crucial determinants of safety (Cassarino & Murphy, 2018). The smaller, older vehicles often chosen by young drivers may well lack the latest safety technology. Providing better information to parents to help them make informed vehicle-purchasing decisions is important, as this first vehicle purchase can deliver either benefits or disbenefits over the duration of vehicle ownership. However, it is worth noting that parents, in the main, are generally aware of safety criteria when making vehicle choices for their children. Re-emphasising the importance of purchasing the best possible vehicle within budget constraints, and directing the young driver towards supportive resources for this purpose, constitute a valuable focus for interventions.

4.2.2 Telematics feedback on driving behaviours

Another crucial aspect which can support young driver safety is the provision of feedback on driving behaviours. Research suggests that when feedback is combined with rewards, it can lead to significant benefits (Mullen et al., 2015). However, the use of extrinsic rewards, while effective to some extent, has its limitations (Lotan et al., 2014). It is therefore essential to explore other avenues of intervention, such as active parental involvement in reviewing telematics feedback (Cassarino & Murphy, 2018).

MAKING DECISIONS THAT SUPPORT SAFETY

Key message: Vehicle and insurance choices made by new driver and their parents can support their safety and comfort in the first six months of driving and beyond.

Preventative messages

Why vehicle choice matters: Cars are getting safer every year thanks to new vehicle technology such as automatic emergency braking, new airbag features and electronic stability control. Although 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, they are nevertheless an important part of securing the safest driving experience. Whenever possible, getting a car under ten years old is preferable, as it means that the car will benefit from more modern safety equipment, which will reduce the severity of injuries in the event of a collision. Getting as new a car as possible within an available budget is a good aim. The safety performance of cars can be looked up in Euro NCAP or on consumer sites such as FirstCar.

Why insurance choice matters: Over the past decade, telematics ‘black boxes’ have become a more common insurance offer for newly qualified drivers. Given the elevated risk that newly qualified drivers present, traditional insurance premiums are often very expensive. Telematics insurance uses a black box, mobile phone or dongle in the car to monitor harsh acceleration and braking, sharp changes in steering, and the speed of the vehicle, to determine the risks the user is taking, and making a journey-based charge accordingly. Competent and in-control drivers typically benefit from financial savings. Using telematics insurance for at least the first year of driving (and ideally for longer) should provide a lower premium, and feedback on performance while driving.

4.3 Maintaining focus – reducing in-vehicle distraction

Distraction-related crashes pose a significant threat to road safety, particularly amongst young drivers.

4.3.1 Mobile phone use

One of the most prominent contributors to distraction-related collisions is the widespread use of mobile phones (Cazzulino et al., 2014), with texting and messaging being a common activity among this demographic (Delgado et al., 2016). It is notable that young, inexperienced drivers are more adversely affected when engaged in secondary tasks within a vehicle than their more experienced counterparts (Klauer et al., 2015).

Mobile phone usage while driving depletes the level of visual, cognitive, manual and aural resources available for the driving task (Stavrinos et al., 2018). Young drivers may acknowledge the dangers associated with mobile phone use, but often engage in it regardless (Dénomée et al., 2020). Several social factors can influence this behaviour, such as parental mobile phone use and the social norm of responding promptly to incoming messages.

It is important to note that simply promoting knowledge about the risks associated with mobile phone use while driving is unlikely to be effective in the long term, as drivers are already well aware of the risks presented by mobile phone use (Cazzulino et al., 2014). Instead, efforts should focus on shaping social norms and discouraging quick message responses (Delgado et al., 2016). Since mobile phone use often involves the need for instant gratification, strategies should aim to bolster positive attitudes towards responsible use of mobile phones and make it easier for drivers to refrain from responding to distractions (McDonald & Sommers, 2015). Encouraging discussions about alternative behaviours can create teachable moments and drive changes in behaviour. Given the prevalence and seriousness of this issue, it should be considered a high priority for road safety initiatives.

MOBILE PHONE USE

Key message: Mobile phone use whilst driving is both controllable and avoidable.

Preventative messages

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, divert attention and slow reactions.

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 being caught using a mobile phone (i.e. Road Traffic (New Drivers) Act 1995, loss of job, of relationships, of opportunities, of own transport, etc.). 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.

How to avoid using a mobile phone whilst driving to stay in control and focused:

Encourage young drivers to make a plan for managing their phone use when in the car. Some ideas include:

- Encourage young drivers to put their mobile phone on silent / Do Not Disturb and out of reach every time they get in the car, or in an appropriate cradle if using as a Sat Nav.
- Provide instruction for how car modes and other phone options can be used to support not touching a mobile phone whilst legitimately using its functions whilst driving (e.g. satnav use).
- Use the car door shutting as a prompt to 'check their phone in' (e.g. putting phone on silent, out of reach, in a suitable cradle etc.).
- Use passengers to help manage phones whilst driving.
- Demonstrate the development of implementation intentions (e.g. **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 the reflex response reaction to the phone, which will benefit mental health, well-being and relationships as well as managing phone use once in the car.
- Encourage discussing 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 the issue with friends and family, and their potential to be good role models.

4.3.2 Passengers

In addition to mobile phones, the presence of passengers in the vehicle can significantly contribute to distraction and risk-taking behaviour (Cassarino & Murphy, 2018). Passengers, especially those of similar age who are risk-tolerant or exert peer pressure, can lead to a higher likelihood of collisions (Cassarino & Murphy, 2018). Reward-sensitivity to risky driving behaviours tends to increase when driving with peers, often resulting in higher speeds (Scott-Parker, 2017, Scott-Parker & Weston, 2017). However, recent research has explored the potential positive role of peer communication and co-operative driving (Cassarino & Murphy, 2018) although the balance of evidence still indicates that increasing the number of peer-age passengers in a vehicle is detrimental for safety. A study by Williams (2017) found that having three or more passengers under the age of 21 in the vehicle increased crash risk *fourfold* compared to driving alone. This underscores the importance of strategies aimed at reducing passenger-related distractions.

PASSENGERS

Key message: Peer passenger distractions can be controlled by both drivers and passengers

Preventative messages

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, divert attention and slow reactions, particularly at night, which can lead to a loss of vehicle control). Ask young drivers to assess the degree of regret they would feel if they were involved in a collision where passengers were involved 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 to promote a phased approach to taking peer-age passengers post-test.

How to manage peer passenger risks when driving: Recommend that drivers carry only one passenger during the day when they have less than six months solo driving experience. Encourage them to make clear to their passengers the rules of their car (e.g. develop their own 'my car, my rules' plan including aspects such as seatbelt wearing and minimising distractions). Outline ways in which young drivers can overcome barriers to managing passenger risks.

How to be a safe passenger: Encourage young people, if travelling with a newly qualified driver, to do so only during the day and as the sole passenger. Discourage young people from travelling at all with a newly qualified driver at night. Also encourage and empower young passengers to take responsibility for their own safety. Encourage passengers to help the driver with certain tasks and support their concentration by seeking not to distract them.

4.4 Fitness to drive

4.4.1 Managing fatigue

Managing fatigue is important, as disrupted sleep cycles can impair a driver's ability to function optimally, leading to a heightened risk of collisions (Soleimanloo et al., 2017). Research also indicates that males are more prone to fatigue-related collisions than women (Owens, 2014). Fatigue-related collisions in this demographic are most likely to occur at night, in contrast to the situation with older adults, for whom these incidents are more common in the mid-afternoon (Owens, 2014). It is worth noting that fatigue collisions, regardless of age, are most likely to occur when a driver is travelling alone (Owens, 2014), with the majority of such collisions resulting from lateral lane position crossing and an increased frequency of white line crossing in young drivers (Soleimanloo et al., 2017). However, there is a need for more in-depth research in this area to better understand the underlying causes of fatigue-related collisions and potential interventions.

Known effective interventions to address fatigue-related collisions include avoiding travelling when fatigued, refraining from drinking and driving, and planned napping when necessary (Owens, 2014). Addressing the broader issue of fatigue on the roads will also involve considering societal norms about electronic device use and caffeine consumption (Owens, 2014). To support young drivers in managing fatigue, it is essential to focus on both individual behavioural changes and system-level changes that can create a safer driving environment.

FATIGUE

Key message: Driver sleepiness is both controllable and avoidable.

Preventative messages

The 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 may not be able to brake. Young males and shift workers are most at risk in this respect. 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.

Causes and signs of fatigue: Sleep is a basic biological need: without enough sleep everyone will experience fatigue. It is possible to predict the times when someone is going to be the most sleepy. Fatigue is influenced by: time of day (0200–0600 and 1400–1600); lack of or disturbed/short sleep; being awake for too long; irregular sleep patterns (the case for shift workers); poor sleep (interruptions and sleep disorders); going against the body clock; and the time spent on-task. Having difficulty concentrating, yawning, heavy eyelids, eyes starting to roll and head nodding are all signs that someone is fatigued. It is not always possible to spot immediate sleep onset (and young drivers can find it difficult to spot drowsy driving), a fact which can cause problems whilst driving. If someone is already sleepy they are unlikely to be able to make good decisions at that moment. This is why planning is the best form of defence. Everyone differs in their personal sleep needs. It is important that individuals are encouraged to know themselves and their limits.

The benefits of good sleep: There are many benefits associated with good sleep, including good mental and physical well-being. Short sleep durations are related to weight gain and obesity. A lack of sleep is also related to the risk of illness, which can have an adverse effect on appearance. Links have been found between sleep and poor mental health, poor mood, poor decision-making, and poor reaction times, as well as a deterioration in sports and exam performance.

The social and legal consequences of driving sleepy: Whilst there is not 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, a driver 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 can be placed on the anticipated regret surrounding driving whilst drowsy or falling asleep at the wheel.

Avoid driver sleepiness by staying in control and alert: Encourage drivers to:

- make a commitment to avoid driving when drowsy or fatigued;
- consider driving to be a situation worth changing/prioritising good sleep habits for;
- set a sleep target and make time for sleep;
- aim to get 7–8 hours sleep before driving the next day;
- have and work towards good sleep habits (e.g. have a regular bedtime, avoid screens late at night, avoid caffeine late at night, and make sure sleeping space is comfortable);
- use sleep technology to monitor their progress towards sleep targets and restructure the environment (e.g. reducing online gaming, asking a friend or family member to act as buddy if they are struggling with managing sleep, or asking them to reinforce good habits, such as turning off the TV if they are tempted to stay up late);
- consider how staying up late when they need to get up early the next day is incompatible with their belief that they are in control of their actions;
- plan journeys around their sleep needs;
- avoid night-time driving, and avoid or carefully plan long journeys;
- set a good example by talking to their parents and siblings about getting good sleep habits in place;
- be a good passenger when they are not driving; when driving, look out for somewhere to stop to take a break and have a caffeinated drink;
- challenge friends and family about their sleepy driving;
- know what to do if they feel sleepy whilst driving (i.e. take in some caffeine and have a nap, take breaks when driving on longer journeys – 20 minutes every two hours) – drivers should also know when it is time to stop driving;
- compare likely or possible outcomes if they do not stop for a break on long journeys; and
- check in with how they are feeling and use the ‘tiredness kills, take a break’ signs as a cue to assess their own sleepiness level.

4.4.2 Avoiding drink and drug impairment

Drink and drug impaired driving has been found to be influenced by individual personality types and reward-seeking tendencies (Cassarino & Murphy, 2018). Research suggests that individuals with low sensation-seeking tendencies and high risk perception are less likely to engage in drink driving. Additionally, the perceived rewards, and sensitivities to both rewards and punishments, play a role in an individual’s propensity for drink driving (Scott-Parker & Weston, 2017). Parental behaviours can also influence these choices (Cassarino & Murphy, 2018).

When it comes to cannabis use, its impact on young drivers reveals itself in reduced speeds, increased tailgating, longer reaction times and increased variability in lane-keeping and steering. Interventions to tackle cannabis-related impaired driving should combine enforcement efforts with awareness campaigns (Cassarino & Murphy, 2018). Given the heightened reward sensitivity in young drivers, using gain-framed messages (Scott-Parker & Weston, 2017) can be an effective communication strategy. Moreover, offering skill-building interventions can empower individuals to make safer choices when it comes to drug-impaired driving.

DRINK AND DRUG IMPAIRED DRIVING

Key message: Drink and drug driving is both controllable and avoidable.

Preventative messages

The impact that drink and drugs have on driving safety: Drink and drug driving impairs driving performance, diverts attention and slows reactions, all of which can lead to loss of vehicle control. There are also longer-term effects on driving (e.g. the morning after in the case of alcohol). It is not possible to say how much alcohol someone can drink and at the same time stay below the legal limit. The way alcohol affects their body is dependent on several factors (their weight, age, sex and metabolism, the type and amount of alcohol they are drinking, what they have eaten recently, and their stress levels at the time). If someone is driving it is best to have 'none for the road'. In addition, alcohol and drugs have specific effects on young drivers owing to their biology.

The social and legal consequences of drink and drug driving: Drink and drug driving is not supported by the general public, or by young people. Drink and drug driving attracts penalties and fines. Drivers are legally, socially and morally accountable for being fit and healthy when driving.

How to avoid driving whilst intoxicated: Encourage drivers to commit to not consuming any intoxicating substance before driving, or to abstain from driving on social occasions where they think they 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/guardians about providing lifts for these occasions and calling a friend for support if they are tempted to drive. Also encourage drivers to think about a recent social occasion they went to and how their plan would have worked. Encourage drivers to see the social get-together planning as being the cue for / reminder about the best way to travel. Encourage drivers to avoid socialising with people who support and take part in impaired driving.

4.5 Controlling the journey

4.5.1 Managing speed

Managing speed is vital for improving road safety. Speeding violations are often influenced by social norms and peer pressure, with young drivers particularly susceptible to peer influence, both directly and indirectly (Cassarino & Murphy, 2018). Passengers can exert an influence on speeding behaviour, typically in a negative way, while informational influence tends to have a positive effect (Cassarino & Murphy, 2018).

The use of cars by young drivers for leisure purposes can also have an impact on their speeding behaviours (Guggenheim & Taubman – Ben-Ari, 2015). Additionally, individuals' sensitivity to rewards, both external (e.g. enjoying fast travel) and internal (e.g. intrinsic motivation), play a role in their speeding habits (Scott-Parker & Weston, 2017). Those with a greater tendency to assess risks are more likely to report lower instances of speeding (ibid.).

Personal attitudes, especially among women, can explain a significant proportion of the variation in speeding behaviour (Scott-Parker & Weston, 2017). Strong emotions, particularly anger, have been found to be strong predictors of speeding incidents (Scott-Parker, 2017). When it comes to interventions to reduce speeding, a combination of feedback and incentives has proven to be more effective than feedback alone (Cassarino & Murphy, 2018). In addition, to effectively combat speeding, it is essential to use 'efficacy messages'⁷ (Carey & Sarma, 2016) alongside speeding messages, prompting the audience to consider their capabilities and responsibility on the road. Where young drivers are concerned, parental behaviours (e.g. both their coaching and their own driving behaviours) can have a marked impact on speeding amongst this high-risk group.

MANAGING SPEED

Key message: Selecting an appropriate speed and staying in control of speed is important, and can be achieved with practice and planning.

Preventative messages

The impact that speeding has on driving: Driving over the speed limit increases the chances of a collision and of injuring both oneself 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 a multitude of potential consequences such as loss of life, emotional impacts, stress and an effect on well-being. It is important to travel at the appropriate speed for the conditions, and always within the speed limit, as this gives people the time and space to react to circumstances that appear on the road. Speeding means travelling at anything over the speed limit. An average speed reduction of 1mph reduces crash frequency by 5% (Brake, 2023).⁸

The social and legal consequences of speeding whilst driving: Neither passengers nor bystanders appreciate speeding. Speeding is disapproved of by the police and is easy to detect (through dash cams, average speed cameras etc.) and attracts penalties and fines. The Road Traffic (New Drivers) Act 1995 means that during the first two years of driving, if a driver accrues six penalty points, their driving licence will be revoked. This could lead to a driver losing their job, relationship and control over their own transport (requiring them to take lifts). The cost of the fine amounts, for many, to a large proportion of a day's wage. Drivers may experience embarrassment from having unattractive damage to the car resulting from a collision, or when admitting to significant others that they have been pulled over for speeding. Speeding may also contradict the view that a driver has of themselves as a considerate driver.

⁷ Efficacy messages enable a recipient to believe that they can perform the recommended response

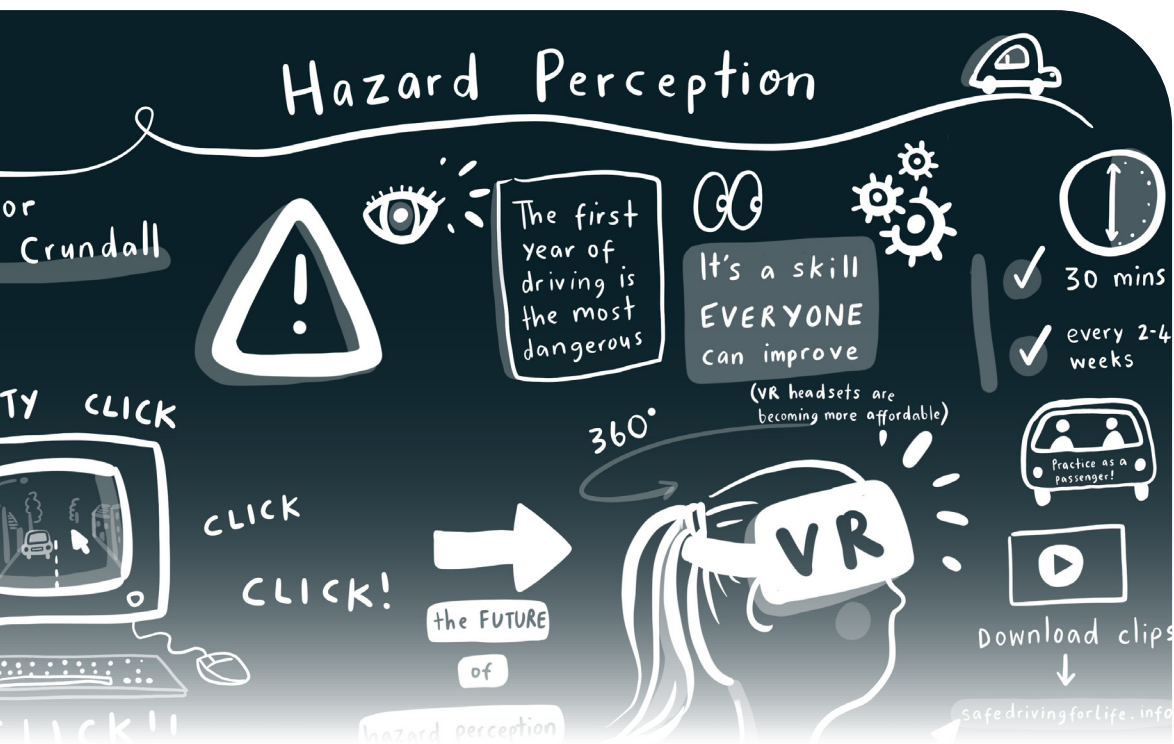
⁸ <https://www.brake.org.uk/get-involved/take-action/mybrake/knowledge-centre/speed>

How to stay in control of speed whilst driving: Emphasise to drivers how important it is to control their car within the speed limit every time they drive, and to develop a plan to avoid both purposeful and accidental speeding. Highlight that driving at the speed limit uses less fuel and is more relaxing. Encourage drivers who might seek to speed for fun to seek other outlets to get their adrenaline pumping (e.g. high-energy sports). Emotions (particularly frustration, anger and boredom) have an impact on speed choice. Emphasise to drivers that it is important not to drive whilst angry (i.e. drivers should pull over if they get angry whilst driving to let the nervous system calm down and recover through employing deep breathing). Suggest to drivers healthier ways than speeding to maintain interest whilst driving (e.g. listen to music). Encourage drivers to plan to leave enough time for the journey to take account of traffic and other unexpected delays, and to call ahead of time (from a safe, stationary location) to let people know if they are running late. Drivers can remind themselves that speeding does not save much time. In addition, remind drivers that it is a common feeling amongst new drivers to want to keep up with traffic – remind them that they are a skilful driver when they are able to control their 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.

4.6 Testing messages with the target audience

Ensuring that young people's perspectives are considered in the design of interventions which affect 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 (involving all stakeholders, those affected as well as the usual designers of the intervention) is recommended, Swist et al. (2022) note that this is not commonly practised where young people are concerned. In road safety there are only a few examples of behavioural interventions which seek out and take into account target audience beliefs to inform intervention designs (e.g. Elliott & Armitage, 2009; Parker et al., 1996). This process was, however, conducted as part of the DriveFit intervention design (see section 5.2). This research found that participants had a good knowledge of road risks, but a lack of understanding of the consequences of traffic law enforcement. Most participants stated that they 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, with mobile phone use in vehicles being described as a nuanced issue given the legitimate (e.g. Sat Nav) and illegitimate (e.g. messaging) 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.

5. Key Considerations in Shaping the Design of Interventions



Road safety interventions are frequently designed on the basis of intuition and personal knowledge rather than with reference to research evidence and behavioural theory (Kinnear et al., 2013b). Even where the effectiveness of an intervention has been evaluated, only descriptions of interventions are typically provided, rather than the actual process of their development (e.g. Cutello et al., 2020b; Dale et al., 2017; Poulter & McKenna, 2010). In this chapter, the important steps to take as part of the intervention development process are outlined, followed by a case study of the DriveFit intervention, developed as part of the PdTWER project.

5.1 Important steps for intervention development

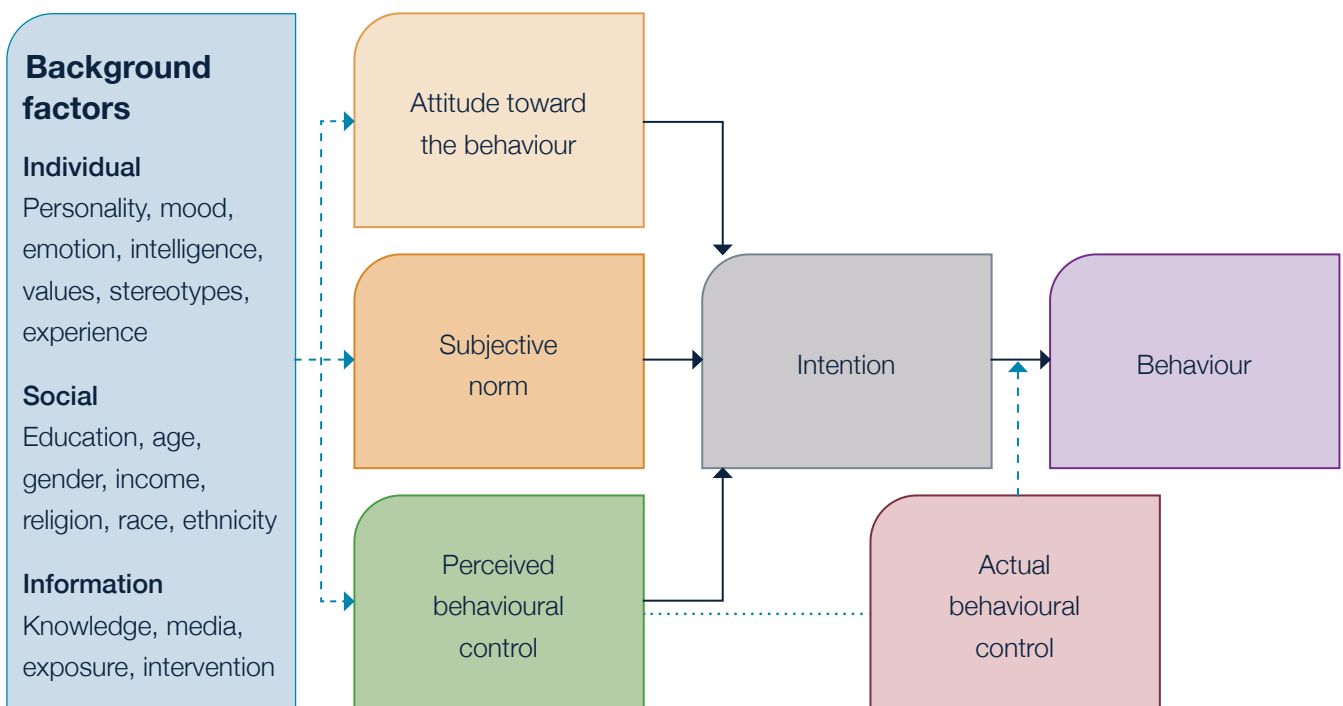
There are several important steps involved in the development of evidence-based educational interventions. Consequently, the following recommendations are made.

Use theory to inform intervention design

Within road safety intervention design, incorporating psychological theory is a recommended yet disappointingly rare practice. While interventions are often developed on the basis of practitioner priorities and intuition, there is increasing recognition of the value of grounding interventions in established psychological theories. The Theory of Planned Behaviour (TPB) (Ajzen, 1991), which was used in the PdTWER programme, has also been used to design various psychosocial interventions for health promotion, including road safety interventions (Elliott & Armitage, 2009; McDonald et al., 2018; Ranaei et al., 2021; Warner & Forward, 2016).

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. the favourable or unfavourable evaluation of a specific 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 all shape an individual's intentions (i.e. cognitive readiness to perform a behaviour) and behaviours, which are also influenced by background factors (i.e. individual, social and information). Figure 5.1 presents a flowchart outlining the theory. 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) within many fields, including road safety (e.g. Stead et al., 2005).

Figure 5.1: Main components in the Theory of Planned Behaviour



Source: Ajzen (1991, 2012)

Another approach that can be used for intervention design is COM-B.⁹ This model outlines the theory that three factors need to be present for a behaviour to occur – **C**apability, **O**pportunity and **M**otivation.

USING THE THEORY OF PLANNED BEHAVIOUR TO DESIGN INTERVENTIONS – A CASE STUDY EXAMPLE

Elliott and Armitage (2009) developed an intervention based on elicited beliefs (behavioural, normative and control) related to a driver's intentions to comply with speed limits (Elliott et al., 2005). Beliefs were elicited using standard procedures described by Ajzen (2019). An eight-page booklet was developed, which contained information about the risks of speeding in 30 mph areas and persuasive messages to target the behavioural, normative and control beliefs that were found to underpin drivers' intentions to comply with speed limits. The persuasive messages were as follows:

- Behavioural Beliefs:
 - Keeping to 30 mph speed limits will reduce the risk of a collision and injury to pedestrians and make it easier to detect hazards;
 - Keeping at 30 mph speed limits will not make it difficult to keep up with traffic; and
 - Keeping to 30 mph speed limits will make you feel more relaxed and use less fuel.
- Normative Beliefs:
 - The people important to you don't want you or themselves to be involved in a collision.
- Control beliefs:
 - When in a hurry, it is easy to keep within the speed limits, because driving above the limit does not save much time; and
 - When other traffic is exceeding the speed limit, it is easy to keep within the speed limits by ignoring how fast others are driving.

Conduct background research

At the start of any intervention design process, it is vital to identify the problem to be addressed, and conduct a form of 'behavioural diagnosis'. This will involve a consideration of what the issue at hand is, what has worked previously, and what has not. It is important to think about the theoretical and the practical issues which are relevant.

It will be helpful to answer the following questions:

- What is the aim of the content/intervention being created?
- Who is the target audience?
- What do they need to do differently to achieve the desired change?
- When/where/how often and with whom do they need to perform this behaviour?

See the COM-B Behaviour Change Wheel¹⁰ for more information about this behavioural diagnosis approach.

⁹ <https://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-6-42>

¹⁰ <http://www.behaviourchangewheel.com/about-wheel>

Set clear aims and objectives

In setting aims and objectives for behavioural interventions, it can be helpful to consider whether the intervention is, for instance, aiming to:

- increase people's capability to perform a behaviour;
- help them find more opportunities to do the right thing;
- motivate them to make the right choice;
- improve their attitudes;
- improve their perceptions about what other people think;
- increase their feelings of competence/control; and/or
- increase their intentions to perform a behaviour.

It can also be helpful to consider what function the intervention will perform. Will the intervention educate, persuade or train people? Will it model or enable specific behaviours? Will it perform one, two or more of these functions?

Use a logic model

Once the intervention aims are set, a logic model can be prepared. A logic model is “a graphic which represents the theory of how an intervention produces its outcomes”.¹¹ By providing a simplified ‘theory of change’ in this way it is easy to see why the intervention has been designed in the way it has and how it can be evaluated. See the DriveFit intervention logic model in subsection 5.2.1 for an example.

Consider how interventions are ‘framed’

Historically, interventions have relied on threat appeal, attempting to evoke fear to encourage behavioural change. However, as outlined in Chapter 3, research reveals that the assumed effect of threat appeals is often overestimated. While threat appeals can indeed affect the level of fear aroused, this does not consistently translate to changed road safety behaviours. A shift in intervention focus towards positive reinforcement, with an emphasis on de-normalising unsafe driving through promoting positive social norms, is an alternative approach which has shown promise.

Positive emotional appeals which use humour and role-modelling and encourage hope, empathy and compassion, have emerged as potentially more effective strategies than fear-based approaches. A balanced emotional appeal that neither overwhelms nor disengages the audience appears to be the key to optimal message processing. Consequently, positively framed health appeals may provide a persuasive approach, particularly for high-risk male drivers. The aim should be for interventions to *be evidence-based and to avoid fear and threat appeal*.

¹¹ <https://www.gov.uk/guidance/evaluation-in-health-and-wellbeing-creating-a-logic-model>

Think about timing

It is also important to consider the timing of intervention implementation. For instance, young drivers have been found to form their attitudes towards driving during their formative years (between the ages of 11 and 16), with risky attitudes being associated with sensation-seeking tendencies and deviant behaviours (Waylen & McKenna, 2008). Therefore intervening earlier, rather than attempting to change established attitudes, is likely to be more effective in encouraging positive attitudes toward road safety. However, there is also good evidence that it is important to have intervention inputs in place at critical points (e.g. whilst learning to drive or immediately after having passed the driving test), and that there are limitations associated with intervening too soon. Ultimately, it is important to have a rationale for why the intervention is being delivered at the point that it is.

Use appropriate behaviour change techniques

The challenge of comparing different interventions has, over time, prompted the development of behaviour change taxonomies. Behaviour change techniques (BCTs) are observable, replicable and essential components of interventions designed to modify behaviour. Michie et al. (2013) introduced a 26-item taxonomy, which was later expanded to 93 items. BCTs provide a structured framework for supporting intervention development, and increase the potential of interventions to deliver positive outcomes (see subsection 5.2.1 for an illustration of their use in DriveFit).

Use implementation intentions

Implementation intentions have emerged as a valuable tool for enhancing the effectiveness of interventions. They offer a strategic approach to bridging the intention–action gap. Ultimately implementation intentions, also known as if–then plans, help to predefine automatic responses to anticipated situational cues (e.g. **if** I have been driving for two hours **then** I will take a 20-minute break). Previous studies have demonstrated that implementation intentions have a positive effect on various behaviours, especially when aligned with pre-existing intentions. Although their application in road safety interventions is limited, there is potential for their use in addressing specific road safety goals and behaviours.

Make learning active

Engagement strategies play a pivotal role in effective interventions. Active engagement maintains attention as well as fostering participation. Energising strategies, such as self-activation and social interaction, are important tools for combating non-engagement. Discussions, the sharing of personal experiences between group members, and encouraging reflective thinking are examples of active learning approaches which can be employed, and which help to make discussions and action points relevant to the individual.

Take a ‘resilience education’ approach

Resilience education focuses on building strengths and competencies, which can be particularly relevant for young people. As an approach, it empowers participants to reflect on their behavioural tendencies, strengths and weaknesses. It can also equip participants

with strategies for navigating risky situations and can support individuals seeking to recover from adversity. A non-driving resilience education programme addressing general risk taking behaviours in Australia reported a significant reduction in crash involvement among young drivers (Senserrick et al., 2009), suggesting that taking such an approach has potential to deliver benefits beyond its initial focus.

Co-design, test and pilot

Co-production (where all stakeholders work together) is increasingly recommended as a way in which the diverse needs of interested parties can be considered in the design of interventions. Where co-design is not possible, it is important to engage with the target audience as part of the design process to understand current behavioural, normative and control beliefs, so as to ensure that the intervention can effect change in the right way, in the right areas. Piloting provides all-important feedback and can ensure that improvements can be made before broader roll-out.

Conduct outcome *and* process evaluations

Outcome and process evaluations have an important place within intervention evaluation. An outcome evaluation assesses the effectiveness of an intervention at *producing change* as measured by pre-determined measures. A process evaluation documents *how an intervention is implemented and what was actually delivered, compared with how it was intended to be delivered*. It measures how the intervention was *perceived* by those involved.

For outcome evaluations, it is important to use measures (whether they be survey, observation or some other form of data collection) that match the intervention logic model (e.g. measure attitudes, when they are included as a short-term impact). More good-quality outcome evaluations of road safety interventions are needed to ensure that the sector can improve the overall quality of the interventions on offer. It is important to continue to measure how programmes are received, through conducting process evaluations, but it is essential that process evaluations are not used as the only measure of intervention effectiveness. A process evaluation cannot be used to deduce the results of an outcome evaluation (or vice versa).

Apply a growth mindset

“In a growth mindset, challenges are exciting rather than threatening. So rather than thinking, oh, I’m going to reveal my weaknesses, you say, wow, here’s a chance to grow.” Carol S Dweck

Very few things in life work straight away. Road safety interventions are no different. It is important that practitioners, policymakers and researchers remain open to being challenged by others and take the opportunity to learn from errors, mistakes and happy coincidences. Collaboration amongst those with different skills and experience is most likely to support this process.

5.2 DriveFit intervention case study

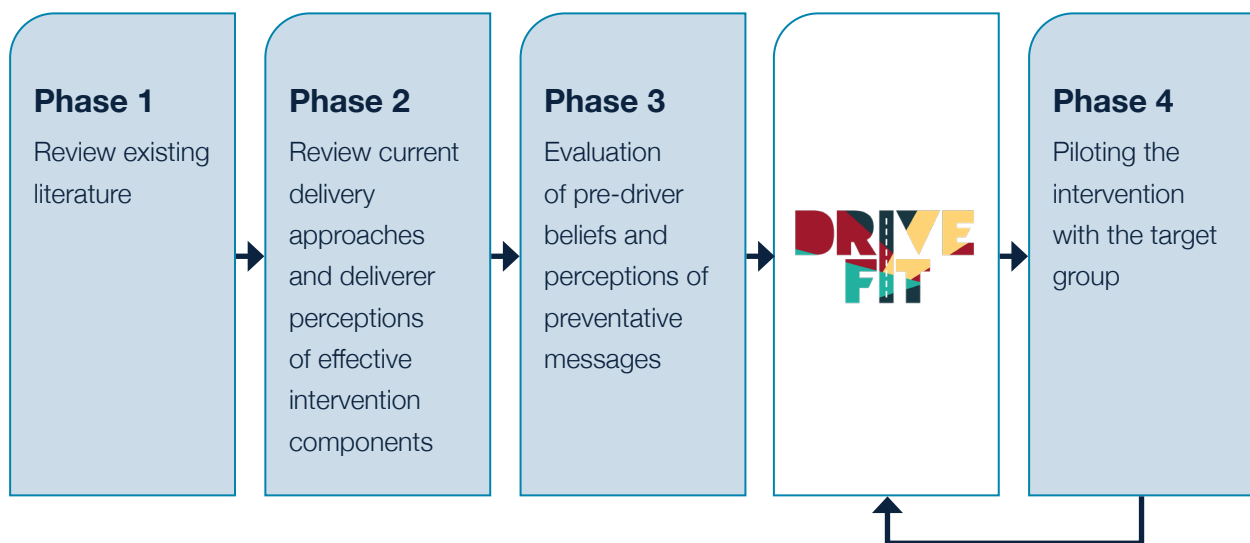
The DriveFit intervention is provided below as an example of an intervention that was iteratively designed to improve the attitudes and intentions of 16- to 18-year-olds towards unsafe road use using the TPB (Ajzen, 1991) as the underlying theoretical framework.

5.2.1 Design

There is significant value in applying a multi-stage intervention design approach to the development of road safety interventions.

For the DriveFit intervention, important intervention components from a deliverer perspective were established by reviewing existing delivery approaches ($n = 6$) and deliverer perceptions of effective intervention components ($n = 33$) (see Appendix B). 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. The process of piloting the DriveFit film and online workshop 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. The process is illustrated in Figure 5.2.

Figure 5.2: DriveFit development model



Source: Author's own

The intervention was titled DriveFit to signify that the intervention was focused on supporting young and novice drivers to build their driving abilities and their fitness to drive. The name was agreed following feedback from the target audience on several early intervention name suggestions.

The DriveFit intervention consisted of a 40-minute film delivered in the classroom, followed by a 45-minute online facilitated workshop undertaken within two weeks of the film showing. The two-part approach adopted aimed to extend the duration of the intervention, given concerns raised by previous research about the importance of securing optimal intervention dosage¹² (Glendon et al., 2014; Kinnear et al., 2017; Markl, 2016; Poulter & McKenna,

¹² e.g. intensity, duration, quantity, frequency

2010). The TPB (Ajzen, 1991) was used to theoretically underpin the intervention. BCTs (Michie et al., 2013), and implementation intentions (Gollwitzer, 1999) were also incorporated into the intervention design with a view to improving its effectiveness.

The logic model for the intervention (see Table 5.1) illustrates that, in the short term, the intervention aims to change attitudes, subjective norms and perceived behavioural control with the aim of bringing about safer passenger and driver intentions.

Table 5.1: DriveFit logic model

Inputs	Immediate impacts	Short-term impacts	Behavioural impacts	Health Outcomes
Providing a film and workshop to 16- to 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 towards and subjective norms concerning 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...	Reduce deaths and serious injuries amongst this at-risk group.

Source: Author's own

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 curtail the risky driving behaviours associated with speeding, tiredness, mobile phone use and intoxicated driving (drink and drug driving).¹³ Table 5.2 provides a brief description of the topics addressed within the DriveFit film.

Table 5.2: Topics addressed in the DriveFit film

Segment	Overall purpose	Key message	Delivery mechanism
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 ¹⁴
Gaining necessary cognitive skills	To promote the importance of hazard perception training	Improving your hazard perception skills will make you a better and safer driver	Interview with Professor David Crundall from Nottingham Trent University ¹⁵

¹³ The DriveFit film can be viewed at <https://roadsafetygb.org.uk/drivefit/>

¹⁴ <https://www.youtube.com/watch?v=Jph1KW2q0u8>

¹⁵ <https://www.youtube.com/watch?v=N59b55LQAq0>

Segment	Overall purpose	Key message	Delivery mechanism
Making decisions that support safety			
Making safety supportive vehicle and insurance choices	To inform the audience as to 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 six months of driving and beyond	Interview with Dr Neale Kinnear from the Transport Research Laboratory (TRL) ¹⁶
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 both controllable and avoidable	Interview with Dr Neale Kinnear from TRL ¹⁶
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 ¹⁶
Fitness to drive			
Managing fatigue	To challenge the belief that driver sleepiness is unavoidable	Driver sleepiness is both controllable and avoidable	Interview with Professor Ashleigh Fitness from Loughborough University ¹⁷
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 both controllable and avoidable	Interview with Oly Taylor MPS from Devon and Cornwall Police ¹⁸
Controlling the journey			
Managing speed	To encourage drivers 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 Oly Taylor MPS from Devon and Cornwall Police ¹⁸

Source: Author's own

The film employed a total of 16 BCTs from the 93-item hierarchically clustered techniques BCT Taxonomy (Michie et al., 2013), 11 of which had been 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 5.3.

¹⁶ <https://www.youtube.com/watch?v=rKvRZd0P2HI>

¹⁷ <https://www.youtube.com/watch?v=rGRMmTVky4c>

¹⁸ <https://www.youtube.com/watch?v=0BTftBTUVuY>

Table 5.3: 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 two hours a week, over 12 months.
1.2	Problem solving*	Participants prompted 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*	Participants encouraged to plan to stop for a 20-minute rest if they have been driving for more than two hours.
1.9	Commitment	Participants asked to pledge not to drive whilst tired, in the same way that they would make a decision not to drink and drive.
2.3	Self-monitoring of behaviour*	Participants asked to record how much driving practice 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*	Participant awareness raised of future regrets related to speeding (i.e. going to prison, collisions and injuries).
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 accompanying driver to increase their experience when undertaking local trips or visiting family.
9.1	Credible source	Interview on speed provided by a high-status professional (i.e. police).

Source: Author's own adapted from Michie et al. (2013)

Note: * indicates high-potential BCTs

The online workshop that followed the film used the ORID (Objective, Reflective, Interpretive and Decisional) framework (ICA-UK, 2014) 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 who delivered the 45-minute workshops using Microsoft Teams video conferencing software according to a pre-defined protocol. 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.

To increase engagement during the workshop, participants were introduced to the Mentimeter voting tool (www.mentimeter.com) 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).¹⁹ The participants were then invited to commit to their implementation intention plans by completing a DriveFit postcard for them to retain. A website²⁰ and a notebook containing the film graphic illustrations were also provided to support the programme through offering additional information to students, parents and guardians. An intervention guide is available on the Road Safety GB DriveFit page.²¹

5.2.2 Piloting

The intervention was piloted with two schools in Kent in September 2021. On the basis of the results of the pilot, several improvements were made before the intervention was trialled in full. The film was amended by cutting speaker introductions at the start of the film in order to take account of the concerns expressed by the students, teachers and delivery partners about its length. 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. However, this approach is recommended for future intervention designs.

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. 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 the more engaging demonstrations originally scoped (e.g. a demonstration of the effects of multitasking on attention, and experiments related to reaction times and fatigue) could not be included.

¹⁹ <https://roadsafetygb.org.uk/wp-content/uploads/2023/05/DriveFit-guide-for-developing-Safe-Drive-Plans.pdf>

²⁰ www.drivefit.info (no longer active)

²¹ <https://roadsafetygb.org.uk/drivefit/>

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 note-taking. To address the accessibility concerns raised, a subtitled 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, which was originally included to support a talk-show-style feel to the intervention. A discussion section on charging mobile phones overnight was also removed as this was identified to be contrary to responsible safe charging guidelines issued by fire and rescue services.

During piloting, the workshop received more support than the film. The only suggested change to the workshop was to take action to reduce discussions going off topic and to include more extension activities, as well as scenarios and stories from people who had 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 (e.g. hazard perception). To address these issues, the workshop protocol was further tightened by adding more polling questions, and a polling question about driving stage was added at the beginning of the workshop to ensure the facilitator was aware of the participants' driving stage in order to adjust the workshop questioning accordingly.

Whilst no specific lesson extension activities were included, a document was provided to support the if-then planning exercise.²² Both the researcher and employed facilitators prepared a question and answer sheet to respond to likely queries in order to allow the facilitators — who were not road safety experts — to respond authoritatively and 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 (which are not collision-orientated) 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.

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

5.2.3 Evaluation

DriveFit was evaluated using a cluster randomised controlled trial (cRCT). The responses of 16- to 18-year-old students ($n = 437$) from 22 schools in Devon were analysed, and showed that the DriveFit intervention led to some small improvements in risk intentions, attitudes and other measures (see DriveFit intervention guide for more information about the measures used²³), which were found to differ by subgroup. Significant, but small, beneficial effects of the DriveFit programme were found for 9 out of the 16 study measures immediately post-intervention (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 8–10 weeks post-intervention (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 to driving violations and perceptions of risk, all improved at both 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 found small, but longer-lasting attitude effects and a trend towards improving intentions, over and above the control group.

As well as the outcome evaluation, a process evaluation was also conducted for the DriveFit intervention. It examined student, teacher, deliverer and facilitator experiences and perspectives using a mixed method approach in order to provide insights for future intervention design. Student participants ($n = 186$) and teachers ($n = 27$) provided responses to questionnaires pre- and post-intervention. Data from interviews with DriveFit facilitators ($n = 2$) and programme deliverers ($n = 2$) were also analysed.

The study found that the intervention was delivered as intended and that trial recruitment procedures were adhered to. DriveFit was rated as having a positive cognitive impact (i.e. credible, useful, interesting, important and informative) and good levels of 'face validity' (that is, it appeared to do what it was supposed to do, e.g. leading participants to say "I am now more aware of my responsibilities as a passenger"). DriveFit was not rated as having a negative emotional effect, albeit with some subgroup differences. Females and college students gave the intervention stronger positive cognitive and negative emotional effects ratings than did males and school students. Females also gave DriveFit a greater face validity rating than males did. Teacher engagement, student interest, delivery logistics and workshop design were rated as both barriers to and facilitators of the intervention's delivery. Trial complexity, the lack of face-to-face delivery and provision for RSE within the curriculum were also identified as barriers.

²³ <https://roadsafetygb.org.uk/wp-content/uploads/2023/05/DriveFit-Intervention-Guide.pdf>

6. Conclusions



The research and analysis in this report highlights several key points regarding the delivery of impactful road safety education (RSE), particularly for pre-driving age young people. First and foremost, it is clear that education alone cannot bear the full weight of promoting responsible road-user behaviours. While education is important for imparting knowledge and awareness, it should be considered as a complement to other influences, such as the impact of other drivers (particularly parents), cognitive skill development, and other factors such as hazard perception skills and competency building.

This report underscores that traditional RSE approaches, such as ‘theatre’-style testimonial provisions, have limitations in terms of their effectiveness and long-term impact. The use of ‘threat’ and ‘fear’ appeal is consequently not recommended for use in future interventions.

In order for meaningful and effective RSE to be delivered to this at-risk group, a comprehensive approach is required, one that focuses on evidence-based preventative actions for young and pre-drivers. This will include strategies for maximising the learning-to-drive process; enhancing cognitive skills; addressing multifaceted factors influencing young driver safety; and managing distractions, impairment from alcohol and drugs and speeding behaviours. The involvement of young people in the design of interventions, ‘co-production’, is also essential.

In terms of intervention design, this report provides a set of important steps for evidence based intervention development, and underlines the importance of evaluating intervention effectiveness. Additionally, the case study of the DriveFit intervention serves as an example of these principles of good intervention design. DriveFit successfully engaged 16- to 18-year-olds and showed small but significant improvements in risk intentions, attitudes, and other measures over the short to medium term, illustrating the effectiveness of a well-designed intervention based on theoretical frameworks and research evidence.

It is clear that RSE for pre-driving age young people needs to evolve and adapt in order to become more effective. While education remains a crucial component, it should be integrated with complementary influences, evidence-based strategies and a thoughtful approach to the design and evaluation of interventions. This report provides insights and recommendations for improving RSE and ultimately enhancing the safety of young and pre-drivers.

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Appendices

Appendix A: Behaviour change techniques included within pre-driver testimonial education interventions

Only 23 of the 93 BCTs in the BCT Taxonomy were identified as potentially present in the six interventions reviewed. The BCTs used were largely negatively framed and spanned 12 of the 16 groups in the taxonomy. Seven BCTs, from four groups, were present in all the performances beyond all reasonable doubt (see Table A.1).

Table A.1: BCTs present in all performances beyond all reasonable doubt

Grouping	BCT
4. Shaping knowledge	4.2 Information about antecedents
5. Natural consequences	5.1 Information about health consequences
	5.2 Saliency of consequences
	5.3 Information about social and environmental consequences
	5.6 Information about emotional consequences
9. Comparison of outcomes	9.1 Credible source
16. Covert learning	16.3 Vicarious consequences

Source: Author's own adapted from Michie et al. (2013)

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. An analysis of the BCTs with high potential (as defined by Fylan, 2017) for application in both theatre and workshop formats for pre-driver education was conducted (see Table A.2). Of these, 50% were identified within the six performances analysed.

Table A.2: 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 goal(s)	0
	1.7 Review outcome goal(s)	0
2. Feedback and monitoring	2.2 Feedback on behaviour	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 the 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

Source: Author's own adapted from Michie et al. (2013)

Appendix B: Deliver perceptions, beliefs and perceptions of testimonial performances

This study was conducted to establish the content and practical elements of testimonial performances that practitioners thought were important for the successful delivery of testimonial interventions. 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. 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 pre-workshop survey found that pre-driver education was being delivered across all secondary school age groups, with testimonial performances dominating in comparison to other intervention types for 16- to 18-year-old students. Traditional 'fatal five' topics (four of them: speeding, failure to wear a seatbelt, drink/drug driving and distraction/inattention) dominated, consequently leaving less time for presenting and developing implementation intentions (Brewster et al., 2015; Gollwitzer, 1999) and action plans (Michie et al., 2013) to support safety promoting behaviours. Multi-agency partnership working was described as common, and funding limitations were reported as affecting the way in which programmes were delivered and resourced. Low, but largely stable, budgets were reported for this area of activity. The lack of resource available to develop evidence-based alternatives may in part explain why testimonial performance styles have persisted for a long time. It is interesting to note that, whilst respondents recognised the value of road safety evaluation, they neither reported conducting it very often nor reported having the budget available to support the commissioning of intervention evaluation.

Twenty-four major themes were identified from the three workshops in response to the focus question posed ("What practical and content elements of the existing testimonial performance intervention programmes do you think are important for improving young driver safety?"). These were summarised by the researcher into three main content themes:

- content relevance;
- delivery communication approaches; and
- consequences and practical tools.

Three further practical themes also emerged:

- logistics, resources and capacity;
- relationship building; and
- ongoing engagement.

Practitioners felt strongly that 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 Guttman's framework does set the message in the context of 'everyday scenes', overall, it appears to be the social contexts surrounding the examples provided (i.e. involvement of friends, peers, parents, enforcement staff etc.) that are the most important to set interventions within.

Reference was also made by several of the workshop attendees to the impact that different individual learning styles have on the effectiveness of interventions. 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; 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). Also, 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 differences can have on responses to intervention content, designing interventions based on learning styles is not advisable.

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. Research indicates that the drive for authenticity may be an overrated consideration (Moon & Fowler, 2008).

The current focus on the negative consequences of poor driving behaviours by testimonial performance delivery agencies, whether health, social or economic, was also strongly supported by workshop participants. Whilst consequences are a recognised BCT, disproportionately focusing on consequences runs the risk of reducing the time available to address other high-potential BCTs (see Table A.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 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. Consequently, it is advisable that future interventions deliver messages by an identified credible source. Practitioners also suggested that high 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, all of which has been found to show promise in improving the effectiveness of interventions (e.g. Griffin et al., 2004).

Based on the feedback secured from the workshops 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 B.1). Where identified intervention components represent a BCT (Michie et al., 2013) this has been noted.

Table B.1: 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. • Recognise that emotional storytelling is not a necessary component. • Make sparing use of consequences, focusing largely on the social and environmental 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"> • Arrange for intervention delivery from a credible source (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. • Design follow-ups with limitations of the school timetable in mind.

Source: Author's own

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



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