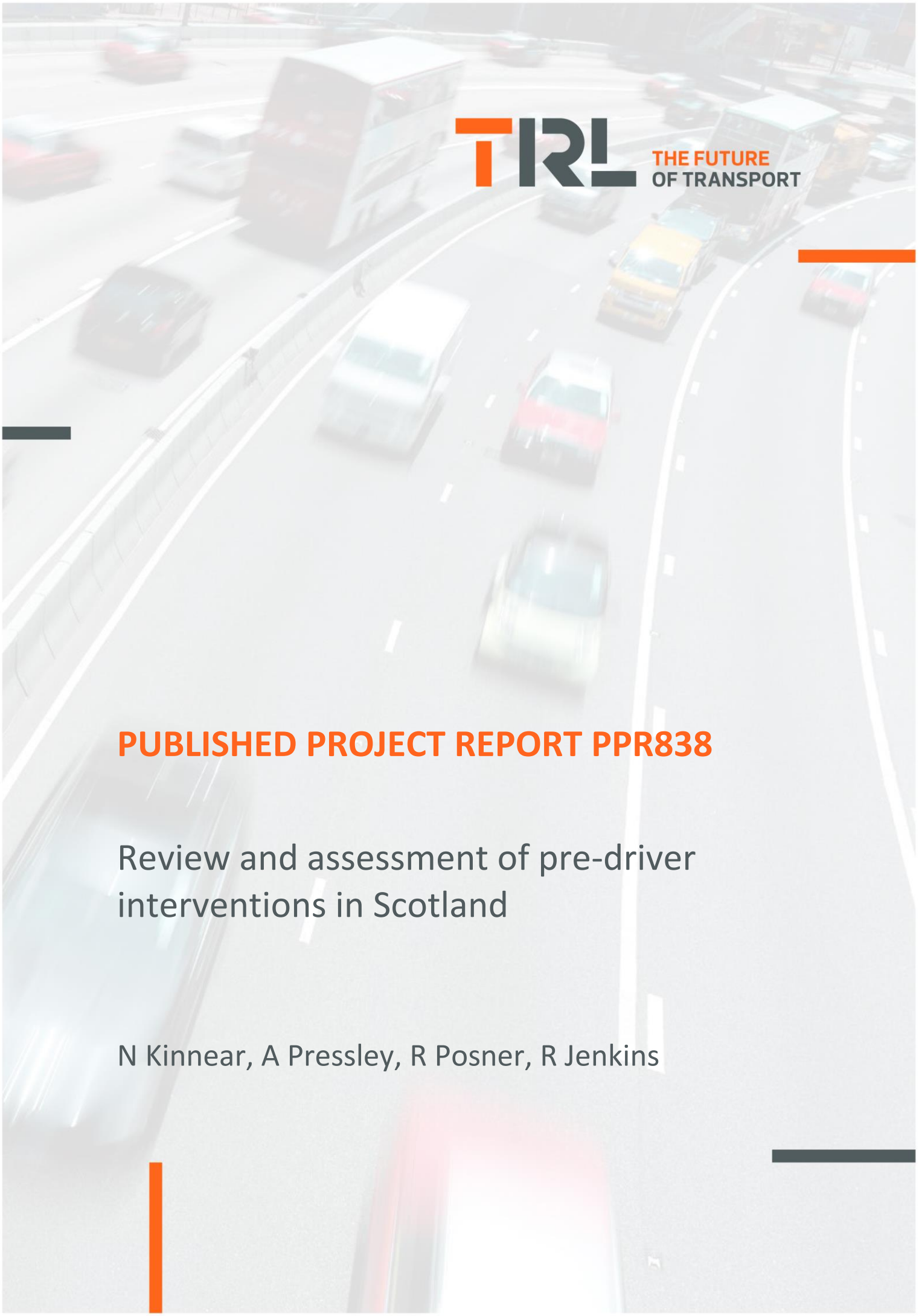

THE FUTURE OF TRANSPORT

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Review and assessment of pre-driver interventions in Scotland

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This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Reviewer
1	31/05/2017	Draft report for Transport Scotland comment	NK, AP, RP	SH
2	05/09/2017	Updated report following Transport Scotland feedback	NK, AP	SH
3	27/09/2017	Final report	NK	SH

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Executive summary

The mid-term review of the Road Safety Framework to 2020 identified the importance of positively influencing behavioural and attitudinal development for pre-drivers. The desired outcome for pre-drivers in Scotland is to "Improve knowledge, positive attitudes and safer behaviours of individuals in relation to road safety before they start driving." (p11).

The project reported here undertook a number of research activities in order to:

- Establish the prevalence of pre-driver interventions across Scotland
- Understand the approaches taken and assumed mechanisms of effect for improving safety
- Assess whether pre-driver interventions in Scotland meet good-practice conditions for maximising the likelihood to improve road safety (e.g. via influencing known risk factors) and whether these are evaluated (and in what form)
- Identify examples of good-practice and provide recommendations for the development of a value driven, outcome based pre-driver intervention
- Make recommendations for how to encourage evaluation of interventions

A three-phase approach was employed with various data collection and research methods used to meet the aims of the project:

Phase	Research task
1	▪ Evidence review of pre-driver interventions ▪ Interviews with Local Authorities and relevant stakeholders involved in the provision of pre-driver interventions in Scotland.
2	▪ Expert workshop and review of pre-driver interventions identified in Phase 1
3	▪ In-depth review of three interventions from those reviewed in Phase 2

This report details the methodology and findings from each of the research tasks. Based on the collective results the following conclusions were drawn:

Background

- Based on national statistical publications young novice drivers are a public health risk to themselves and other road users. 'Pre-drivers' are a group worthy of attention and intervention.

Evidence for effectiveness

- There is currently no robust evidence suggesting that pre-driver interventions are being effective at improving road safety.

- The reasons for a lack of evidence are numerous. They can largely be summarised as being due to too few evaluations having been conducted (e.g. lack of funding, assumption of effectiveness) or inadequate quality (e.g. poor design, poor evaluation methods).
- Another key reason for a lack of evidence for effectiveness, and possibly for a lack of evaluation in the first place, is an unreasonable expectation that pre-driver interventions can improve road safety in isolation. The typical dosage (the amount of time a participant is engaged with the intervention) of a pre-driver intervention is not sufficient for any meaningful effect to be realised. Recommendations for reassessing the role of pre-driver interventions are made.
- In the absence of formal evidence, assessment criteria based on best practice were developed to assess the potential for current interventions to improve safety. These criteria assessed each intervention for design, implementation, proposed mechanisms of effect, targeted risk factors, and outcomes.

The prevalence of pre-driver interventions in Scotland

- Around two-thirds of Scotland's local authority areas were found to run or support some form of pre-driver intervention. Around 12 different interventions were found to be running across Scotland. None have been demonstrated to be effective at improving safety.
- It is estimated that approximately 20,000 young people receive some form of pre-driver intervention in Scotland each year, although this is likely to be an underestimate.

Types of interventions being delivered

- The common forms of pre-driver intervention can be classified as classroom, theatre/demonstration, off-road and expo-style. No singular approach was found to be significantly more or less likely to be effective than the others. All have pros and cons dependent on the content and aims of the intervention.
- There is a repeated theme whereby interventions typically focus only on consequences without exploring preventative measures or learning in detail. Where dramatic presentations are used, this could lead to feelings of discomfort that are not resolved by offering the young participants potential solutions or coping mechanisms. This raises some ethical concerns and does not reflect best practice in the field of behaviour change.
- The assessment noted that interventions generally lack incorporation of behavioural change techniques (representing learning from other areas of public health), and do not necessarily target evidenced preventative measures for risk factors associated with collisions.
- Off-road driver training offers the potential for a structured approach much like driving lessons, following a developmental curriculum; although marketing of one-off experiences was also common. Of all the approaches, based solely on dosage this

approach had the most potential for meaningful impact on road safety; however it also has the greatest potential for harm through adverse unintended consequences (for example, early licensure and exposure to risk) where delivery is not evaluated. There is some concern that without good quality controlled evaluation the benefits or the adverse unintended consequences of off-road pre-driver training are unknown. This is a product that is popular with young people and is marketed and often assumed by parents to be safety related. In the absence of controlled evaluation, the simplest way to control the risk of harm would be to introduce a minimum learner period.

General considerations

- If pre-driver interventions are not evidenced to be effective, then those receiving them are being exposed to unnecessary experiences. If such interventions are effective, then those not receiving them are exposed to an unfair lack of opportunity. Either way, more evidence is urgently required to support the continued application of current interventions.
- Pre-driver interventions are currently running in a piecemeal fashion across Scotland. There is a lack of consistency of design, approach and messaging reaching young people. While all interventions have a common aim to improve safety, the way they interact with the other influences and the road safety system as a whole is not clearly defined. This presents an area for potential gain if a coordinated approach can be achieved.
- All approaches are limited by real-world constraints of time, usually related to securing time within a school timetable. Road safety in some areas may not afford the same importance as other domains of personal and social education. Limiting pre-driver interventions to potentially one hour per year means it is necessary to set expectations accordingly.
- The research activities undertaken highlighted in particular an extremely motivated group of professionals who design, organise and facilitate such events. This is often in the context of a lack of funding and no external support. These individuals for road safety are critical to the roll out and support of any interventions that are implemented in Scotland in the future.

Ten recommendations are described that represent longer term strategic challenges and short term opportunities to improve current interventions. These are summarised on the following page and described in more detail in the main text of the report.

Recommendations	
Long term	**1. Use pre-driver interventions to support a road safety framework**
	2. Develop a consistent pre-driver intervention
	3. Set realistic expectations
	4. Put road safety into context
Short term	**5. Improve evaluation approaches for existing interventions**
	6. Encourage adoption of behaviour change techniques
	7. Encourage targeting of appropriate risk factors
	8. Re-design of theatre/demonstration based interventions
	9. Consider theatre/demonstration 'plus' guidance
	10. Investigate the impact of off-road pre-driver training

1 Introduction

In 2009, the Scottish Government and Transport Scotland outlined a Vision Zero road safety strategy, with the ultimate aim of a future where no one is killed on Scotland's roads, and the injury rate is much reduced. The starting point was a Road Safety Framework through to 2020 which set specific targets for reductions in injuries, fatalities and casualty rates on Scotland's roads (Scottish Government, 2009).

In 2016 a mid-term review of the Road Safety Framework considered progress towards meeting the casualty reduction targets for 2020 (Transport Scotland, 2016). The review identified priority areas to focus activity in order to achieve the greatest contribution towards reducing injuries and fatalities on Scotland's roads. The areas identified were:

- Speed and Motorcyclists
- Pre-drivers, Drivers aged 17-25 and Older Drivers
- Cyclists and Pedestrians

For each area, outcomes, indicators and priority commitments have been set with the agreement, support and co-ownership of Scotland's Road Safety Delivery Partners. Following the review, Transport Scotland's Road Safety policy division was directed by the Strategic Partnership Board to assess pre-driver interventions being delivered across Scotland.

1.1 Pre-drivers

The mid-term review notes the importance of positively influencing behavioural and attitudinal development for pre-drivers. It defines that the desired outcome for pre-drivers in Scotland is to:

> "Improve knowledge, positive attitudes and safer behaviours of individuals in relation to road safety before they start driving." (Transport Scotland, 2016, p11)

It is known (although not formally collated) that numerous interventions targeting pre-drivers are undertaken across Scotland each year. These interventions vary in their approach, development, content and presentation, although all have a similar aim to improve road safety for new drivers. The extent to which this is achieved is not known; nor is it known if there are any unintended and undesirable effects.

In 2015, Transport Scotland commissioned an independent study to evaluate a Safe Drive Stay Alive (SDSA) pre-driver intervention and develop a framework for outcomes-focused evaluation of future interventions (Transport Scotland, 2015). There is a desire to build on this work and develop a greater understanding of other current pre-driver interventions in Scotland.

1.2 Aims and objectives

This project's primary aim is to inform future direction, investment and delivery of pre-driver interventions across Scotland. The project sought to deliver on the Road Safety

Framework's commitment to obtain a better understanding of how pre-driver interventions in Scotland are contributing to the overarching pre-driver outcome (i.e. to improve knowledge, positive attitudes and safer behaviours of individuals in relation to road safety before they start driving).

More specifically, the project sought to achieve the following objectives:

- Establish the prevalence of pre-driver interventions across Scotland
- Understand the approaches taken and assumed mechanisms of effect for improving safety
- Assess whether pre-driver interventions in Scotland meet good-practice conditions for maximising the likelihood to improve road safety (e.g. via influencing known risk factors) and whether these are evaluated (and in what form)
- Identify examples of good-practice and provide recommendations for the development of a value driven, outcome based pre-driver intervention
- Make recommendations for how to encourage evaluation of interventions

1.3 Approach

A three-phase approach was employed with various data collection and research methods used to meet the aims of the project (see Figure 1 for an overview). After each Phase the project team presented the findings to Transport Scotland and agreed the approach for the next Phase.

Phase 1 involved conducting an assessment of the evidence for pre-driver interventions to improve safety based on published scientific literature. This review established the criteria against which to assess pre-driver interventions in the remaining activities in the project.

Phase 1 also involved interviews with Local Authorities and relevant stakeholders involved in the provision of pre-driver interventions in Scotland. Interviews were conducted in order to establish the type and prevalence of pre-driver interventions taking place.

In Phase 2, all of the interventions identified in Phase 1 were assessed against the criteria established in Phase 1. This included summarising materials and any evaluations available to the research team. The assessment was conducted via a workshop with the project team and three external independent experts.

The workshop identified pre-driver interventions that were suitable for further assessment. These interventions were taken forward into Phase 3 where in-depth reviews were carried out involving observation, interviews, focus groups and review of materials.

This document represents the final report of all of these research activities.

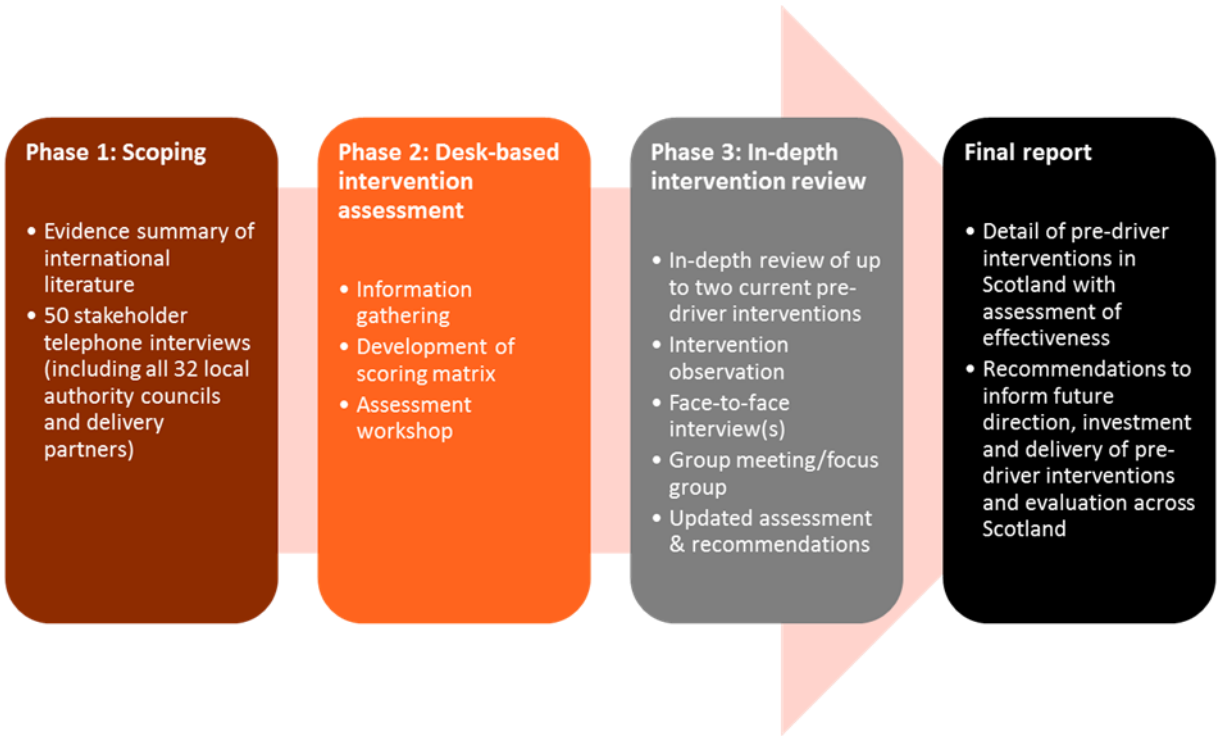

Figure 1: Overview of project approach

1.4 Structure of this report

This report details the findings from the research activities in each Phase of the project.

Section 2 and Section 3 present the Phase 1 activities (the evidence summary and the method and results from the interviews).

Section 4 details the workshop and its findings. Section 5 presents the output from the in-depth intervention reviews.

Section 6 presents a collated summary of all of the research questions with key findings.

Section 7 makes recommendations based on the results of the research.

2 Phase 1: Evidence summary

The review sets the context, and sought to inform, the development of assessment criteria for reviewing pre-driver interventions currently being delivered in Scotland. This was to include the relationship with improving knowledge, attitudes, behaviours, and ultimately road safety, as per the aim of the mid-term review.

The evidence provided in this section is supported by two significant investigations of pre- and novice driver[1] literature conducted for the Department for Transport (DfT) by TRL (Kinnear et al., 2013; Pressley et al., 2016). In addition, a supplementary literature search was conducted to identify any significant contributions in the field since the literature search conducted for the Pressley et al. review. The method and results of this search can be seen in Appendix A. This section summarises the context, evidence, and justification for the approach to the development of the assessment criteria

2.1 Young and novice driver risk

In 2015, 2,183 drivers aged 17-25 years old were injured on Scotland's roads (37 fatal, 293 serious and 1,853 slight injuries) making up 20% of all injury crashes on the nation's roads (Transport Scotland, 2016). It is well known in the literature that young and novice drivers (i.e. those who have recently acquired their licence) are a high-risk group of road users and are involved in a disproportionate number of crashes in Scotland, Great Britain, and across the world (DfT, 2016; Transport Scotland, 2016; WHO, 2013).

Age-related factors associated with collision risk are not necessarily unique to driving and can be summarised as being both social and developmental. Social freedom, personal expression, late night socialising and legal access to alcohol are just some of the activities related with youth health risk factors. These social factors are allied with incomplete neurological development related to the suppression of impulsivity and risk taking; the areas of the brain that inhibit impulsivity and risk taking do not fully mature until the mid-20s (Giedd, 2004; Gogtay et al., 2004; Romine & Reynolds, 2005). As a result, the age at which licensure is permitted in Great Britain (17 years) is associated with a peak in the attraction and opportunity for risk taking and sensation seeking (see McKenna, 2010a for more detailed discussion). However, while age is a contributor to novice driver collision risk, all new drivers, regardless of age, are at increased collision risk due to their inexperience (Forsyth, Maycock & Sexton, 1995; Mayhew et al., 2003; Vlakveld, 2004).

A newly licensed driver's collision risk is highest during the first few months of driving, reducing over time with estimates suggesting that most learning occurs during the first 500 to 1000 miles (Kinnear, Kelly, Stradling & Thomson, 2012; Mayhew et al., 2003; McCartt et al., 2003). While there is still much to understand, we do know a great deal about the differences between novice and experienced drivers. These include differences in the ability of anticipating, detecting, recognising and dealing with hazards, attending to the right things at the right time in the driving environment, dealing with multiple tasks, and matching one's actual capability to the demands of the task (Deery, 1999; Fuller et al., 2008).

[1] The term "pre-drivers" refers to those who have not yet acquired a driving licence (and are typically young), where "novice driver" refers to newly licensed drivers. See section 2.2 for further definition of pre-drivers.

2.2 Defining pre-drivers and pre-driver interventions

One approach that aims to improve the safety of young novice drivers is the use of pre-driver education and training. The broad rationale of this approach is that early intervention (i.e. before the person has started learning to drive) could have a positive effect on shaping driving attitudes, behaviours and habits, thus reducing the likelihood of the driver being involved in a collision when newly licensed. Such interventions could aim to target either age- or experience-related risk factors.

Kinnear et al., (2013) defined pre-driving interventions as, "any intervention aimed at pre-drivers, and which focuses (implicitly or explicitly) on some outcome variable (e.g. behaviour, attitudes, collisions) related to being a driver or passenger in a motor vehicle." (p15). Ultimately, the aim of pre-driver interventions is to attempt to reduce the risk of young drivers (and passengers) by influencing their knowledge, behaviour or attitudes before they obtain their full licence or share a vehicle driven by a peer.

An overview of pre-driver interventions by RoSPA (2012) noted that pre-drivers have rarely been defined in the literature. Kinnear et al. (2013) define a pre-driver as, "an individual before they have obtained their provisional licence and have started to learn to drive" (p15). In Great Britain, an individual can apply for their first provisional licence up to three months before the licensing age, which is 17 years old. While by definition any adult who has not started to learn to drive can therefore be defined as a pre-driver, the vast majority (if not all) pre-driver interventions are aimed at young drivers within the years immediately preceding the minimum age of licensure.

An argument can be made for the application of effective pre-driver interventions for novice drivers of any age, given the greater collision risk post-licence for all new drivers. However, data on licensing suggests that the vast majority (approximately 70%) of newly licensed drivers in Great Britain are between 17 and 24 years. Therefore, targeting of pre-drivers immediately before the licensing age is reasonable. It is also easier to target this group at pre-licensing ages given that many are still within the education system. Pre-driver interventions aimed at potential young drivers are therefore a pragmatic use of resources, where the intervention is proven to be effective.[2]

2.3 The current state of the evidence

The formal evidence surrounding the three main mechanisms of behaviour change (changing attitudes, imparting knowledge and improving skills) in the context of pre-driver interventions is weak.

Kinnear et al. (2013) noted that the behavioural impact of pre-driver interventions is under-researched and pre-driver interventions are rarely evaluated. Where interventions are evaluated, they are seldom conducted using robust evaluation techniques (e.g. randomised controlled trials).

[2] This review was open to reviewing interventions targeting pre-drivers of any age, not just those under the age of 17 years old. No interventions were found in the literature for older pre-drivers however.

McKenna (2010a,b) notes several reasons for the lack of evidence including poor design, poor relationship between content and outcome measures, poor evaluation methods and lack of available funding for effective evaluation. It is also noted that pre-driver interventions are often inappropriately expected to deliver collision reductions directly; such expectation is not realistic for one-time interventions that typically last only a few hours. Such experiences are likely to be consumed along with various alternative messages and motivations (e.g. vehicle manufacturer advertising) on a young pre-driver (Pressley et al., 2016).

Nevertheless, pre-drivers are a large, at risk, and accessible population and any small effect of an intervention could therefore yield great benefit (or harm were unintended adverse effects to be realised). Further, it is plausible that pre-driver interventions may have an indirect effect on safety. Interventions do not exist in a 'vacuum', and where they might support factors that have been evidenced to be related to collision risk, there is a theoretical route to improving safety. For example, where an intervention might positively influence the acceptability of legislative change or enforcement activities that have been shown to bring about a safety benefit, there is a mechanism by which safety can be improved by the intervention. Recent studies note this potential where pre-driver interventions are seen as part of the road safety 'system' or 'culture' rather than as stand-alone programmes (Scott-Parker, Goode, & Salmon, 2015; Twisk, Commandeur, Bos, Shope, & Kok, 2015). It is feasible that interventions can have a gradual and cumulative effect on behaviour via supporting the legislative system or feeding into a safety culture around road safety, although the evidence for this has not been demonstrated.

Following a review of pre-driver education, RoSPA (2012) outlined eight recommendations that align with taking a broader perspective of the role of pre-driver interventions. The recommendations included: 1) Incorporate into a continuous curriculum, 2) Set clear and realistic aims and objectives, 3) Be specific, 4) Be positive, 5) Focus on higher level factors rather than vehicle handling skills, 6) Refresh periodically, 7) Involve parents, and 8) Evaluate.

2.4 Assessing the effectiveness of pre-driver interventions

This section discusses how, based on the current evidence, pre-driver interventions can be assessed for their potential to improve safety.

Given the lack of formal evidence on which to assess the effectiveness of pre-driver interventions, assessment of effectiveness is required to consider how it has been designed and implemented, what the proposed mechanisms of effect are, those risk factors it targets , and has it been evaluated . Such an assessment process is shown in Figure 2.

The following sub-sections discuss each of these in turn.

Figure 2: Process for intervention assessment

2.4.1 Design and implementation

Any assessment of an intervention will need to consider factors relating to the design and implementation of the intervention. In addition to general best practice considerations, it is necessary to consider whether the intervention uses established behaviour change techniques (BCTs) (see Abraham & Michie, 2008; Fylan & Stradling, 2014; Fylan, 2017; Sullman, 2017). A BCT is a theory-based method for changing one or several psychological determinants of behaviour such as a person's attitudes towards targeted behaviours. Such behaviour change methods are commonly used in public health interventions. Assessing whether an intervention has incorporated these techniques is a useful way to assess the likelihood that an intervention has been designed to impact on safety related behaviours via known routes to effectiveness.

BCTs can be considered in a variety of ways (for example, whether they have been explicitly incorporated during the design phase or whether they plausibly feature within the implementation phase of the intervention). However, as stated in Kinnear et al. (2013) many of the pre-driver interventions examined during the review tended not to be based on formal theory or established BCTs. It may be necessary in such circumstances to allow some degree of subjectivity to enable a judgement to be made in this regard.

It is also important to consider the suitability of the implementation approach (i.e. method of delivery) used in producing the desired effect, both from the perspective of achieving the aims and objectives of the intervention, and achieving a positive safety related outcome. Similarly, the extent to which the aims and objectives are compatible with the dosage (the amount of time a participant is engaged with the intervention) will be considered.

2.4.2 Mechanisms of effect to improve safety

While all pre-driver interventions can be said to have an ultimate aim of improving safety, closer inspection can elicit how they seek to meet this aim. Each intervention can be said to use certain “mechanisms of effect” in order to influence pre-drivers positively. In reviewing current pre-driver intervention literature Kinnear et al. (2013) established that most pre-driver interventions use one or more of three basic mechanisms:

1. Changing attitudes towards driving
2. Imparting knowledge
3. Improving skills

It is important to understand whether an intervention that uses one or more of these mechanisms is likely to produce the desired outcome in terms of improving safety. The evidence base behind each of these three proposed mechanisms is examined in the following subsections.

It is worth noting that a gradual shift towards a mixture of the mechanisms above in novice driver training (i.e. post-test) has been noted (Kinnear et al., 2013). This has entailed a shift from the delivery of vehicle control skills only, to a more holistic delivery of skills, knowledge and attitudes designed to promote safe driving in a single package. Similarly this trend has been noted in pre-driver training. Nevertheless, it is useful to examine the main mechanisms of effect in isolation.

2.4.2.1 Changing attitudes towards driving

Interventions focused on changing attitudes are developed on the basis of the assumption that changes in attitudes towards road safety and driving have the potential to lead to changes in behaviour, and ultimately (possibly through intervening variables) lead to fewer collisions and injuries.

There is evidence suggesting that pre-driver attitudes are to some extent linked with later risk-taking behaviour post-licence (Harré, Brandt & Dawe, 2000; Mann & Sullmann, 2008; Waylen & McKenna, 2008), which justifies the targeting of attitudes at this time. However, the evidence for changing attitudes following an intervention is mixed at best. While there is some evidence that pre-driver interventions can improve attitudes to driving in the short term, the improvements are generally found to be small and there is little evidence that they are maintained over time (see Kinnear et al., 2013 for a review). One example found that following intervention, some attitudes deteriorated over the long term (i.e. were worse than baseline after six months), even after demonstrating short term improvements (Poulter & McKenna, 2010). Such findings raise concerns about the typical approach to administer evaluation tools shortly (often immediately) after completion of the intervention. Without the collection of longer term data, it is not known what the extended impact of such interventions is on pre-driver attitudes, particularly where there is no ongoing support or reinforcement.

Even where successful positive influence on attitudes is achieved, the link from changed attitudes (e.g. following intervention) to changed behaviour is not straightforward; nor is it demonstrated consistently in this domain. In terms of the theoretical evidence base, there are several models that explore how attitudes may link to behaviour (e.g. 'The Theory of Planned Behaviour' (TPB) and 'Motivation and Opportunity as Determinant' models (Ajzen, 1991; Fazio, 1986). A meta-analysis[3] of TPB studies (largely for health-related behaviours, not including driving), showed that the combination of components in the TPB could explain around 20% of the variance in observed behaviours (Armitage & Conner, 2001). This finding suggests that by knowing about peoples' attitudes and related constructs, we can explain only a small proportion of their observed behaviour, but a larger proportion of their behaviour is due to other influences (e.g. immediate motivations).

Whichever theoretical framework is used to describe the attitude-behaviour link, the formal literature suggests that it is not as simple a link as might be assumed by those delivering many pre-driver interventions (Launchbury, Deighton & Luther, 2007). It is also worth considering whether new attitudes about safe driving can be formed in pre-drivers or whether attitudes already exist and therefore require changing.

2.4.2.2 Imparting knowledge

Interventions focusing on imparting knowledge as the mechanism of effect tend to provide information about the risks faced by young and novice drivers. The assumption underlying this approach is that increased knowledge will lead to the avoidance of such risks.

This approach assumes that there is an information deficit to begin with; this assumption is not clearly supported by evidence (McKenna, 2010b). Further, it is not clear whether providing information, even if there is a deficit, influences attitudes or behaviour, and subsequently collision risk.

Information deficit models of behaviour change rely on new information being processed and translated into knowledge; this knowledge must then influence attitudes and behavioural outcomes. It often appears logical that by providing information about a risk, behaviour will change. In some health related circumstances this has been demonstrated. For example providing nutritional information on food packaging can influence purchase decisions (Drichoutis, Lazaridis & Nayga, 2006). However, such information appears to largely influence those with existing positive attitudes towards healthy eating; those who value price are less influenced. This example highlights the complex relationship between providing information and influencing behaviour change (e.g. Drichoutis et al., 2006; Monroe, 2006).

There is very little evidence and evaluation in road safety in general, and particularly with respect to pre-drivers, regarding whether the provision of information can influence driver behaviour. One study in the area of road safety (although not targeting driving behaviour) found that educational interventions can increase children's knowledge about safe road crossing, but this knowledge did not appear to transfer into improved behaviour (Zeedyk, Wallace, Carcary, Jones & Larter, 2001). Conversely, evaluation of the Kerbcraft safe crossing resource for 5-7 year olds found that between four and six roadside training sessions was effective at improving crossing skills, when compared with a control group (Whelan, Towner, Errington & Powell, 2008).

Such examples highlight the need for good quality evaluation to inform the effectiveness, and therefore the efficacy in supporting, interventions.

2.4.2.3 Improving skills

A number of organisations provide an opportunity for pre-drivers (typically 11 to 16 year olds) to experience driving before they apply for their provisional licence. Such interventions provide practical driving in an off-road environment.

This type of intervention usually offers a mixture of increasing awareness of the risks of driving, developing 'risk aware' attitudes, and increasing drivers' skills. There is often an

emphasis on increasing the level of capability as a driver and learning to control the vehicle to a high standard.

The assumption behind developing pre-driver driving skills is that by developing vehicle control (including some advanced techniques) the driver will be better prepared for driving when they reach the legal age to obtain a driving licence. It may be further considered that having developed low level vehicle control skills, the driver can focus their attention on other elements of the driving task (such as reading the road) rather than on basic vehicle control.

Formal theory and evidence does not typically support these assumptions however. Broadly speaking, the evidence from the broader skill learning literature shows that training in skills does not transfer very well beyond the setting and context in which the training is delivered (Barnett & Ceci, 2002). Groeger and Banks (2007) discuss this in detail as it relates to driver training within various settings and processes for gaining a driving licence. Their conclusion – that driver training cannot be expected to transfer very well to post-licence driving – applies even more strongly to pre-driver training since this type of training is not carried out on-road (the context in which later driving is undertaken), and is by definition temporally distant from post-test driving, especially for younger attendees.

Across both pre- and novice- driver groups, the assumption that increased practical (i.e. vehicle handling) skill will improve safety is not supported (see Helman et al., 2010 for an overview, and also see McKenna, 2010a,b). Furthermore, an unintended consequence of pre-driver off-road skills training could be to create an appetite for driving and encourage young drivers to pass their test sooner. This results in an earlier exposure to risk rather than postponing licence acquisition until a later date where the risk is lower due to the maturational effect of increased age (Williams & Ferguson, 2004). Drivers demonstrating good vehicle control skills may require less on-road practice when learning to drive, missing out on valuable on-road experience in safe conditions. As a result, while they may demonstrate good driving skills, they may be ultimately inexperienced in varied post-licence conditions when risk is highest; it is not clear that improved skills of this type can offset the risk associated with inexperience.

One promising area of skill development relates specifically to the development of hazard perception skill. The evidence shows a positive effect in terms of reduced collision risk in novice drivers when the skill is tested (see Wells et al., 2008a,b), but it is not currently known whether this extends to training in pre-drivers. One recent US study has shown a safety benefit for some sub-groups (but no effect in others) of novice drivers who engaged in hazard perception training at the time of test pass (Thomas, Rilea, Bloomberg, Peck & Korbelak, 2016).

2.4.3 Risk factors

An alternative to using collision outcomes as the outcome measure involves using proxy measures. Proxy measures are prevalent in the road safety field partly due to the practical challenges inherent in designing and implementing evaluation studies measuring collisions. It is widely assumed that proxy measures are viable alternatives to collision outcomes where they have been previously associated with collision involvement. The use of proxy measures (in order to measure risk factors associated with collisions) as a means of

assessing the likely impact of interventions is detailed in Pressley et al. (2016). Based on the strength of evidence linking the measure to the likelihood and severity of collision involvement, the report defined a hierarchy of risk factors (see Table 1). Where an intervention aims to influence knowledge, attitudes, or behaviours towards these proxy measures, there is a plausible route towards improving safety, albeit with the caveats mentioned in the sections above.

Table 1: Risk factors that can be used as proxy measures (Pressley et al., 2016)

Risk factor	Rationale
Older age at licensure	Known to be associated with a reduction in risk
Less night time driving	Known to be a particularly risky situation for young and novice drivers
Less driving with peer-age passengers, or fewer peer-age passengers	Known to be a particularly risky situation for young and novice drivers
More supervised on-road experience pre- or post-test	Known to lower collision risk
More seat belt wearing	Uncontroversial association with injury outcomes
Lower levels of drink driving	Uncontroversial association with collision risk
Lower speeds	Uncontroversial association with collision risk and injury outcomes
Higher hazard perception skill	Hazard perception skill is the only driving skill shown to be associated with collision risk over multiple studies
Less close following	Close following has been shown to be associated with collision risk
Less use of distracting devices when driving	Distraction is widely shown to impact on driver attentiveness, which is strongly associated with the chances of missing timely stimuli on the road ahead
Reducing unsafe attitudes and behavioural intentions regarding all of the above	In general it is accepted that safer attitudes and behavioural intentions will be associated somewhat with safer behaviour, and (to a smaller degree) injury and collision outcomes

2.4.4 Safety outcomes

The most reliable tool to measure the effectiveness of any intervention would ideally be via the use of randomised control trials (RCTs) based on the collision outcomes of participants. While RCTs are accepted best practice in behaviour change domains (e.g. public health) their application in the context of road safety is fairly limited. Assessing the effectiveness of an intervention using a comparison of collision data outcomes is not always feasible and other measures (e.g. proxy measures and risk factors) for examining effectiveness must be considered. Nevertheless, regardless of the outcome measure, robust evaluation is a

necessary component of establishing the effectiveness of an intervention and ensuring that it does not in fact do harm.

The first important step of effective evaluation is ensuring that the aims and objectives of the intervention have been defined. Effective evaluation can only take place where this has been done. Kinnear et al. (2013) note that this is rarely observed in road safety. Once the aims and objectives have been identified, a logic model, which shows the step-by-step process from the inputs (design and implementation) of an intervention to long-term outcomes, can be developed. A logic model illustrates the process through which the intervention is expected to achieve its desired aims and objectives (Road Safety Evaluation, 2010). The steps involved in the evaluation process, from defining the objectives of the evaluation to writing an evaluation report, are covered in DfT literature (Sentinella, 2004) and practitioners can also use the Road Safety Evaluation website E-valu-it (Road Safety Evaluation, 2010).

Evaluating against realistic aims and objectives within a clearly defined process of effect is important as failure to consider these (e.g. via proxy measures) may result in under- or over-estimation of the true benefits of such interventions, and may also miss unintended negative effects. With evidence that pre-driver interventions can cause harm it is imperative that interventions first establish that they are not having any adverse effect (for reviews see Christie, 2001; Clinton & Lonero, 2006; Helman, Grayson & Parkes, 2010; Ker et al., 2003; Mayhew, Simpson, Williams & Ferguson, 1998; Mayhew, Simpson & Robinson, 2002; Roberts & Kwan, 2001; Vernick et al., 1999).

2.5 Pre-driver intervention assessment criteria

At the time of the review, it was known (although not previously formally collated) that a wide range of interventions were being undertaken across Scotland (e.g. in-car training, interactive classroom sessions, and theatre/demonstration activities). Therefore, the assessment criteria for the subsequent research tasks were developed to take account of differences in approach, development, content and presentation. Furthermore, the criteria needed to allow for pragmatic comparison of approaches.

The literature reviewed determined that there is limited direct evidence of the positive impact of pre-driver interventions on safety outcomes. The assessment criteria therefore needed to consider components or aspects of the interventions for their potential to relate to, promote, or support safety outcomes based on formal theory or scientific knowledge. In taking this approach, interventions were broken down into the aspects described and reviewed in section 2.4: design, implementation, mechanism of effect, risk factors and safety outcomes (e.g. evaluation). These five overarching aspects (as highlighted in Figure 2) were used to guide the research tasks detailed in the following sections of this report (stakeholder interviews, assessment workshop and in-depth reviews). The factors are subject to some overlap but are intended to represent the main components of an intervention from design through to evaluation.

The design of the assessment criteria incorporates assessment against a range of 'best practice' evidence detailed in the road safety literature (e.g. McKenna, 2010a; RoSPA, 2012). In addition to a general assessment of road safety best practice, the assessment criteria

consider whether the intervention uses established BCTs (e.g. Abraham & Michie, 2008; Fylan & Stradling, 2014; Fylan, 2017; Sullman, 2017). Assessing whether an intervention has incorporated these techniques is a useful way to assess the likelihood that an intervention might plausibly have an impact on safety-related behaviours. Where BCTs are not explicitly mentioned a subjective interpretation of whether the intervention components might plausibly be attributed to one or more BCT will be made. The assessment criteria also consider the extent to which the intervention targets known risk factors and the extent to which it has been evaluated against these.

A summary of the assessment criteria and examples of the questions that the interventions were assessed against can be seen in Table 2.

Table 2: Workshop assessment criteria

Factor 1: Design		
• Are the aims and objectives clearly stated? • Does the design include known psychological or educational principles? • Is there evidence for the effectiveness of the design employed? • Are there any possible unintended consequences of the intervention?		
Factor 2: Implementation / Presentation		
• Is the implementation / presentation of the intervention appropriate for the aims? • Is the dosage sufficient?		
Factor 3: Mechanisms of Effect		
• Is/are the mechanism(s) [Knowledge/Attitudes/Skills] appropriate to meet the aims and objectives?		
Knowledge	**Attitudes**	**Skills**
Does it address known knowledge gaps? Is the knowledge related to safety outcomes?	Are the attitudes targeted related to safety outcomes? Does it use positive or negative messages?	Are the skills related to known collision risk factors? Are these skills related to safety outcomes?
Factor 4: Risk Factors (see Table 2)		
• Does the intervention target any known risk factors? • Could the intervention be easily modified to better influence these risk factors?		
Factor 5: Outcomes		
• Has the intervention been evaluated? • Is the evaluation of sufficient quality to establish effectiveness in meeting aims or collision outcomes?		
Overall assessment		
• How likely is it that the intervention will have a positive impact on knowledge, attitudes or behaviour? • How likely is it that the intervention will have a positive impact on safety?		

3 Phase 1: Interviews

3.1 Aim of the interviews

The purpose of this phase of the research was to identify the range of interventions being conducted in Scotland that target pre-drivers. In addition to local authority representatives, a range of other road safety partners were interviewed. These participants were typically referred by the authority as being involved with the intervention. An online search of pre-driver intervention providers was also conducted and relevant contacts were interviewed.

3.2 Topics covered/design of interview guide

A topic guide was developed in conjunction with Transport Scotland (see Appendix B). The topic guide was informed by the criteria developed from the literature review and sought to ensure that interviews explored the following points:

- The responsibility of the participant in terms of road safety activities
- The priority areas for road safety in the local authority
- Pre-driver risk factors as perceived by the representative / local authority
- Details of pre-driver interventions either conducted by the authority or conducted within the authority by third parties
- Intervention-specific information such as aims and objectives, design, delivery mechanism, intervention components, number of participants, frequency, and evaluation technique.

The topic guide was used as a way to structure the interviews to ensure that the information gathered was consistent. However, where appropriate the researchers were able to explore other avenues of interest depending on the area of expertise of the respondent.

The interviews were carried out by telephone from the TRL offices in Wokingham. Three researchers undertook the interviews which typically lasted 30-45 minutes.

3.3 Approach and recruitment (councils and others)

A detailed description of the recruitment process can be seen in Appendix C.

Overall, responses were obtained from all of the local authorities that were contacted, and interviews were conducted with 21 representatives. Seven local authorities advised that they did not currently undertake any interventions, nor did they know of anyone who would be able to provide any information about any privately-provided interventions. One representative was on maternity leave with no alternative replacement during her absence and two contacts were willing to take part but were not available at the original time set for the interview and were not able to reschedule.

In addition to the contacts provided by Transport Scotland, participants were encouraged to provide TRL with contacts that they felt may be able to provide additional information regarding any interventions currently undertaken (e.g. emergency services, private

organisations, and local community groups). It was through this approach that contact details were received for intervention partners.

A number of additional contacts were provided following the interviews. These included colleagues from other local authorities who would be able to act as a representative from their area, organisations responsible for the development and delivery of the intervention or members from local emergency services. All additional representatives were contacted; when taking into consideration duplications and those who were unable to take part this resulted in three additional interviews being conducted. A further two representatives did not take part in an interview but provided TRL with material and information regarding the interventions currently undertaken (one local authority and one private organisation).

3.4 Results

Table 3 contains a summary of interventions conducted by the local authorities who participated in the research. Table 4 highlights the interventions that are undertaken by partner organisations in Scotland.

Table 3: Summary of pre-driver intervention by local authority

Local authority	Intervention	Intervention description	Approx. participants per year	Target age group	Evaluated Yes/No
1	Safe Drive Stay Alive	Theatre/ demonstration	Not known	16+	Yes – Annual Evaluation
1	Road Safety Magic	Magic show	1/3 of schools in the LA	4-7 years old	No
2	Friends Disunited	Theatre/ demonstration	Not known	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires*
2	Safe Drive Stay Alive	Theatre/ demonstration	1,000	16+	Yes – Annual Evaluation
2	Crash Live	Theatre/ demonstration	Not known	14-16 (S4)	No
3	The Ripple Effect	Classroom	265 (10 secondary schools)	16-18 (S5 and S6)	Yes – Post event questionnaire
3	Friends Disunited	Theatre/ demonstration	Not known	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires*
4	Safe Drive Stay Alive	Theatre/ demonstration	400	15-18 (S5 and S6)	Yes – Annual Evaluation
5	2MRO's Drivers	Theatre/ demonstration	1,000	15-18 (S5 and S6)	Yes – Intervention Feedback*
6	Safe Drive Stay Alive	Theatre/ demonstration	3,500/4,000 – across 18 schools	15-17 (S5)	Yes – Student questionnaires
7	Cut It Out	Theatre/ demonstration	5/10 schools	15-18 year olds (S5/S6)	No
8	Driving Ambition	Expo – style (1/2 day)	2,000/3,000	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires
9	Friends Disunited	Theatre/ demonstration	Six Schools, between 50-150 pupils	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires*

Local authority	Intervention	Intervention description	Approx. participants per year	Target age group	Evaluated Yes/No
10	Reckless Drivers Wreck Lives	Theatre/ demonstration	2,000	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires
11	Good Egg – New Driver Program	Classroom	1,000	High Schools and Colleges (13 Schools and three Colleges)	Yes – Pre / Post Questionnaires
12	Driving Ambition	Expo-style (1/2 day)	270 - Two secondary schools	16 year olds	Yes – Pre / Post Questionnaires
13	Driving Ambition	Expo-style (1/2 day).	800 – Two schools)	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires
14	Reckless Drivers Wreck Lives	Theatre/ demonstration	2,000	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires
15	Friends Disunited	Theatre/ demonstration	600	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires*
16	Safe Drive Stay Alive	Theatre/ demonstration	4,000	16+	Yes – Annual Evaluation
17	Streets Ahead	Expo-style	2,100 – Across 23 authority schools and 10 independent schools	16-18 (S6)	Yes – Post event questionnaire
18	Friends Disunited	Theatre/ demonstration	500 / 600	15+	Yes – Pre / Post Questionnaires*
19	Westdrive	Expo-style	11 secondary schools	15-18 (S5 and S6)	Yes – Pre / Post Questionnaires

***** denotes evaluation coordinated by Road Safety Scotland

Table 4: Summary of pre-driver intervention by other service providers

Service Provider	Intervention Name/s	Intervention Description	Approx. Participants Per Year	Target Age Group	Evaluated Yes/No
Young Driver	Young Driver	Off-road training (private)	Information not provided	10-17	Yes – Apparently evaluated against collision outcomes. Information not available at the time of publishing.
Young Driver	Young Driver	Off-road training (schools)	Information not provided	16+	No
Good Egg	Good Egg Guides	Online information	Exact coverage data not available	All (parents and young drivers)	No
Good Egg	New Driver Program	Classroom	2,200 (UK) 1,000 (Scotland only)	15-18 (S5 and S6)	Yes – A range of evaluation materials received.

3.5 Description of interventions

Interviews were focused on obtaining an overview of the interventions undertaken within each local authority. Where evaluations had been conducted this information was requested for further consideration as part of the expert workshop (see Section 4). In the current section, a descriptive overview of the main interventions from Table 3 and Table 4 is provided.

3.5.1 Friends Disunited

Friends Disunited is a theatre/demonstration style play targeted at senior secondary pupils (S5/S6). The play runs for 35-40 minutes followed by a 10-15 minute workshop session.

The play follows the lives of four friends at secondary school, one of whom is given a car for his birthday, with the play culminating in a car crash that leaves the lives of friends badly affected. The main themes covered during the play relate to the role of peer pressure in

relation to driving behaviour, and the possible life changing consequences that it can have. The overall aim of the intervention is to target pre-drivers' attitudes towards driving (e.g. the feeling of being invincible, which was reported as one of the attitudes that had to be targeted in newly qualified drivers by those taking part in the interviews). It also sought to help them gain awareness and an understanding of the extent to which their behaviour (e.g. racing as a result of peer pressure) can impact their own life and that of others.

The intervention is managed by Transport Scotland with Local Authorities tasked with distributing these sessions across schools in the catchment area.

3.5.2 Four local authorities reported using this intervention Safe Drive Stay Alive

The Safe Drive Stay Alive Roadshow is a theatre/demonstration intervention targeted at senior secondary pupils (S5/S6). The intervention provides a first-hand account of road collisions from victims, surviving family members and emergency service personnel who were present at the scene.

According to the intervention promotional material, "It comprises of (sic) a film depicting a typical road collision where young people are involved, including driver distraction, bad driving practices and peer pressure. Interspersed within the film, real emergency service workers go on stage to explain their role in the aftermath of the accident". The overall aim of the intervention is to provide participants with hard hitting and thought provoking accounts of real life collisions and their outcomes, with the aim of triggering emotional reactions that will allow them to think and gain awareness about the possible consequences of their driving behaviour.

Five local authorities reported using this intervention.

An evaluation of Safe Drive Stay Alive was completed by Transport Scotland (2016).

3.5.3 Good Egg – New Driver Programme

The Good Egg New Driver intervention consists of a 50/60 minute classroom based workshop delivered to 16-17 year olds (Sixth Year). It uses a range of delivery techniques including multi-media, facilitated group discussions, and individual tasks. Part of the session involves a presentation of safety related content by a young female racing driver who is an ambassador for Good Egg. The workshop is delivered at the participants' own school. The average group size is normally between 20 and 30 students.

The Good Egg New Driver Programme provides information such as how to choose a good driving instructor, the importance of seat belt use, the dangers of mobile phone use, insurance selection, and drink & drug driving laws. It also covers topics such as speed awareness, avoiding distractions, and attitudes.

The intervention is supported using a range of 'guides' produced by the same partner. The guides are available online and provide information to parents and young drivers during the early stages of learning to drive.

Three local authorities reported using this intervention.

3.5.4 *Young Driver*

Young Driver is a private sector initiative that is focused on off-road driving tuition. The organisation has two forms of driver training (private training and in-school training). Both are focused on the delivery of the Driver and Vehicle Standards Agency (DVSA) curriculum, delivered by Approved Driving Instructors (ADIs). The delivery approach (i.e. number of sessions, material covered in each session) differs according to the age of the participant.

The private training element (weekends only) is delivered in three locations in Scotland (Edinburgh, Falkirk and Glasgow). The majority of participants are 11-16 years old with around 15% being 17 or over. The main intervention can be delivered to anyone from the age of 10 years old.

The initiative is supported by Admiral Car Insurance which offers an insurance discount for young drivers who have completed two or more hours of in-car tuition.

The intervention is supported by 'How to' online videos. The company also offers, in addition to the main course, the opportunity to attend an off-road "Skills Day" on a disused stretch of motorway[4].

The Young Driver syllabus includes the following:

- **Levels 1 and 2**: Pre-drive checks and adjustments, starting the car, moving away, stopping, steering
- **Level 3**: Controlling speed, stopping, changing gear, judging space and the car's size, judging corners, road positioning
- **Level 4**: Driving in two-way traffic, dealing with junctions, dealing with roundabouts, dealing with obstructions
- **Level 5**: Straight reversing, slalom – reverse slalom, reversing round corners, turning in the road, bay parking, parallel parking
- **Level 6**: Overtaking, performing manoeuvers in traffic, judging following distance, manoeuvring in confined space.

3.5.5 *Streets Ahead*

Streets Ahead is an annual event held at a music venue in Edinburgh, set up in exhibition style (the term 'Expo-style' is used to describe this type of intervention). The event is sponsored by a local legal firm and is free for schools to attend. The intervention also uses a 'courtroom presentation' (provided by the event sponsor) to show the impact of a road traffic collision on a family and includes a 'personal recollection' story from someone whose life has been changed by a road traffic collision. The overall aim is to target inexperience in driving, as well as understand the risks and responsibilities associated with the driving task as presented through the courtroom presentation and the personal recollections. The intervention seeks to improve road safety for new drivers, specifically related to behaviours such as drink-driving, distraction, speeding and wearing seatbelts.

[4] Information on the local authorities that commissioned Young Driver in schools was not available at the time of publishing.

The intervention involves contributions from Police Scotland, Scottish Fire and Rescue Service, the Scottish Ambulance Service, NHS, Volvo Group (police bike/car display), provider of an ECO driving simulator and a cycling advocate

One local authority reported using this intervention.

3.5.6 Driving Ambition

This expo-style intervention is focused around the DVD "Just another day". This DVD follows the story of Donald Geddes, who following a high speed crash ten years ago, was left blind in one eye and partially sighted in the other. In between the two parts of the DVD, participants receive five talks from each of the intervention partners. This is followed by a question and answer session. The event also uses a number of interactive elements including seat belt slides, beer goggles, example Hazard Perception tests (developed by the AA) and a crashed car.

The intervention aims to influence the mind-set of pre-drivers to comply with the rules of the road (e.g. vehicle maintenance, drink driving, legal requirements), improve their knowledge of the issues relating to becoming a driver, as well as improve their awareness of the skills required to be a safe driver (e.g. hazard perception) and the impact that certain behaviours can have on their driving ability (e.g. drinking alcohol). The intervention involves contributions from (location dependant) Police Scotland, Scottish Fire and Rescue Service, mechanics, Approved Driving Instructors and Road Safety Officers.

Three local authorities reported using this intervention.

3.5.7 2MRO's Drivers

This intervention is an annual theatre event (held each autumn) which targets S5 and S6 pupils. The event comprises a play (Friends Disunited) and a briefing from a range of emergency services. The intervention lasts for about half a day per school and is subsidised by Transport Scotland. The intervention's aims are similar to Friends Disunited, but in this case it is supplemented with emergency services providing additional information and discussion regarding road safety initiatives that are available for those who are currently learning to drive or who are newly qualified drivers. The intervention tries to educate and inform participants of their own vulnerability due to their lack of experience, and the increased risk of accident involvement post-test, as well as highlighting the consequences of dangerous driving to this age group in order to encourage safe driving behaviour.

The services involved include Police Scotland, Scottish Fire and Rescue Service, and the Scottish Ambulance Service.

Two local authorities reported using this intervention.

3.5.8 Reckless Drivers Wreck Lives

This theatre/demonstration intervention is delivered from a local cinema. It is run over four days and attended by nine secondary schools. The intervention has been running for six years.

The intervention is built around a DVD showing a group of young people travelling in a vehicle on the way to a party, during which the vehicle crashes. Three emergency services (Police, Fire and Ambulance) then deliver a short talk at different points of the 'story'. The intervention also involves the use of road traffic victims and the parents of a young person who has been killed in a collision. The overall aim of the intervention is to increase awareness of the dangers of driving and the possible life changing consequences that can occur as a result of traffic collisions.

Two local authorities reported using this intervention.

3.5.9 The Ripple Effect

The Ripple Effect is a short classroom based workshop delivered in schools that seeks to give participants a better understanding of the possible consequences of their actions, whether as a passenger or driver, and to think about the 'ripple effect' this could have on the people around them. The aim of the intervention is to 'highlight to young people that they are entering a period of their life where it is highly likely that they, or someone they know, will be involved in a traffic collision'. The intervention is comprised of a 45 / 50 minute workshop delivered in schools.

The intervention is focused on facilitated discussions where participants discuss the consequences of bad driving, who they think is a good or bad driver, what a good passenger is, and post-test driver training options.

A part of the intervention involves participants reading personal written accounts of people affected by traffic collisions. These are read aloud by participants and then discussed in a group setting. The intervention also uses quizzes on the Highway Code.

One local authority reported using this intervention.

3.5.10 Cut It Out

Cut it Out is a theatre/demonstration intervention delivered by Fire and Rescue teams. The intervention is a combination of a DVD and live demonstrations. Participants watch a number of different collisions with commentary from the emergency services that were present at the scene. The collisions chosen are ones that are relevant to key road safety priorities relating to this target group (e.g. distracted driving, peer pressure, speed), with the aim of increasing pre-drivers' awareness of the dangers associated with driving. Following the viewing of the DVD, a discussion is held between the participants and the organisers. The aim of the intervention is to encourage young people to become aware of the possible consequences of their actions both on their own safety and that of others, and to provide them with a more global and complete view of the possible outcomes (e.g. injuries, insurance costs, license suspension, recovery).

Five local authorities reported using this intervention.

3.5.11 Crash Live

Crash Live is a road safety event that is based on a live demonstration of how the Emergency Services deal with the scene of a road traffic collision. The event is typically held

in the grounds of a Fire and Rescue Station. The event is supported by Police Scotland, Scottish Fire and Rescue Service, and the Scottish Ambulance Service.

One local authority reported using this intervention.

3.5.12 Westdrive

This intervention is a three day expo style event held in a conference facility. The intervention targets 6th year students from all secondary schools in the local authority. It is aimed at those young people who are already holders of a provisional/full driving licence or who will shortly be looking to gain a driving licence. The intervention is a multi-agency (e.g. Police Scotland, Drug and Alcohol Education, Road Safety Scotland and Driving Instructors) awareness program to increase road safety amongst young drivers.

The intervention includes a range of performances, demonstrations and guest speakers and some peer-to-peer discussions. Part of the intervention includes a vehicle mechanics discussion and demonstration on a vehicle.

The broad aims of the intervention are to raise awareness and improving understanding of the consequences of a young person's actions.

One local authority reported using this intervention.

3.6 Summary

The purpose of this task was to identify the range of interventions being conducted in Scotland that target pre-drivers. In addition, the project sought to estimate the prevalence of pre-driver interventions across Scotland. At this stage it is challenging to ascertain a reliable total number of young people who have been exposed to some form of pre-driver intervention in Scotland. Using estimates based on the information presented in Table 3, it is anticipated that around 20,000[5] pre-drivers annually are receiving one or more of the interventions described in this report.

The research exercise identified a wide range of interventions targeting novice drivers across Scotland. A number of observations can be made at this stage:

1. The form of intervention reaching the greatest proportion of pre-drivers across authorities in Scotland appears to be theatre/demonstration events. This is partly due to the dominance of 'Friends Disunited' and 'Safe Drive Stay Alive'.
2. Events that do not solely focus on a form of theatre production typically combine a presentation or DVD 'story' with talks from a range of emergency services.
3. There is considerable variety in the topics covered even though the format is broadly similar. For example, interventions commonly cover topics such as drink driving, mobile phone use (distractions), seatbelts, passenger safety, and present the consequences of

[5] This figure is an estimate based on the information provided by local authorities, and is likely to be an underestimate. This figure should not be used as a reliable figure of the number of pre- or novice drivers exposed to interventions in Scotland.

taking risks. However, these messages are not consistently applied across all local authorities.

4. Local Authorities are pooling together to share resources where participants live within bordering authorities.

Only one intervention was being used in schools that employed off-road training. While this is delivered in school in some circumstances, this type of intervention tends to be delivered by private sector organisations outside of school hours.

The form and presentation of the interventions being delivered across Scotland varies although there are clear similarities and common aims that are consistently reported. There is also a clear enthusiasm to do something to help improve the safety of young drivers, although pre-driver interventions are not delivered in all authorities or in all areas within all authorities. The overall picture is therefore piecemeal and inconsistent. Some young people in Scotland will receive a pre-driver intervention, and many others will not. Those that do will not necessarily receive the same messages as other young people who are the recipients of a different resource. It is also not known whether those who receive any of the pre-driver interventions described are at any safety advantage (or indeed disadvantage) relative to those who do not receive any pre-driver intervention. The next section looks to assess the interventions for their potential to improve safety.

4 Phase 2: Workshop

The twelve pre-driver interventions identified in Phase 1 (reported in Section 3) were assessed in a workshop for their potential to impact positively on safety using the criteria defined in section 2.5. The aim of the workshop was to identify those interventions, or components of interventions, with the most promise for improving safety either directly, or indirectly. The outcome of the workshop informed the in-depth analysis of pre-driver interventions in Scotland to be conducted in Phase 3 (see Section 5).

4.1 Workshop approach

A full day workshop was held at the TRL office in Crowthorne on the 15th December 2016. Attendees included four members of the TRL project team and three external experts with experience of education, road safety and the implementation of pre- and novice-driver interventions. The experts were chosen to reflect views from another independent research organisation, a charitable transport policy and research organisation, and a local authority. The experts have no involvement with any interventions running in Scotland and were therefore considered to be independent of the interventions being reviewed[6]. Two of the TRL representatives were lead authors of two previous reviews of pre- and novice driver interventions and were able to therefore facilitate discussion with the external experts and be involved in discussion where appropriate (e.g. to present evidence from the published literature). The other two TRL participants had conducted the interviews with local authorities and were able to provide further information or clarification to supplement the intervention information.

The workshop was led by TRL and the agenda was structured as follows:

1. Overview of the project
2. Aims of the workshop
3. Overview of each intervention
4. Additional materials (e.g. example intervention material and evaluation reports)

Workshop attendees were sent a summary of each intervention and any associated evaluation materials (known and made available to the research team) for each intervention in advance of the workshop.

At the start of the workshop attendees were presented with the process for assessing the interventions against the defined assessment criteria (see section 2.5). All attendees agreed with this approach. During the workshop each intervention was assessed qualitatively against the five defined aspects of an intervention: 1) Design, 2) Implementation / Presentation, 3) Mechanisms of Effect, 4) Risk Factors and 5) Outcomes. The assessment criteria against which the interventions were considered, along with an example response, are provided in Appendix D; risk factors can be seen in Table 1 on page 11. Each intervention was assessed against the criteria through group discussion with a qualitative assessment

[6] One expert noted an association with Road Safety Great Britain (RSGB) which has involvement with some pre-driver events in Scotland. The expert was not personally involved with this aspect in his role and there was not considered to be any conflict of interest.

noting the consensus view. Conflicts were resolved by exploring the reasoning for members' views in more detail until an agreed conclusion could be reached.

Following the workshop a summary of the discussions and outputs from the workshop was sent to the attendees. This allowed the attendees to check that the summary accurately reflected the discussions during the day. This was also an opportunity for attendees to add any additional comments.

4.2 Results

In this section we summarise the findings from the workshop. The comments from the workshop are presented in sections, reflecting each of the five aspects of the assessment criteria. This is followed by a summary of more general points that were made during the workshop.

4.2.1 Design

- Across almost all interventions the aims and objectives did not specify what collision risk factor the intervention sought to influence. Intervention descriptions tended to be focused on broader aims such as raising awareness or generally improving safety of a range of factors.
- The main observation made in respect to intervention design was that the majority of interventions were designed with the aim of communicating or demonstrating *consequences*. The consequences of speeding, drink driving, and being involved in a collision are examples of this approach. The mechanism for achieving this goal differed across interventions but examples included:
    - Demonstration of a post-collision scene
    - A courtroom drama showing the legal consequences of speeding
    - Presentations from emergency services who have attended young driver collisions
    - Presentations from families of victims, or survivors of collisions whose lives have been affected
    - DVDs showing the consequences of a young person being involved in a collision.
- The workshop participants agreed that there is little or no evidence that the presentation of consequences is effective as a primary outcome for a safety-oriented intervention. However, the use of consequences might have a place as part of more holistic intervention where additional engagement occurs once young people have been made aware of the potential consequences and risks of driving (or other related behaviours). The phrase "closing the loop" was used to describe this process.
- One of the interventions reported being designed using behaviour change techniques (BCTs) (Good Egg Driver). Some interventions contained examples of BCTs but these were not explicitly reported. They may have been inadvertently integrated into the design but were recognised by workshop attendees.

4.2.2 *Implementation / Presentation*

- The implementation approaches of the interventions discussed during the workshop can be divided into four broad approaches: 1) Classroom (Good Egg Driver and Ripple Effect), 2) Theatre/demonstration (Friends Disunited, Safe Drive Stay Alive, 2MRO's Drivers, Reckless Drivers Wreck Lives, Cut It Out, Crash Live), 3) Off-road training (Young Driver), and 4) Expo-style (Streets Ahead, Driving Ambition and Westdrive).
- The implementation approach of the two classroom based interventions examined (Good Egg Driver and The Ripple Effect) was well received by attendees and intervention sponsors. These interventions combined a presentation with group discussions. Attendees were more supportive of interventions that used small group environments rather than larger groups, but understood the resource implications of this approach. The interventions were different in their design however. Good Egg Driver provides information on numerous topics, presented to pupils in mainly populous areas of the central belt. The Ripple Effect meanwhile is designed to emotionally represent the impact of a young person fatality on the local community, representing the rural setting in which it has been designed. It is also presented to complement the Cut it Out intervention in certain schools.
- Seven of the 12 interventions examined used theatre/demonstration approaches. The workshop attendees questioned whether this mechanism of delivery offered any potential for effectiveness beyond other forms of presentation (e.g. classroom discussions). No attendees were aware of evidence to support this approach over any other. There was consensus that theatre/demonstration interventions are useful for delivering messages to large groups but that a follow-up discussion element would have a greater chance of impacting attitudes and behaviour. For example 2MRO's Drivers added some post-event discussion to a theatre presentation.
- It was agreed that the implementation approach of the 'expo' or exhibition style interventions would be engaging for participants. However, such approaches might not offer sufficient focus on specific risk factors that might be more likely to lead to meaningful behaviour change.
- Across all interventions examined, the level of dosage was an area in which it was felt improvements could be made. With the exception of off-road training (Young Driver), none of the interventions lasted more than one day. The majority of the interventions were designed to fit into a school timetable up to a half-day activity. With the exception of Young Driver, none of the interventions had a medium or longer term follow-up component.
- It was agreed that theatre or expo-style events are an efficient way to reach a large audience of young people in the same local authority via the same mechanism, but there was no evidence yet relating this approach to effective behaviour change. The workshop participants discussed the potential for follow-up activity to take place in schools or colleges post-event (i.e. as a two-part intervention).

4.2.3 *Mechanisms of Effect*

- Discussions during the workshop centred on the use of fear appeals as a presumed mechanism of effect within the consequence-focused approach (discussed in section 4.2.1). Fear appeals typically use hard-hitting stories or visuals and as such raise ethical considerations in respect to their use in pre-driver interventions. Not all interventions explicitly use fear appeals although almost all rely on the consequences approach that inherently involves some level of fear raising.
- There was consensus that there is little or no evidence that fear appeals are an effective mechanism of behaviour change. There was also concern raised when evaluations for some interventions considered the outcome of triggering introspection[7] of young people as a positive outcome. The issue with this approach is that an intervention promotes introspection but offers no support post-event for the participant to meaningfully consider the accurate and appropriate response or coping mechanism for managing it.
- In addition it was felt that ambiguity, due to a lack of support post-event, could lead to unintended consequences (e.g. negative impact on safety-related attitudes).
- Across the 12 interventions there were examples of mechanisms of effect across all three effect types; knowledge, attitudes and skills. The consequence-based approach was considered as being focused on knowledge acquisition with a presumed effect of influencing attitudes. Based on current best practice, attendees questioned whether this was an effective route to positive attitude or behaviour change.
- There are examples of ad-hoc skills development present in some interventions (e.g. basic car mechanics). There was some concern that the inclusion of these elements was focused on improving the levels of engagement of young people rather than contributing to a specific risk-related outcome.
- It was agreed that in the context of pre-driver education "skill" would be benefit from being re-positioned as coping skills (e.g. improving social skills to allow a passenger to convey their discomfort to a driver), rather than technical driving skill (i.e. vehicle handling). It was however recognised that this type of intervention would need different expertise in terms of group facilitation than currently exists within most intervention designs.

4.2.4 *Risk Factors*

- The majority of the interventions did not explicitly target known risk factors. It is possible to see examples of risk factors included within the interventions but they are not typically designed or implemented with these factors in mind. Nor were risk factors typically included within the intervention evaluations. There was, however, evidence of consideration and evaluation of content associated with the Good Egg resource.

[7] Introspection refers to internal thoughts focused on the emotions that may have arisen from taking part in the intervention.

- In the case of theatre/demonstration approaches the risk factors targeted were highly dependent on the selection of a guest presenter (i.e. a parent, victim, emergency service representative). It can therefore be challenging to accurately deduce which risk factors are included in the intervention for any given occasion. It is also challenging to recognise whether a particular risk factor is *targeted* or whether it is merely included as a part of the presentation (e.g. a story involving a speeding driver).

4.2.5 Outcomes

- All evaluation information provided to the project team was discussed during the workshop. The consensus was that evaluations were of insufficient quality and scope to allow a comprehensive judgement of the likely safety benefit of the interventions. Common limitations included a lack of proper controls for bias or comparison in order to establish a measure of effectiveness, and poor design of evaluation materials. There were two interventions with evaluations that were considered 'above average' (Safe Drive Stay Alive and Good Egg Driver), although even these fall short of what would be considered good practice in other areas of public health when determining effectiveness.
- Of the interventions that had been evaluated (without using collision outcomes) the proxy variables used were not considered appropriate to make a judgement of safety benefit. It was recognised that budget constraints often impact on the design and implementation of robust evaluation tools, but that pooling of resources might overcome this limitation in future.
- There were examples of where positive feedback had been received by participants, facilitators and teachers across the majority of interventions. It was agreed, however, that this is not a suitable proxy for safety outcomes and is not a reliable indicator of positive attitudinal or behavioural change.

4.3 Discussion

In this section we discuss key outcomes of the workshop and provide an overview of the points that were made regarding future directions of pre-driver education in Scotland.

4.3.1 Consequences approach

- One of the key outcomes of the workshop was the recognition that the majority of the interventions discussed were focused on communicating consequences as the *main* presumed mechanism of effect.
- Excessive focus solely on consequences could lead to feelings of discomfort that are not resolved by the use of potential solutions or coping mechanisms (because these are typically not offered to participants). This raises some ethical concerns and does not reflect best practice in the field of behaviour change. A review of the use of BCTs by Sullman (2017) found that a range of BCTs have the potential to positively influence behaviour in the context of driving behaviour.

- ‘Providing information on consequences’ is a BCT that is used in a range of public health contexts including obesity, physical activity, alcohol consumption, and smoking (Sullman, 2017). However, the evidence outlined in Fylan (2017) and Sullman (2017) supports the use of this BCT as part of a combination of other BCTs, rather than the primary approach that underpins the intervention. Solely focusing on consequences without the use of other supporting BCTs is unlikely to lead to successful outcomes based on the available evidence. Only one intervention was found to have been specifically designed or reviewed against BCTs (Good Egg).
- Equipping young people with the necessary skills to solve the problems once they have been made aware of the dangers / risk factors that may lead to the consequences is an approach that has more promise from a behaviour change perspective. The absence of this approach was considered by the workshop attendees to be the main weakness of many of the interventions examined.

4.3.2 Future directions

Workshop attendees were also invited to discuss the future direction of pre-driver education in Scotland. The following key points were made:

- There could be significant benefits in implementing a centralised approach to pre-driver education. Interventions could be designed (or modified) by those trained in behavioural science and educational intervention design. The resource could also be developed alongside other relevant areas of public health for this age group (e.g. travel choices, air quality, obesity). This would allow local authorities to focus on the delivery of the interventions.
- With the approach above in mind, a single well-designed intervention could be piloted and evaluated. This intervention could be designed in such a way to allow for local adaptability but would follow a consistent design and evaluation approach. Such an intervention should have synergy with other syllabus based interventions (e.g. Road Safety Scotland’s educational materials).

5 Phase 3: In-depth Reviews

5.1 In-depth intervention review

Phase 3 sought to explore examples of the types of intervention identified in Phase 2 in more detail to develop a greater understanding of their development, implementation and potential for improving safety. This included such things as the reason for running the intervention, the aims, the delivery and how this fits into the wider context of road safety in Scotland.

The interventions were selected for further investigation based on the outputs of the expert workshop in consideration of the following:

- Design and implementation
- Availability and credibility of evaluation material using appropriate methodologies
- The inclusion of a follow-up (e.g. including group discussions or role play)
- Interventions with viable mechanisms of effect and dosage

The interventions chosen did not necessarily meet each of the criteria and were considered, on balance, relative to the other options available. Safe Drive Stay Alive was not included for consideration in Phase 3 as this had recently been subject to individual review (see Transport Scotland, 2016). Similarly, Road Safety Scotland supported activities were also out of scope as these have also been evaluated separately.

The three interventions chosen for further investigation were:

Intervention	Type	Selection criteria
1. **Good Egg Driver**	Classroom	• Design and implementation • Availability and credibility of evaluation materials
2. **Young Driver**	Off-road training	• Dosage • Popularity
3. **The Ripple Effect**	Classroom	• Design and implementation • Popularity • Follow-up

Good Egg Driver was well received during the workshop as it appears to have been developed with some 'good practice' approaches from road safety education. The intervention also combined presentations with a follow-up discussion and group work component. Behaviour change techniques were suggested, as were examples of attempts to provide practical coping mechanisms and advice to participants.

With regard to Young Driver, workshop attendees were concerned about the theoretical unintended consequences of off-road driver training in general (e.g. increased risk through

early licensure). The workshop also discussed the lack of empirical support for off-road driver training in terms of safety benefit. Without detailed examination of the intervention it is not possible to exclude the possibility that there are positive or negative impacts of the approach.

When viewed in context against other interventions examined during the workshop (e.g. theatre/demonstration interventions or expo-style events) it could be argued that the overall mechanism of delivery used by Young Driver (off-road training) has greater potential to impact safety outcomes. For example, the dosage of Young Driver far surpassed all other interventions and was considered to be one of its major strengths. Furthermore, Young Driver appears be a popular intervention in terms of its overall reach and engagement with local authorities and pre-drivers.

The Ripple Effect represents a rural based classroom intervention that has been developed to complement an existing 'theatre style' presentation. The combination of the interventions (e.g. presentation of consequences followed by smaller group discussion) was considered to have potential by the workshop. The Ripple Effect also represents a more localised intervention.

5.2 Methodology

The project team contacted the facilitators of the chosen interventions to organise a mutually convenient opportunity to observe the interventions.

The main method, where possible, was observation supplemented by additional data collection from interviews and focus groups. Direct observation allowed the researchers to experience the intervention first hand in a natural setting. Where direct observation was not feasible, in-depth interviews were conducted with facilitators of the intervention to understand influences on the design, implementation and evaluation in detail. The project sought to maximise the available opportunities for conducting this phase of the research. However, due to scheduling it was not always possible to directly observe the intervention. Similarly, the opportunity to interview participants varied between the interventions due to the differences in the delivery structure and availability.

As with other phases of the research involving human participants, ethical approval was provided by the TRL Ethics Panel to ensure respondents were aware of the purpose and scope of the study and would not be adversely impacted by the research. Consent was obtained from all participants of the research. Only subjects of 16 years or above were included in the sample. In the case of Young Driver, approval for in-car observations was obtained from the driver and parent. In the case of Good Egg, specific approval was also obtained from the school for TRL to attend the sessions. This included the development of consent forms outlining the purpose and scope of the project. This is particularly important for research involving young people where they are required to provide 'informed consent'. The main points contained in the consent form were also explained verbally before the respondent agreed to participate. In cases where the parent was present (e.g. during observation of the Young Driver intervention) consent from the parent was also obtained.

Two researchers directly observed two interventions: Good Egg Driver Programme and Young Driver. The same two researchers undertook face-to-face interviews with organisers

of the third intervention, Ripple Effect. The Ripple Effect was not running during the timeframe of the project, hence direct observation was not possible.

The assessment framework used during previous phases of the project (see section 2.5) was completed during the observations. This framework was also used to guide discussions during one-to-one interviews with facilitators. During direct observation of the first two interventions (Good Egg Driver Programme and Young Driver) the researchers observed independently, only comparing notes during a debrief session following the events. This also allowed data collection to be maximised through interviews with facilitators and focus groups with attendees in the short space of time where both were available. Attendees of the Good Egg Driver Programme were asked to volunteer for a focus group to discuss the intervention after the sessions. Young Driver attendees were accompanied by their parents for a one-to-one training session so it was not feasible to set up a focus group with multiple attendees. Instead interviews were conducted on a one-to-one basis. In the case of the third intervention, the same two researchers were present during face-to-face interviews with the facilitators. A similar debrief was undertaken after the interviews where the topics covered during the interviews were discussed and intervention materials were assessed.

5.2.1 Good Egg Driver Programme

TRL attended a day of sessions delivered by the Good Egg intervention delivery team in Wishaw, North Lanarkshire. The day comprised the following research activities:

- Observation of three 'live' sessions
- Collation of intervention materials (e.g. presentation slides, certificates, booklets etc.)
- Interviews with the main facilitator / speaker, the guest speaker (racing driver), and a council representative
- Three focus groups with pupils that received the intervention

In addition to the above activities, pre- and post- evaluation material for each of the three sessions was sent to TRL by the project organisers one week after the event.

5.2.2 Young Driver

TRL attended a training event delivered by the Young Driver delivery team at the Royal Highland Centre at Ingliston, near Edinburgh. The day comprised the following research activities:

- Observation of the intervention activities
- Collation of intervention materials (e.g. progress workbooks)
- Interviews with facilitators (e.g. Approved Driving Instructors)
- Interviews with participants (e.g. young drivers) and their parents
- Direct in-car observation of lessons (four in-car lessons were observed in total)

5.2.3 Ripple Effect

TRL visited representatives of The Ripple Effect in Lochgilphead, Argyll. Due to the timings of the intervention during the school calendar, it was not possible to directly observe the intervention or interview participants.

The day comprised the following research activities:

- Interviews with the intervention designer, organiser and main facilitator
- Interview with a teacher from a local school with responsibility for Personal and Social Education (PSE) who had been involved in the development and delivery of the intervention
- Collation of intervention materials (e.g. workshop plan, presentation slides, worksheets)

5.3 In-depth Review Results

An overview of the three interventions is provided below. This contains a combination of the stated aims of the intervention and a summary of key information provided to TRL during observation activities and information gathered before and after this activity. The main risk factors that were included in the intervention are also listed[8] (see Table 1 for the full list and rationale).

However, inclusion of the risk factor in the intervention overview is not evidence of effective coverage of the factor in question. Similarly, observations presented below are not intended to be a full content analysis of each intervention nor should they be seen as an exhaustive review. They are intended to provide the reader with an overall picture of the intervention and how it relates to the overall objectives of this project: to inform future direction, investment and delivery of pre-driver interventions across Scotland.

5.3.1 Good Egg Driver Programme: Summary and Observation Results

The programme is a workshop delivered in schools that engages young people on road safety-related topics. It uses a range of delivery techniques (e.g. multi-media, a guest racing driver, facilitated group discussions, and individual tasks) to maintain interest during a session containing a wide range of information. The use of a Good Egg ambassador racing driver in the workshop adds to the overall fast-paced and high-energy engagement approach. Around 6,500 students have attended the workshop in Scotland over the last three years. Figure 3 provides a summary of the Good Egg Driver Programme.

The programme is focused on helping young people to understand how to obtain a driving licence and keep it. Some of the stated aims (as shown above) are closely related to the risk factors that are pertinent for the target audience. There is an underlying assumption that all

[8] Risk factors are: older age at licensure, less night time driving, less driving with peer-age passengers, or fewer peer-age passengers, more supervised on-road experience pre- or post-test, more seat belt wearing, lower levels of drink driving, lower speeds, higher hazard perception skill, less close following, less use of distracting devices when driving, and reducing unsafe attitudes and behavioural intentions regarding all of the above.

young people are looking to become licensed, with little focus on alternative travel options or the potential safety benefits of postponing licence acquisition.

Intervention summary:

- A 50/60 minute workshop delivered during term time in schools (several workshops are held throughout the year but each pupil will only attend the workshop once)
- Between 20 and 30 students attend each session
- Pre and post course questionnaire
- Insurance discount voucher
- The opportunity to win a new car with 1 year's insurance
- Supported by material on www.goodeggdrivers.com
- Supported by Road Safety GB, Brake, Arnold Clark and More Than Insurance

Topics covered:

- How to choose a good driving instructor
- The importance of seat belt use
- Dangers of mobile phone use
- Insurance selection
- Speed awareness
- Avoiding distractions
- Attitudes and human factors
- Drink & drug driving laws

Figure 3: Good Egg Drivers – Intervention Summary and Topics Covered

It was the opinion of the attending researchers that the Good Egg programme could benefit from information that would encourage more and varied forms of practice during the learning to drive process. For example, there was no mention of the benefit of maximising the number of hours of practice (e.g. best practice from the available evidence would suggest obtaining 120 hours of driving during the learner phase) and gaining experience in varied driving contexts (e.g. varied weather conditions, road types, speed limits, night time).

The intervention has been designed using behaviour change techniques (BCTs) and of the interventions considered throughout this project Good Egg Driver has sought to implement BCTs into its design the most.

Three evaluations of the intervention's content and outcomes have been carried out which has allowed ongoing improvements to be made. For example, evaluations using a pre- post-workshop self-reported survey suggest that the intervention improved participants' knowledge in relation to the topics covered during the session. Overall feedback from participants appears to be consistently positive. It has also been reported that the intervention uses BCTs to good effect.

The main risk factors covered during the session related to:

- Seat belt wearing
- Drink driving
- Speed
- Hazard perception
- Use of distracting devices when driving
- Unsafe attitudes and behavioural intentions regarding other risk factors

Overall, the main mechanism of effect is via imparting knowledge (e.g. ADI qualification levels, the penalties for breaking the law, young driver risks etc.) to participants. In most cases these are primarily based on the use of consequences (e.g. crashing or losing your licence) as the starting point for further discussion. However, there were also some aspects of the intervention that focused on skill as a mechanism of effect, in particular through the use of group discussions. This element of the workshop was particularly interesting as it treated 'skill' as something different to driving skill (e.g. practical techniques). For example, sections of the session encouraged participants to consider how, in a 'live' driving situation, they would express discomfort with a driver or passenger (e.g. reckless driving, not wearing a seatbelt, drink / drug driving). This approach was used to varying degrees of success during the sessions; pupils in the focus groups noted the coping strategies used as examples were unlikely to be put into practice. There is potential to develop this coping strategy approach as a key aspect of Good Egg and in other pre-driver interventions. As previously discussed, this approach focuses on equipping young people with the necessary skills (i.e. coping mechanisms and assertiveness) to speak up against risky driving behaviours. The workshop format is a viable mechanism for this type of activity to take place.

It is worth noting that the participants already exhibited quite a high level of knowledge around much of the information provided. The workshops were attended by a mixture of learners who had started to learn to drive and non-drivers, so it is possible that information about learning to drive could already have been exchanged within social groups. The clear exception was the information relating to ADI qualifications and selection. There was a knowledge gap identified, although this is largely practical with an unknown relationship to safety. Further knowledge gaps noted were in relation to drink and drug driving laws, particularly drug driving law, and stopping distances.

It might be more productive from a safety perspective to prioritise coping mechanism skill development over information / knowledge provision in the intervention session itself. The workshop (or similar workshops) could then provide 'Further Information' to different sources of information that are relevant for those interested in learning to drive (e.g. information websites). In practical terms this would involve prioritising interactive components (e.g. social skill development) over knowledge provision in the actual intervention session. Ultimately, however, this depends on the aims of the intervention.

In terms of participant evaluation, Good Egg Driver has a well-established mechanism of gathering pre- and post- quantitative and qualitative data from participants. This utilises an independently developed questionnaire and includes measurement of the knowledge imparted during the course, likely future behaviour, and overall experience of the workshop. The evaluation material from the sessions observed showed improvements across all of the

topics covered[9]. Participants in the sample also indicated that their future behaviour would change as a result of the presentation. A number of things are important to consider when interpreting these results. The first is that there is no control group to compare the intervention attendees' answers with. Second, there is possible an effect of social desirability bias (i.e. pupils responded in the way expected of them); although the questionnaire was independently developed, it is completed in the presence of the facilitators. Third, there may have been a researcher effect as TRL researchers were known to be observing (albeit evaluation without TRL researchers is generally also positive for this intervention). Overall, while Good Egg Driver has been evaluated by external parties, which have resulted in ongoing content improvements, a controlled evaluation of effectiveness is desirable.

The overall impression of the attending researchers was that a lot of information was covered in a short session. Some streamlining of the intervention could be undertaken that would increase the focus on specific risk factors and social coping mechanisms as discussed above. Pupils in the focus groups conducted as part of this observation also mentioned that a lot of information was covered. The organisers note that this is not reflected in feedback they have collected over a period of time, hence this may not be representative of the overall pupil experience. This fast-paced approach does make the intervention engaging, but the depth with which information is being processed might be questioned.

It would be challenging to confidently attribute significant longer term safety benefits to a small dosage (maximum one hour) session. However, one of Good Egg's strengths is its accompanying online information (e.g. the Good Egg 'Guides'). The session could be seen as a starting point for an ongoing 'relationship' to be developed with the young driver.

5.3.2 Young Driver: Summary and Observation Results

Young Driver is an off-road pre-driver training scheme. The scheme operates in three locations in Scotland and has also delivered similar interventions in schools. The vast majority of 'lessons' are delivered via the private sector. It is clear that Young Driver is a popular private sector intervention for pre-drivers and will continue to engage with this segment of the road user population in parallel to any public sector funded interventions. Figure 4 provides a summary of Young Driver.

The main risk factors covered during the session related to:

- Seat belt wearing
- Speeds
- Hazard perception
- Close following
- Unsafe attitudes and behavioural intentions regarding other risk factors

[9] Measured statements: 1) All driving instructors are qualified to the same standard, 2) I would never travel with a driver who had recently used cannabis, 3) It wouldn't bother me being a passenger in a car that was speeding, 4) It is not a good idea to have 4 friends in the car with a newly qualified driver, 5) I would never travel with a driver who had been drinking, 6) The best way to get cheap insurance is to insure the car in the name of your parents, 7) If I was in a car with someone who was not wearing a seatbelt, I would say something about it.

Overall, Young Driver is a well-designed intervention (based on its aims and objectives) and is a structured way for a young person to develop their driving skills. The syllabus is based on the DVSA driving test and is delivered over six sessions by ADIs in an off-road environment. Participants complete a 'Drive Diary' which notes the progress of their lessons and areas for improvement. ADIs provide feedback on the progress of the participant using a checklist. A participant can progress to the next 'level' once they can undertake the task independently.

Intervention summary:

- Off-road driving tuition delivered in three off-road sites across Scotland and also in some schools across Scotland
- Delivered by Approved Driving Instructors
- In car (one-to-one) tuition
- Structured training programme based on six levels
- Sponsored by Admiral Insurance and supported by vehicle manufacturers
- The intervention is supported by online 'how to' videos

Topics covered (Six level syllabus):

- Levels 1 and 2: pre-drive checks and adjustments, starting the car, moving away, stopping, steering
- Level 3: Controlling speed, stopping, changing gear, judging space and the car's size, judging corners, road positioning
- Level 4: Driving in two-way traffic, dealing with junctions, dealing with roundabouts, dealing with obstructions
- Level 5: Straight reversing, slalom – reverse slalom, reversing round corners, turning in the road, bay parking, parallel parking
- Level 6: Overtaking, performing manoeuvers in traffic, judging following distance, manoeuvring in confined space.

Figure 4: Young Drivers – Intervention Summary and Topics Covered

The intervention appears to be attractive to parents of young drivers who are enthusiastic about learning to drive and will probably commence driving tuition close to their 17th birthday. The parents that were interviewed on the day felt that Young Driver was likely to have a positive effect and gave them some reassurance that the young person will be a safer driver at the point of licensure. Parents of younger participants felt that young people should start to learn to drive as soon as possible (from age 11 or 12) in order to be safer drivers.

From the observations made on the day, it is possible that there is some pressure from the organisers and parents to see the young person driving the vehicle as soon as possible in the first session. It was the opinion of the researchers that this emphasis on driving the vehicle could overpower aspects of in-car coaching that might have greater safety benefits at the earlier stages of the syllabus (e.g. hazard perception, justification of licensing and road rules, extending learning and varied practice).

Comparison between the observations of the researchers on the day found some subtle but notable differences between the approaches of the ADIs. This 'trainer bias' meant that some ADIs focused on handling skills while others combined this with 'higher level' skill development such as recognising and planning for hazards. That said, the commitment and enthusiasm for the scheme of the ADIs involved was notable. Another consideration is the use of off-road driving as 'experiences' that may lead to some intended consequences due to the small dosage and emphasis on vehicle handling described above. These one-off 'products' (e.g. birthday parties) are marketed by Young Driver and observations on the day suggest that these were quite common.

From the perspective of parents it was reported that the young people had become more engaged in observing the parents' driving habits (e.g. asking questions, discussing what they had been taught during the driving sessions). It has been evidenced in scientific literature that parental driving habits have a strong influence on driving in young people (Bianchi & Summala, 2004). This type of intervention might be one route to promoting good driving practices directly to the young driver before they inherit poor habits via observation.

There could also be some benefit for young drivers in terms of developing an understanding of the process of learning to drive, albeit in a condensed format. The drive diary is a similar format to the real driving lesson approach so could prepare young drivers for the format of future driving lessons. Young Driver also offers participants the opportunity to purchase a video recording of the lesson. The impact of this could be improved by briefing parents on how to support their young driver when reviewing the lesson. This type of reflection might have a positive role to play in the development at an early age of the attitudes necessary to be a competent driver.

The evidence from the literature suggests that there is potential for unintended effects associated with this driving skills approach for pre-drivers that require serious consideration. For example, by introducing young people to the physical and emotional enjoyment of driving a car at a younger age than formal licensure permits it is possible that an appetite for driving is created that may not have existed pre-intervention. This could result in earlier licensure, which is known to have a strong correlation with increased risk (McCartt, Mayhew, Braitman, Ferguson & Simpson, 2009). Similarly the experience gained off-road may result in a shortening of the time spent undergoing formal on-road driving tuition at a later stage, with less on-road practice required to pass the driving test. This effectively leads to a scenario of earlier licensure with fewer on-road hours of driving practice. The evidence supports the principle that more hours of on-road tuition has a safety benefit (Gregersen et al., 2000; Scott-Parker, Bates, Watson, King & Hyde 2012). Were earlier licensing resulting in increased exposure to risk, any safety benefits afforded by the one-to-one training could be completely offset, and even exceeded. This type of effect has been demonstrated previously (Peck, 2011). Parents are unlikely to be aware that this approach could increase risk when the intervention is marketed and perceived to improve safety for their child. A controlled study of this type of intervention is necessary to establish the benefits and risks associated with such interventions.

It is not possible to robustly evaluate the impact of Young Driver as the information (i.e. the results of evaluations against collisions) was not available at the time of writing. Anecdotal information provided by the organisers point to positive outcomes that have been linked to

collision data, although without formal evaluation such claims cannot be assessed. Young Driver is in the process of establishing an evaluation mechanism that will continue to track young drivers into the early stages of their driving career, including measurement against collision outcomes. The results of this evaluation will need to be considered before a judgement can be made on the overall safety impact of the intervention; importantly, the extent to which self-selection and other biases are controlled within such an approach need to be considered.

5.3.3 Ripple Effect: Summary and Observation Results

The Ripple Effect is a short workshop delivered in schools that seeks to give participants a better understanding of the possible consequences of their actions, whether as a passenger or driver, and to think about the 'ripple effect' this could have on the people around them. The intervention has been running for four years with an estimated 265 pupils per year participating. Figure 5 provides a summary of the Ripple Effect.

Intervention summary:

- A 45 / 50 minute workshop delivered in schools in mostly rural areas (workshop runs once or twice per year but each pupil will only attend the workshop once)
- Delivered in parallel (in some schools) with the Cut it Out intervention
- Post-intervention survey (with an Amazon voucher as an incentive)
- The aim is to 'highlight to young people that they are entering a period of their life where it is highly likely that they, or someone they know, will be involved in a traffic collision'
- The intervention 'aims to give participants a better understanding of the possible consequences of their actions, whether as a passenger or driver, and to think about the 'ripple effect' this could have on the people around them'.

Topics covered:

- Discussion about young driver accident statistics
- Whether participants are learners, drivers or passengers
- Discuss parents' driving behaviour
- Consider and discuss what makes a good / bad driver / passenger (worksheet and discussion)
- Consider who would be affected in the event of a serious collision (worksheet)
- Participants read letters (i.e. 'real life' written accounts) from a range of people who would be affected e.g. Girl/Boyfriend, Brother/Sister, Florist, Grandparents, and Funeral Director
- Being a good passenger
- Consider the consequences of your actions (either as a passenger or driver)
- Further training options (Pass Plus)

Figure 5: Ripple Effect – Intervention Summary and Topics Covered

The main mechanism for achieving the key aims outlined above is via the use of personal written accounts of people affected by traffic collisions. These are read aloud by participants and then discussed in a group setting. The mechanism of effect is based on imparting knowledge related to young driver risk and the effects this can have on others. It is then anticipated that this will positively impact on the attitudes of participants. The intervention is designed to engage participants at an emotional level.

The intervention also asks participants to discuss what makes a good / bad driver and passenger in combination with discussions about their parent's driving habits. It is during this session that some risk factors would be discussed, although these are not necessarily done so in a formal or structured way. The tools used to facilitate discussion are designed to be adaptable rather than prescriptive. From discussion with the facilitator, the typical risk factors covered during the session relate to:

- Seat belt wearing
- Drink driving
- Speed
- Use of distracting devices when driving
- Unsafe attitudes and behavioural intentions regarding other risk factors

The intervention is very much designed in response to what has happened in terms of young driver collisions in recent years in a rural community. The content focuses on how the impact of a fatality of a young person can impact a whole community. It is highly likely that the immediate aims of the intervention are achieved but the route to longer term safety benefits is not so clearly demonstrated.

It was noted by a local teacher that road safety is further down the agenda than other youth related behaviours (such as sexual health and drug use) in this age group. This is despite road trauma being one of the most likely causes of death for this age group (WHO, 2017). One of the reasons given for this was priority being given to other social issues in response to local experience and media.

Feedback obtained via evaluation materials supports the aims of the intervention, with participants of the intervention stating it was emotionally engaging, quite hard hitting, and very 'real'. The extent to which this would affect their future behaviour was not measured.

It was noted during the discussion that the intervention was available to 5th and 6th year pupils. This is common across interventions and it may be noteworthy that this would exclude 4th year pupils, and therefore those who had left school after that point. With such an approach, it is likely that those exiting formal education after 4th year are unlikely to receive any pre-driver education or training. This is a consideration that would be mirrored across other interventions targeting this age group.

The small-group format of Ripple Effect was perhaps its greatest strength in terms of the delivery mechanism. The dosage was as high as could be achieved with the structure of the school timetable setting, although it was acknowledged that such a short one-off dose was not ideal.

6 Report summary

The Mid-term Review of the Road Safety Framework to 2020 identified the importance of positively influencing behavioural and attitudinal development for pre-drivers. The desired outcome for pre-drivers in Scotland is to "Improve knowledge, positive attitudes and safer behaviours of individuals in relation to road safety before they start driving." (Transport Scotland, 2016, p11).

The project reported here undertook a number of research activities; these included a literature review, interviews with local authorities and stakeholders, an expert workshop, and in-depth reviews of three interventions currently running in Scotland. The aims were to assess the prevalence of pre-driver interventions across Scotland, the ability of those interventions to improve safety, and to make recommendations to help inform future direction, investment and delivery of pre-driver interventions across Scotland. This section summarises the key findings and emerging themes from the research activities undertaken. Section 7 details ten recommendations based on these findings.

6.1 Should interventions target pre-drivers?

It is repeatedly confirmed that young and novice drivers (i.e. those who have recently acquired their licence) are a high-risk group of road users, and are involved in a disproportionate number of collisions. These collisions can involve injury to the young novice driver themselves, their passengers and other road users, representing a genuine risk to public health. Based on collision national statistics this is as true in Scotland as it is in other countries. The effect can be summarised as being due to both inexperience of driving situations and age related behavioural motivations.

Young people also make up the vast majority of newly licensed drivers. On the face of it, pre-drivers, particularly given that many are still in the formal education system, are a justifiable and prime target for interventions that seek to reduce novice driver risk.

6.2 What is the evidence for the effectiveness of pre-driver interventions?

The current evidence for the effectiveness of pre-driver interventions is weak. Interventions are usually not evaluated, and where they are, the evaluations do not stand up to scientific scrutiny (e.g. poor design and lack of control to substantiate results) and are of little or no value for informing policy[10].

6.3 Why is there limited evidence for the effectiveness of pre-driver interventions?

The reasons for the lack of evidence of effectiveness include the fact that interventions are often designed based on 'common sense' assumptions (not evidenced approaches to

[10] There are a number of resources that provide advice for the design of good quality evaluations, such as Transport Scotland (2015). Other resources include a DfT guide (Sentinella, 2004) and the Road Safety Evaluation website E-valu-it (Road Safety Evaluation, 2010).

behaviour change), poor relationship between content and outcome measures, poor evaluation methods and lack of available funding for effective evaluation.

The minimal dosage of such interventions is compounded by over-expectation. The aim of pre-driver interventions is almost always to improve safety, and they are therefore expected to contribute in some measurable way to reducing collision involvement. It is difficult to comprehend why a small dose one-off intervention should be expected to override the numerous overriding and constant motivations on a young driver's decisions and behaviour.

In Section 7, it is discussed that pre-driver interventions should be part of a wider framework and used to support that framework with realistic aims which are measurable.

6.4 What is the prevalence of pre-driver interventions in Scotland?

From the interviews conducted, some form of pre-driver intervention appears to be running in around two-thirds of Scotland's local authority areas. Around a dozen different pre-driver interventions were identified, some of which are shared between local authorities. It is estimated that approximately 20,000 young people receive some form of pre-driver intervention in Scotland each year, although this is likely to be an underestimate. The vast majority will have been captured in a formal education setting (i.e. school or college).

In areas where interventions are running, there is a clear enthusiasm to do something to help improve the safety of young drivers. However, it is noteworthy that seven local authorities reported doing nothing and four did not respond. The overall picture is therefore piecemeal and inconsistent. Some young people in Scotland will receive a pre-driver intervention, and many others will not. Of those that do, they will receive varied interventions and may therefore receive varying messages on differing topics. It is not known whether those who receive any of the pre-driver interventions described are at any safety advantage (or indeed disadvantage) to those who do not receive any pre-driver intervention. If such interventions are not effective, then those receiving them are being exposed to unnecessary burden. If such interventions are effective, then those not receiving them are exposed to an unfair lack of opportunity. A more consistent approach is clearly needed, ideally one that checks first whether what is being delivered actually works.

The overall picture is one of a well-intentioned but fragmented approach that cannot guarantee a reliable route to safety benefits or consistent messages.

6.5 How can we assess the value of these interventions to road safety?

In the absence of robust evidence confirming what does, and what does not work, interventions that have not been evaluated (i.e. all of them) must be assessed against criteria known to be important for increasing the likelihood of effectiveness. The criteria defined in this project used the following five categories:

1. Design
2. Implementation and presentation
3. Mechanisms of effect (e.g. knowledge, attitude and/or skill development)
4. Risk Factors (i.e. targeting of factors evidenced to be associated with crash risk)
5. Outcomes (e.g. have the aims been evaluated)

Each of the twelve interventions identified were assessed against these criteria in a workshop with independent experts.

No current pre-driver intervention was identified that could be replicated across all local authorities and guarantee positive safety outcomes.

The prevailing culture of those designing and organising pre-driver interventions appears to be reliant on the communication of the consequences of being involved in a collision. While this is the outcome that those in road safety want to avoid, and may seem like a logical starting point, there is an urgent need for other behaviour change mechanisms to be engaged in such interventions. Observation of the pre-driver interventions and interviews with facilitators reveals that aside from some stand-out facts (e.g. knowledge of ADI instructor levels), young people are fairly knowledgeable and are aware that a collision is bad and has negative consequences. There does not appear to be a knowledge gap related to consequences that requires filling, and it may be supercilious to assume that there is a lack of awareness by young people of the seriousness of being involved in a collision. The overarching goal and narrative around pre-driver interventions should be shifted from 'seeking to raise awareness of the consequences of young driver risk' to 'developing the strategies and personal and social skills to cope with young driver and passenger risk factors'.

Excessive focus on consequences in short, dramatic presentations could lead to feelings of discomfort that are not resolved by offering the young participants potential solutions or coping mechanisms. This raises some ethical concerns and does not reflect best practice in the field of behaviour change. Therefore, while discussing or presenting consequences can form part of an intervention, it needs to be utilised alongside additional supportive behavioural and attitudinal measures, rather than being the sole focus. Focusing on what young people can actually do to reduce their risk will also minimise the risk of them disengaging with the message through maladaptive strategies such as assuming that they are somehow 'immune' through an inflated estimate of their own skill.

In addition to a general reliance on consequences, the workshop identified common weaknesses in the lack of association between design of interventions and known risk factors for road collisions. The majority of the interventions did not explicitly target known risk factors, although some were covered by overlap with common road safety themes (e.g. speed and seatbelts). Nevertheless, there is a sense that targeted interventions focusing on manageable aims associated with one of, or a small number of, risk factors may be more likely to support and promote safe behaviours.

6.6 What is the best approach to delivering a pre-driver intervention?

The form and presentation of the interventions reviewed varies, although there are clear similarities and common approaches that are consistently reported. The common forms of pre-driver intervention can be classified as:

1. Classroom
2. Theatre/demonstration
3. Off-road
4. Expo-style

The literature review, workshop, and in-depth reviews did not reveal a particular method of approach that is evidenced as being more or less effective. Each intervention has pros and cons and it is probably more important to match the specific aims of the intervention to the presentation and approach. For example, an expo-style (exhibition) event may be useful for presenting general messages or starting engagement, but it was considered unlikely to be a useful route to promoting meaningful behaviour change.

Theatre/demonstration approaches are good for reaching large audiences with general messages and may possibly promote self-reflection. However, without any follow-up affording the opportunity to discuss or learn coping strategies, it was considered that the messages may not lead to meaningful attitudinal or behavioural change. It is possible that there could be negative consequences where the messages are not supported or reinforced and participants are left to develop their own unsupported response.

More intimate classroom based approaches were considered ideal settings for discussion and learning of coping strategies, developing personal and social skills to manage risks. However, classroom approaches were reported to be constrained by pragmatic dosage restrictions. Classroom time in schools is precious and road safety might not be considered as important as other high profile matters, such as alcohol, drug use, suicide prevention and sexual education. As such, interventions may have to fit within a 50 minute or 1 hour timetabled period per year. It is important to consider this realistic time constraint when managing the expectations of the impact of pre-driver interventions.

The only approach that was not constrained by time limits was the off-road driver training approach, which is usually administered by the private sector. Off-road driver training can instead be offered and structured much like driving lessons, following a developmental curriculum. Of all the approaches, based on dosage alone, this approach has the most potential for meaningful impact on safety; it also has the greatest potential for adverse unintended consequences where delivery is not evaluated. Previous literature has noted the potential for pre-driver interventions to engage young people with driving where they may not have otherwise been interested, or where they advanced in driving skill in order to pass the driving test with lower than usual on-road experience. Both situations can lead to early licensure thereby increasing risk that potentially offsets or exceeds any benefit afforded by the off-road training. There is some concern that without good quality controlled evaluation the benefits or the adverse unintended consequences of off-road pre-driver training are unknown. This is a product that is popular with young people and is assumed by parents to be safety related.

It was notable that the two private sector interventions directly observed (Young Driver and Good Egg Driver Programme) were supported or directly sponsored by the insurance industry. Participants of both interventions were offered a discount by the respective insurance company, which could give the participant the misleading impression that they are a lower risk. The question could be asked whether insurance companies have empirical evidence of the specific intervention in question having a direct safety benefit. There is nothing to suggest these data are being collected, hence sponsorship of the intervention is most likely a route to new customers with the discount being unrelated to risk.

6.7 Overall

Numerous young people receive a variety of pre-driver interventions in Scotland each year. There is no evidence to suggest that these young people are any more or less safe than those who do not receive any intervention. It is therefore difficult to determine at present whether those who receive such interventions have improved knowledge, more positive attitudes or safer behaviours than those who do not.

Despite this there is an encouraging motivation from those who design, organise and facilitate such events. This is often in the context of a lack of funding and no external support. These 'champions' for road safety are critical to the roll out and support of any interventions that are implemented in Scotland in the future.

Almost all interventions currently being undertaken focus on presenting young people with graphic or emotional consequences of crashes. The underlying assumption is that young people are not aware that crashes have serious consequences, and will be less likely to behave recklessly if they are made to appreciate the consequences. However, the reasons and motivations for young novice driver behaviour, and the risk associated with inexperience, does not relate strongly with crash consequences. The route to improving safety via this approach is therefore unclear, particularly if not supported by follow-up interventions to develop coping strategies and social skills for managing the risks. Such is the dosage of most interventions that it is unlikely that such time will be afforded to allow follow-up resources to be incorporated into the implementation of these interventions.

Given the limited time, resource and evidence for effectiveness, it is necessary to consider how pre-driver interventions in Scotland can fit into the overall framework to have most impact on improving road safety in Scotland. The next section therefore makes recommendations to this effect.

7 Recommendations

This section presents ten recommendations for consideration in the long and short term.

The finding that pre-driver interventions are currently a fragmented non-evidenced based offering across Scotland suggests it is necessary to challenge the strategic positioning of it as an approach to improve road safety. This type of change is not insignificant and is likely to require time, leadership and collaboration. The first four recommendations relate to taking a long term strategy to pre-driver interventions.

1. Use pre-driver interventions to support a road safety framework

It is possible to reframe pre-driver interventions as supportive tools in a wider road safety framework and strategy. For example, should a road safety framework set a strategy to increase the amount and variation or learner driver practice (this has an established relationship for reducing post-test collision risk), it is possible to use pre-driver interventions to promote increased practice, present strategies for achieving it and possibly explain tools developed to help, such as log books. In this way, pre-driver interventions are supporting a road safety framework to improve safety rather than being relied upon to improve safety in isolation.

2. Develop a consistent pre-driver intervention

It was highlighted during the expert workshop that consideration could be given to development of a centralised resource to be consistently applied across Scotland. This could, in time, replace or provide direction for existing resources.

Such a resource would ideally complement the existing road safety curriculum developed by Road Safety Scotland. It would also need to be considerate of localised focus (e.g. urban-rural differences) where communities might want to 'personalise' the resource.

A well-designed and evaluated pre-driver intervention of this nature is likely to have a greater chance of supporting a national safety strategy than the current piecemeal approach. In combination with recommendation 1, it is also more likely to reduce the current inequality of some, but not others, receiving a road safety intervention. Consideration would need to be given to reaching those who leave school early and are not in the education system at the time of a pre-driver intervention.

3. Set realistic expectations

Pre-driver interventions are typically delivered in schools and colleges and are limited by time constraints. Where an intervention might only have one or two sessions, expectations of its impact need to be clearly set to allow clear design of content and evaluation against realistic aims and objectives. Such expectations should be limited to addressing knowledge gaps identified through research (not simply assumed) or supporting means to address known risk factors related to collision risk. For example, an intervention could simply seek to improve the perceived legitimacy of speed limits and their enforcement. Such an intervention would address a known risk factor (that reducing speed reduces collision risk), could improve knowledge around the setting of speed limits and enforcement (e.g. dispelling the common myth that it is to raise money), and might influence attitudes towards an important driving behaviour. It is also possible to easily

evaluate and measure whether the intervention is having an effect on its stated aim (e.g. to improve the perceived legitimacy of speed limits and enforcement).

4. Put road safety into context

Road safety is a risk to the health and wellbeing of Scotland's youth. It is also a risk to all other road users and impacts society as a whole. In being a significant cause of death for young people (Box, 2011), it is important that road safety is afforded similar respect as other key public health concerns. More could be done to highlight this to authorities and represent road safety as a public health concern. It is also noteworthy that the issues of youth that pre-driver interventions seek to affect (e.g. decision making, management of risk, coping strategies) are concomitant to those that many other health and social interventions target. There is therefore potential scope for closer relations between road safety and public health more generally.

The remaining six recommendations relate to actions that could be taken in the short term to improve the current state of pre-driver interventions in Scotland.

5. Improve evaluation approaches for existing interventions

It has long been known that evaluations undertaken for road safety interventions are sparse. The reasons for this are wide ranging but, put simply, local authorities do not appear to have the resources to evaluate interventions to a standard that is deemed appropriate to draw conclusions on the likelihood of reduced collision involvement. Local authorities unsurprisingly focus scarce resources on 'doing' rather than 'evaluating', even if this means they cannot be sure if the intervention is having a positive (or negative) effect.

Numerous resources exist to assist and advise practitioners in developing and evaluating interventions, for example:

- Evaluation framework for self-evaluation of young driver interventions

https://www.transport.gov.scot/media/5735/road-safety-safe-drive-stay-alive-ods-final-evaluation-framework-12-10-15.pdf

- Using Behaviour Change Techniques: Guidance for the road safety community

http://www.racfoundation.org/research/safety/behaviour-change-techniques-guidance-for-the-road-safety-community

- E-valu-it Toolkit. E-valu-it is an interactive evaluation toolkit designed to provide tailored options for evaluating road safety interventions

http://www.roadsafetyevaluation.com

- DfT, 2004. Guidelines for Evaluating Road Safety Education Interventions

https://www.roadsafetyevaluation.com/docs/dft-guide.pdf

- Road safety education best practice

https://trl.co.uk/reports/PPR456

6. Encourage adoption of behaviour change techniques
Transport Scotland could promote the use of behaviour change techniques to those responsible for pre-driver education. As previously stated there have been recent publications in the field of BCTs that offer general guidance (e.g. Fylan, 2017) that are useful in guiding future practice. The examples cited in these publications are intended to be accessible to a wide audience. Authorities could be encouraged to consider how interventions in their current form align with recommended best practice from the BCT literature, and where possible, changes to existing interventions could be made. This would be a relatively inexpensive way to 'tweak' existing resources to increase the likelihood of positive impacts (and reduce the potential for negative unintended consequences).
7. Encourage targeting of appropriate risk factors
Similarly, Transport Scotland should consider promoting a focus on specific risk factors. Again, this could involve the promotion of these factors to local authorities who can then consider how existing interventions could be modified to include specific components that target these risk factors.
8. Re-design of theatre/demonstration interventions
Theatre/demonstration approaches are a popular way to reach pre-drivers. It may be necessary to undertake a case-by-case content analysis of the 'storyline' of each of these theatre/demonstration productions. If necessary, interventions may need to be re-scripted to bring them in line with the latest thinking in pre-driver education. For example it is possible that scripts are focused exclusively on consequences and could be redesigned to include other behavioural change techniques, promote coping strategies and focus on specific risk factors.
9. Consider theatre/demonstration 'plus' guidance
Based on current conditions, theatre/demonstration events are attractive because they allow for presentation of messages to large numbers of attendees at one venue. There could be scope to develop a 'follow-up' session that could be delivered in a school classroom setting after the theatre event. This could be developed in partnership with the event providers and road safety professionals to ensure the greatest potential for safety benefit is achieved from the constituent parts. The challenge of schools affording time to such sessions would be present here but relates to recommendation 1. Road safety may benefit from better integration with the Curriculum for Excellence.

10. Investigate the impact of off-road pre-driver training

Off-road pre-driver training was the only intervention with dosage considered sufficient to impact attitudes and behaviours directly. However, there is no current evidence (e.g. from a controlled study) that this intervention type is effective, and genuine concerns remain (supported by previous evidence) that pre-driver off-road training could lead to early licensure and reduced learner on-road practice, thereby having the unintended consequence of increasing young novice driver risk. Off-road pre-driver training, nevertheless, is popular among parents and young people and is currently endorsed by the insurance industry and vehicle manufacturers.

There are two possibilities for managing the potential for unintended consequences of this approach. One is to carry out a controlled study to determine the effectiveness, or not, of such an approach, and to confirm whether any harm is done. The second is to consider the introduction of a minimum learner period. The second of these possibilities alone would mitigate the risk of early licensure but would require legislative action. Introducing a minimum learner period has been demonstrated to be effective for improving safety regardless of any link with off-road pre-driver training, and has been previously recommended as part of licensing system (see Kinnear et al., 2013).

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Appendix A Evidence review literature search

A search of international literature was conducted by TRL's library services[11]. The date parameters were September 2015 to September 2016 to include literature published since the previous review. The search terms used were identical to those used for Pressley et al. (2016) and can be seen in Table 5.

Table 5: Search terms

Key terms	Intervention type (AND terms entered separately)	Type of study
Driv*	Intervention	Evaluat*
AND (one further term at a time, in order)	Risk perception	Effect*
	Behav*	Trial
	Attitud*	RCT
Teenage*	Knowledge	Test
New	Skills	Compar*
Inexper*	Training	Analys*
Pre-test/Pre	Test*	Survey
Under 17/U17	Educat*	
Young	Publicity	
Novice	Communicat*	
Post-test/Post	Campaign	
Learner / Learn*	Program*	
	Crash OR collision AND prevention / prevent* OR reduction / reduc*	
	Fatal* OR injur* AND prevention / prevent* OR reduction / reduc*	
	Parent*	
	Simulat*	
	Game*	
	App*	
	Feedback	
	e-learning	
	Classroom	
	Lesson	
	Technolog*	
	Learn*	
	Insurance	
	Restrict*	
	Guidance	
	Safety	
	Experience	

[11] The databases searched were Psychoinfo, ScienceDirect, PubMed, Scirus, SORT (Social Research in Transport Clearinghouse), TRIP (Transport research in progress from the EU area) and SINGLE (System for Information on Grey Literature in Europe).

The search yielded a total of 56 abstracts. The list of abstracts was reviewed to establish the potential relevance of each article in relation to the objectives of the current project. The 56 articles were independently assessed for potential relevance by two researchers (AP and NK) and the results were compared. Conflicts were resolved through discussion and agreement between the researchers. This resulted in seven articles being taken forward for further consideration[12] to supplement the literature collated for Kinnear et al. (2013) and Pressley et al. (2016). The seven articles found are summarised in Table 6.

Table 6: Additional articles of relevance published since Pressley et al. (2016)

	Author(s)	Title
1	Abdel-Rahim, Tomlinson, Johnson (2016)	Educating Idaho Teenage Drivers of the Dangers of Distracted Driving
2	Beullens & Rhodes (2015)	A longitudinal study on the relationship between adolescents' medical drama viewing and speeding
3	Hirsch & Bellavance (2016)	Pilot project to validate the transfer of training of driving skills learned on a high fidelity driving simulator to on-road driving
4	Kaye, Lewis, Algie & White (2016)	Young drivers' responses to anti-speeding advertisements: Comparison of self-report and objective measures of persuasive processing outcomes
5	Rowe et al. (2016)	Identifying beliefs underlying pre-drivers' intentions to take risks: An application of the Theory of Planned Behaviour
6	Simons-Morton, Li, Ehsani & Vaca (2016)	Co-variability in three dimensions of teenage driving risk behaviour: Impaired driving, risky and unsafe driving behaviour and secondary task engagement
7	Yamani, Samuel, Knodler & Fisher (2016)	Evaluation of the effectiveness of a multi-skill program for training young drivers on higher cognitive skills

[12] For consistency the search terms were not changed from the Pressley et al. review. This meant that 'post-test' interventions were also included in results, hence the final number of relevant articles is small, relative to the number of articles initially identified.

Appendix B Interview Topic Guide

Pre-driver interventions in Scotland: Council interviews

Interview Date / Time: **Interviewer Initials:**

Respondent Name / Council:

Introduction:

Thank you for agreeing to take part in this interview.

TRL has been commissioned by Transport Scotland to investigate the current provision of road safety interventions that target pre-drivers in Scotland.

We are planning to interview representatives from all local authorities in Scotland and other stakeholders who are involved in these interventions.

At this stage of the project the information we are gathering is factual in nature.

Participation:

Participation is entirely voluntary and you can choose to end the interview at any point.

The interview should last up to 30 minutes depending on how much you would like to say.

Please feel free to request a break at any time should you wish.

Please say if you are not comfortable with anything that is asked, or if there are questions that you feel unable to answer.

We are not recording the interview but I will be taking notes.

If you have any queries after the interview has taken place please contact [NAME] (TRL's Project Manager) on 01344 77 [EXT] or [NAME] (Transport Scotland's Project Sponsor) on [EXT].

Purpose and scope:

We are interested in understanding what pre-driver interventions take place in your area, how these activities have been designed, how they are supported and implemented, and whether they subject to any evaluation.

The scope of this research *includes*:

- Activities being undertaken in Scotland
- Interventions that target drivers, of any age, before they obtain their full licence.
- ”Interactive” interventions (e.g. one-off interventions, theatre/demonstration interventions or off-road driver training).

The scope of research *does not include*:

- Syllabus-based classroom interventions (e.g. Road Safety Scotland’s educational material)
- Information only interventions (e.g. television adverts, websites, leaflets, radio adverts).

As part of this project we are also planning to interview other respondents with an interest in pre-driver training (e.g. off-road driver training organisations, emergency services, educational institutions, and other delivery organisations). Please feel free to suggest relevant stakeholders in this area for us to interview.

Interview structure:

During the interview we will ask you a series of specific questions relating to pre-driver interventions in your council area. Your responses will be collated into a response matrix that will allow us to collate and compare the activities across all local authorities.

We will then ask to you to recommend other relevant stakeholders who might be able to contribute to this research.

How will we use your responses?

The information you provide during this interview will be summarised into a report by TRL for Transport Scotland. We expect the final report to be made publically available by Transport Scotland in the future. You will not be personally identifiable in any of the reporting although information you provide will be linked with your local authority unless you request that it remains anonymous.

Section 1: Background

1. Can you briefly tell me about your role and what responsibility you have for road safety in your region?
2. What are the priority areas for road safety in your council?
i. If not mentioned, "are pre-drivers a priority group?" if yes, probe, if no, ask whether they know why this is.
3. What is your understanding of pre-drivers and their relationship with road safety?
i. What do you think are the key risks that need to be addressed with pre-drivers?
4. How does your council, or how would you, define pre-drivers as a group?
5. What is the general approach of your council towards pre-drivers?
i. What does the council do to address safety concerns associated with pre-drivers?
6. Can you list any pre-driver interventions the council supports or is actively involved with?
7. Can you list other pre-driver interventions that you know take place in your region (that the council are not involved with)?
i. Prompts: off-road training? Theatre in education? Emergency service demonstrations?

[Use responses from 6. and 7. to ask respondents about each intervention in turn. Complete a new response matrix for each intervention. Complete the matrix with as much information as possible to the best of the respondent's knowledge.]

Intervention: [enter title here]_____

General information
Intervention aim(s)
Target age group/s
Where and how is it delivered to participants?
Estimated number of participants per year?
How long has it been running for?
Delivery partners (obtain contact details if suitable for a follow-up interview)
Approximate budget per year (if appropriate to declare)
Sources of intervention material available / requested

Intervention: [enter title here]_____

Design, Implementation and Evaluation	
Where did the idea for the intervention come from?	
Has the intervention been modified over time? Is it regularly updated?	
What are the desired outcomes of the intervention (e.g. practical driving skill, awareness, attitudes, behavioural intentions, behaviour change)?	
Have you received any feedback from participants of the intervention? **If yes,** how is that information used?	
Has the intervention been evaluated? **If yes,** is this reported and available to us? **If yes,** what methods are used to evaluate the intervention (surveys, interviews, verbal feedback etc.)? **If yes,** how have the results of the evaluation been used?	

Intervention: [enter title here]

Does the intervention do any of the following?	Yes / No (circle answer)	If yes, how does it address this?
Encourage participants to delay licence acquisition	Yes / No	
Make drivers aware of the dangers at driving at night	Yes / No	
Make drivers aware of the risk of carrying similar-aged-passengers	Yes / No	
Encourage participants to have more supervised on-road practice as a learner driver	Yes / No	
Make drivers aware of the dangers of not wearing a seat belt	Yes / No	
Make drivers aware of speed-related dangers	Yes / No	
Improve hazard perception skill	Yes / No	
Make drivers aware of the dangers of close following	Yes / No	
Make drivers aware of the risk associated with distracting devices (e.g. mobile phones) when driving	Yes / No	

Appendix C Interview recruitment

Transport Scotland and Road Safety Scotland provided TRL with a list of representatives from local councils in Scotland. A representative from Transport Scotland made initial contact with each local authority to inform them of the project and provide them with some background information regarding the research. Representatives were also informed that a member of the TRL research team would contact them to arrange a time to carry out a telephone interview. A password protected spreadsheet was created to record and monitor all communications with local authorities.

A member of the TRL research team then contacted each representative by email inviting them to take part in the research. An initial 32 representatives from 31 local authorities were contacted on the 6th of October 2016. Representatives were informed that if they did not feel that they were the best person to take part they could suggest one of their colleagues who would be contacted directly. Similarly, if local authorities did not currently undertake any pre-driver interventions or could not suggest another suitable representative this was recorded within the database.

Follow up emails were sent out on the 13th of October to 15 local authorities that had not responded at all. A third email was sent to non-responding local authorities on the 20th of October. Following this, TRL contacted Transport Scotland in order to seek support in contacting remaining non-responders. Transport Scotland subsequently provided TRL with alternative contact details within the local authorities in question, and contacted them directly to emphasise the importance of their engagement in this project. This was followed with a final email and/or phone call to the remaining local authorities on the 4th of November.

Appendix D Assessment criteria

Table 7: Workshop assessment criteria and example outcomes

Assessment criteria Factor 1: Design	Example outcome
• Are the aims and objectives clearly stated? • Does the design include known psychological or educational principles? • Is there evidence for the effectiveness of the design employed? • Are there any possible unintended consequences of the intervention?	Agreement that aims and objectives are clearly stated. Little evidence of the design being based on theory or evidence. The potential for unintended consequences could not be ruled out.
Factor 2: Implementation / Presentation	
• Is the implementation / presentation of the intervention appropriate for the aims? • Is the dosage sufficient?	The presentation of the material was considered appropriate for the target audience although unlikely to be effective in a one-off setting.
Factor 3: Mechanisms of Effect	
• Is/are the mechanism(s) [Knowledge/Attitudes/Skills] appropriate to meet the aims and objectives?	Yes, it was agreed that they are.
Knowledge Does it address known knowledge gaps? Is the knowledge related to safety outcomes?	**Attitudes** Are the attitudes targeted related to safety outcomes? Does it use positive or negative messages?	**Skills** Are the skills related to know collision risk factors? Are these skills related to safety outcomes?	*Knowledge only* It is not clear that all areas targeted can be considered knowledge gaps, although the knowledge is related to safety outcomes
Factor 4: Risk Factors (see Table 2)	
• Does the intervention target any known risk factors? • Could the intervention be easily modified to better influence these risk factors?	The intervention includes seatbelts and speeding. It was agreed that it could be adapted to target more risk factors.
Factor 5: Outcomes	
• Has the intervention been evaluated? • Is the evaluation of sufficient quality to establish effectiveness in meeting aims or collision outcomes?	No evaluation was available.
Overall assessment	
• How likely is it that the intervention will have a positive impact on knowledge, attitudes or behaviour? • How likely is it that the intervention will have a positive impact on safety?	The intervention has clear aims and objectives and targets some known risk factors, but due to no clearly defined design based on theory or evidence or evaluation of effectiveness, it is unlikely the intervention will have a significant positive impact on road safety, if at all.

Review and assessment of pre-driver interventions in Scotland

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