

Synthesis title:

Driver Training

Category: Drivers



Other Relevant Topics:

- ▶ Driver Education
- ▶ Learning to Drive
- ▶ Young Drivers
- ▶ Novice Drivers

Keywords:

Driver training,
Driver education,
Young driver,
Novice driver,
Intervention,
Driver skill,
Driver attitudes,
Driver behaviour

About the Road Safety Observatory

The Road Safety Observatory aims to provide free and easy access to independent road safety research and information for anyone working in road safety and for members of the public. It provides summaries and reviews of research on a wide range of road safety issues, along with links to original road safety research reports.

The Road Safety Observatory was created as consultations with relevant parties uncovered a strong demand for easier access to road safety research and information in a format that can be understood by both the public and professionals. This is important for identifying the casualty reduction benefits of different interventions, covering engineering programmes on infrastructure and vehicles, educational material, enforcement and the development of new policy measures.

The Road Safety Observatory was designed and developed by an Independent Programme Board consisting of key road safety organisations, including:

- ▶ Department for Transport
- ▶ The Royal Society for the Prevention of Accidents (RoSPA)
- ▶ Road Safety GB
- ▶ Parliamentary Advisory Council for Transport Safety (PACTS)
- ▶ RoadSafe
- ▶ RAC Foundation

By bringing together many of the key road safety governmental and non-governmental organisations, the Observatory hopes to provide one coherent view of key road safety evidence.

The Observatory originally existed as a standalone website, but is now an information hub on the RoSPA website which we hope makes it easy for anyone to access comprehensive reviews of road safety topics.

All of the research reviews produced for the original Road Safety Observatory were submitted to an Evidence Review Panel (which was independent of the programme Board), which reviewed and approved all the research material before it was published to ensure that the Key Facts, Summaries and Research Findings truly reflected the messages in underlying research, including where there may have been contradictions. The Panel also ensured that the papers were free from bias and independent of Government policies or the policies of the individual organisations on the Programme Board.

The Programme Board is not liable for the content of these reviews. The reviews are intended to be free from bias and independent of Government policies and the policies of the individual organisations on the Programme Board. Therefore, they may not always represent the views of all the individual organisations that comprise the Programme Board.

Please be aware that the Road Safety Observatory is not currently being updated; the research and information you will read throughout this paper has not been updated since 2017. If you have any enquiries about the Road Safety Observatory or road safety in general, please contact help@rospa.com or call **0121 248 2000**.

How do I use this paper?

This paper consists of an extensive evidence review of key research and information around a key road safety topic. The paper is split into sections to make it easy to find the level of detail you require. The sections are as follows:

Key Facts	A small number of bullet points providing the key facts about the topic, extracted from the findings of the full research review.
Summary	A short discussion of the key aspects of the topic to be aware of, research findings from the review, and how any pertinent issues can be tackled.
Methodology	A description of how the review was put together, including the dates during which the research was compiled, the search terms used to find relevant research papers, and the selection criteria used.
Key Statistics	A range of the most important figures surrounding the topic.
Research Findings	A large number of summaries of key research findings, split into relevant subtopics.
References	A list of all the research reports on which the review has been based. It includes the title, author(s), date, methodology, objectives and key findings of each report, plus a hyperlink to the report itself on its external website.

The programme board would like to extend its warm thanks and appreciation to the many people who contributed to the development of the project, including the individuals and organisations who participated in the initial consultations in 2010.

Key facts

- Driver training (and education) is a common approach to improving road safety.
- The focus of such training (and education) for non-professional drivers depends on the driving career stage being undertaken (e.g. pre-driver, learning to drive, post-licence, driver improvement or professional driving)
- Training (and education) generally proposes to improve safety via one or more of three mechanisms. These are the provision of information, influencing attitudes, and training driving skills.
- Although there are some promising research developments (such as hazard perception training and testing, and training that seeks to provide insight into driving skill limitations and life skills), driver training and education has not yet reliably been demonstrated to be effective at directly improving road safety.
- It has been demonstrated that well-intentioned interventions can actually do harm (typically through fostering over-confidence in novice drivers, and encouraging early licensure).
- The most important advice for those seeking to administer training and education interventions is to ensure that such interventions are based on formal theory and knowledge from relevant domains such as psychology and the other behavioural sciences, and to ensure that such interventions are properly evaluated using scientifically robust designs.
- While driver training and education has failed to demonstrate effectiveness for improving safety directly, training and education play an extremely important role developing cultural values, beliefs, skills and legitimising safety-relevant enforcement and legislation.
- Driver training and education should not be expected to improve safety on its own. Driver training and education should occur within an evidence-based holistic and lifelong driver licensing system, such as graduated driver licensing, with a developmental curriculum providing support and legitimacy for the things that do reduce risk (for example enforcement and reduced exposure).
- The value to society of driver training and education is probably not in direct prevention of crashes and casualties, but in the legitimising and developing a safety culture that can provide mechanisms that do reduce the risk of crashes and casualties.
- Evaluation in this context is manageable (i.e. the aims are more easily tested) and critical to determine that maximum benefit is being derived from programme resources.

Summary

Definitions

- In research, and general road safety literature, the terms 'driver training' and 'driver education' are often used interchangeably.
- McKenna (2010) differentiates "training (which is concerned with skills acquisition) from education (which is concerned with knowledge acquisition) in the driving field" and acknowledges that "there is little evidence that people note the difference" (p6).
- Helman, Grayson and Parkes (2010) note that 'education' is the preferred term in North American literature and 'training' in European literature.
- In this synthesis, the terms 'training' and 'education' are used synonymously unless the evidence specifically requires a commitment to one term or the other. In these cases we will use the term identified.
- Driver training (and education) for non-professional drivers in Great Britain (GB) can be classified into the following driver stages:
 - Pre-driver – the provision of instruction that intends to inform the development of attitudes, beliefs and behaviours related to driving, clearly aimed at those who have not yet obtained their provisional drivers licence.
 - Learning to drive – in-vehicle and largely on-road instruction aimed at developing driving skills (mainly, although not exclusively, vehicle control skills) necessary to pass the driving test.
 - Post-license – interventions targeted at novice drivers (mostly young) that aim to combat their greater relative risk of being crash-involved.
 - Driver improvement – this might involve voluntary take up of driver training with private organisations or a course offered following the committing of a road traffic offence (e.g. speeding or drink driving).

Mechanisms

- The key mechanisms through which driver training (and education) propose to improve safety are:
 - Provision of information
 - Influencing attitudes
 - Training of driving skills

Effectiveness

- All programmes should be evaluated against their aim. Most of the time the outcome measure is therefore safety. That is, what evidence is there that driver training (or education) can improve driver safety? In some instances, there may be an alternative aim, such as training to pass the driving test or to discourage reoffending behaviour.
- Pre-driver
 - A recent review of pre-driver training and education found no evidence to support the presumption that such programmes directly improve driver safety (Kinnear et al., 2013). While there was some evidence of short-term attitudinal change, the vast majority of programmes are not evaluated sufficiently, or at all, to determine if this is a consistent finding.
- Learning to drive
 - The vast majority of drivers who pass the driving test in GB have some form of driver training prior to taking the test (Wells et al., 2008). Driving instruction in this sense seems to be useful in helping to develop the skills necessary to pass the practical driving test. However it should be noted that there has been little formal assessment of the effectiveness of driving instruction in GB either at preparing learner drivers for the practical test, or in terms of its impact on safety.
 - There is some evidence that hazard perception skill may be important in safety terms. Wells et al. (2008) and Boufous et al. (2011) have both shown that better performance on the hazard perception test is associated with a lower risk of crashing when driving post-licence (in GB and Australia respectively). However it is not clear if this is due to training, or simply due to the fact that the hazard perception test measures an important competency for safety, therefore delaying access to driving to those drivers who lack the required level of skill.
 - There is not yet a consensus for how to best train, or test, higher order skills such as hazard perception. Studies have shown for example that hazard perception can be trained by having drivers undertake on-road training (McKenna & Crick, 1994), by listening to a commentary drive accompanying video (e.g. McKenna & Crick, 1997), and by interacting with hazards in a simulator (Vlakveld et al., 2011; Wang et al., 2010).

- Post-licence
 - New drivers are at the highest risk of being crash involved when they first receive their full drivers licence – higher than at any other time in their driving career. Their crash risk drops sharply with on-road experience, and with increasing age.
 - Several reviews and meta-analyses of driver training and education targeted at improving the safety of new drivers have been conducted, using data from a range of countries. The findings are consistent. All of the reviews have concluded that driver education and training has little or no reliable direct effect on road safety in terms of reductions in collision risk for new drivers (e.g. Brown, Groeger, & Biehl, 1987; Christie, 2001; Clinton & Lonerio, 2006; Helman et al., 2010; Kinnear et al., 2013; Mayhew, Simpson & Robinson, 2002; Mayhew, Simpson, Williams, & Ferguson, 1998; Roberts & Kwan, 2001; Vernick, Li, Ogaitis, Mackenzie, Baker & Gielen, 1999).
 - A systematic review of post-licence driver training (Ker et al., 2003) looking largely at remedial education courses in the United States, came to the same conclusion as novice driver training reviews; there is no strong evidence that such interventions reduce crashes, and only very weak evidence that they reduce re-offending. There are some promising findings from recent research (e.g. af Wåhlberg, 2011), but as yet firm evidence showing consistent positive benefits of such training are lacking.

Discussion

- In the absence of strong evidence of effectiveness, the most important advice for those seeking to administer training and education interventions for pre-drivers, learner drivers, and novice drivers is to ensure that such interventions are based on formal theory and knowledge from relevant domains such as psychology and the other behavioural sciences, and to ensure that such interventions are properly evaluated using scientifically robust designs (e.g. Helman et al., 2010; McKenna, 2010; Kinnear et al., 2013.; Lonerio & Mayhew, 2010; Thomas et al., 2012).
- While driver training and education has failed to demonstrate effectiveness for improving safety directly, researchers nevertheless acknowledge that training and education play an extremely important role in developing cultural values, beliefs, skills and legitimising safety relevant enforcement and legislation.

- Driver training and education should not be expected to improve safety on its own. Driver training and education should occur within an evidence-based holistic and lifelong driver licensing system, such as graduated driver licensing, with a developmental curriculum providing support and legitimacy for the things that do reduce risk (for example enforcement and reduced exposure).
- The value to society of driver training and education is probably not in direct prevention of crashes and casualties, but in the legitimising and developing a safety culture that can provide mechanisms that do reduce the risk of crashes and casualties.
- Evaluation in this context is manageable (i.e. the aims are more easily tested) and critical to determine that maximum benefit is being derived from programme resources.

Methodology

This synthesis was compiled between November 2013 and January 2014. A detailed description of the methodology used to produce this review is provided in the Methodology section of the Observatory website at <http://www.roadsafetyobservatory.com/Introduction/Methods> .

Review of research literature

The foundations of the synthesis were previous published reviews of driver training and education from the last two decades. To supplement these reviews searches were carried out on the pre-defined research (and data) repositories. Search terms used to identify relevant papers included:

Search	Primary terms	AND
1.	Driver training	Risk Behaviour Behavior Attitudes Knowledge Skills Education Crash OR collision OR accident Intervention Evaluat* Effect* Aims Objectives Insight Offend* Work Young Old*

2.	CPC OR Certificate of Professional Competence	Risk Behaviour Behavior Attitudes Knowledge Skills Education Crash OR collision OR accident Intervention Evaluat* Effect* Aims Objectives Insight Offend* Work Young Old*
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As driver training has been subject to extensive review, a search of the literature for driver training specifically (search 1) was restricted to 2010 onwards. This ensured that the synthesis took account of literature published since previous reviews were conducted. A total of 167 pieces of potentially relevant research were identified using these search terms. References before 2010 were included where relevant based on the knowledge of the authors.

There were only 11 references returned from search 2 when restricted to 2010 to present. As this is a more specific topic area without many previous reviews, the date restriction was removed and returned 29 pieces of potentially relevant research.

Titles and abstracts were examined using the selection criteria below.

Selection criteria

Research articles were scored on their relevance and quality. A rating of 'high', 'medium' and 'low' as given to each article under the following criteria.

For relevance

- 'High'= refers to data on a metric clearly relevant to the topic under investigation
- 'Medium'= refers to data on a metric that is probably relevant to the UK (e.g. training interventions targeting driver behaviour, but not necessarily focused on reducing collisions)
- 'Low'= does not refer to data relevant to the topic under investigation

For quality

- 'High'= from a high-quality peer-reviewed publication, with clear and appropriate methods
- 'Medium'= from an academic source (e.g. book chapter, conference) but without peer-review, and/or possessing some methodological weakness (e.g. some possible confounding factors)
- 'Low'= from a more 'general' source (e.g. conference, trade paper) and/or clearly being methodologically weak or inappropriate (e.g. failing to address random variability by use of appropriate statistical techniques)

The two authors independently scored the abstracts and agreement was sought on any conflicts through discussion. Full text articles of the selected abstracts (available in English) were then sought, and reviewed, with those that definitely met the 'medium' relevance and quality criteria or higher included in the review.

Some of the research used in this review derives from outside of the UK, but has been included because it is relevant to the topic.

Research findings

Summaries of key findings are given below. Further details of the studies reviewed, including methodology and key findings, and links to the reports are given in the References section.

Definition of terms

- In research, and general road safety literature, the terms ‘driver training’ and ‘driver education’ are often used interchangeably.
- McKenna (2010) differentiates “training (which is concerned with skills acquisition) from education (which is concerned with knowledge acquisition) in the driving field” and acknowledges that “there is little evidence that people note the difference” (p6).
- Christie (2001) previously suggested a similar distinction defining that training tends to have a practical focus and concentrates “on building specific skills and competencies, usually over a short time period” whilst “education is broad and intellectually based” (Christie, 2001, piii). Christie (2001) argues that most courses that are referred to as education could be seen as training in so far as they have a “specific, practical focus” (Christie, 2001, p4).
- Helman et al. (2010) note that ‘education’ is the preferred term in North American literature and ‘training’ in European literature.
- In this synthesis, the terms ‘training’ and ‘education’ are used synonymously unless the evidence specifically requires a commitment to one term or the other. In these cases we will use the term identified.

Driver training in Great Britain

- Driver training (and education) for non-professional drivers in Great Britain (GB) can be classified into the following driver stages:
 - Pre-driver – the provision of instruction that intends to inform the development of attitudes, beliefs and behaviours related to driving, clearly aimed at those who have not yet obtained their provisional drivers licence.
 - Learning to drive – in-vehicle and largely on-road instruction aimed at developing driving skills (mainly, although not exclusively, vehicle control skills) necessary to pass the driving test.
 - Post-license – interventions targeted at novice drivers (mostly young) that aim to combat their greater relative risk of being crash-involved.
 - Driver improvement – this might involve voluntary take up of driver training with private organisations or a course offered following the committing of a road traffic offence (e.g. speeding or drink driving).

- There is no requirement for drivers to take part in any driver education or training in order to gain a driving licence in GB. Drivers must pass the hazard perception, theory and on-road driving tests to gain a driving licence. This incentivises most drivers to undertake some form of official training. The effectiveness of this approach is demonstrated by over 99% of test candidates having taken some professional instruction (Wells et al., 2008).
- There is no requirement for drivers to undertake any driver and education or training post-test unless they commit specific driving offences, or become a professional driver (in which case they need to take the Certificate of Professional Competence (CPC) initial qualification and commit to periodic CPC training).
- The provision for driver training and education in GB, particularly for pre- and novice-drivers, is extremely varied and courses are too numerous to list in detail in this synthesis. The Royal Society for the Prevention of Accidents (RoSPA) (2012) and Kinnear et al. (2013) both outline that pre-driver interventions are extremely varied, in both content and delivery.
- Launchbury, Deighton and Luther (2007) report probably the most detailed overview of pre-driver education (the review did not include pre-driver off-road training programmes) in GB. They found that:
 - The most commonly reported aims were, to reduce young driver collisions, to influence attitudes, to prepare young people for driving, and to raise awareness of risks.
 - The majority of interventions were aimed at 14-18 year olds.
 - Most do not adhere to any formal design process and were developed in response to local young driver casualties.
- Warren and Wheaton (2012) detailed a review of young driver safety interventions in Scotland, which included a mapping exercise of ongoing programmes.
- For professional drivers of buses or coaches (D, D1, D+E, D1+E) or lorries (C, C1, C+E, C1+E), there is a Certificate of Professional Competence.
 - Initial qualification – this is required to gain a vocational licence, unless vocational licence was gained already before 10/09/09 (lorry drivers) or before 10/09/08 (bus and coach drivers) in which case the drivers is deemed to have gained this through ‘acquired rights’.
 - Certificate of Professional Competence periodic training – courses undertaken as a requirement to maintain a professional driving licence – 35 hours of training every 5 years are required.

Mechanisms to improve safety

- Almost all driver training ultimately aims to improve safety. Some training may have alternative aims such as improving driver's fuel-efficient driving skills or simply driving pleasure. Nevertheless, even where these aims are realised, safety is usually a concurrent aim and claimed benefit.
- The key mechanisms through which driver training (and education) propose to improve safety are:
 - Provision of information
 - Influencing attitudes
 - Training of driving skills

Provision of information

- Programmes that seek to achieve their aims through the provision of information rely on two key assumptions:
 - That there is an information deficit (i.e. those receiving the information are not already aware of it)
 - That by providing information drivers will act on that information, either directly or indirectly via changes to their attitudes and beliefs.
- 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. This description of how information might lead to behavioural change is attractive due to its clear logic.
- Information can be a prerequisite for behaviour in some instances. The complex relationship between providing information and affecting behaviour is often reported in the domains of health and environment. 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 (e.g. Drichoutis et al., 2006). It must be considered whether providing information to drivers can be effective if the information does not fit with pre-existing attitudes or a desire for the information (Marteau, Sowden & Armstrong, 2002).

Influencing attitudes

- Programmes focused on changing attitudes are developed on the basis of the assumption that changes in attitudes have the potential to lead to changes in behaviour.
- There are several models that describe how attitudes and other psychological constructs may link to behaviour (e.g. Ajzen, 1991; Fazio, 1986). The Theory of Planned Behaviour (TPB) developed by

Ajzen (1991) suggests that behaviours are driven largely by behavioural intentions, which are themselves driven by attitudes towards the behaviour in question, as well as subjective norms (an individual's belief about the expectations of others with regard to the behaviour), and perceived behavioural control (an individual's perceived level of control relating to the behaviour).

- Another approach taken to explaining the link between attitudes and behaviour is the MODE (Motivation and Opportunity as Determinants) model developed by Fazio (1986). This model identifies the process of predicting behaviour from general attitudes in the direction of the object; it outlines the relationship between attitude strength and behaviour. The model suggests that general attitudes are weak predictors of specific behaviours as there are other factors which moderate the strength of the attitude-behaviour relationship.
- A meta-analysis of TPB studies suggests that attitudes can explain a small proportion of observed behaviour but a much larger proportion of behaviour is influenced by other factors (e.g. situation and motivations) (Armitage and Conner, 2001).
- Kraus (1995) describes that while a relationship between attitudes and behaviour exists they are not equal representations of each other. It is not easy to determine an attitude-behaviour relationship and the measurement of attitudes should not be used as an easily measurable substitute for behaviour.

Training of driving skills

- The assumption behind developing driving skills is that by developing vehicle control (including some advanced techniques) the driver will be better able to deal with threatening driving situations.
- As with programmes targeting information and attitude change, the underlying assumption here – that increased skill is necessary to improve safety – is not supported by formal theory (see Helman et al., 2010 for an overview, and also see McKenna, 2010).
- Evidence relating to the transfer of skill training suggests that skills learned in one environment do not transfer well to other environments. Groeger and Banks (2007) discuss this in relation to learning to drive and how driver training at this stage does not necessarily transfer to solo unrestricted on-road driving.

Evidence of effectiveness

- All programmes should be evaluated against their aim. Most of the time the outcome measure is therefore safety. That is, what evidence is there that driver training (or education) can improve driver safety? In some instances, there may be an alternative aim, such as training to pass the driving test or to discourage reoffending behaviour.

- Pre-driver
 - A recent review of pre-driver training and education found no evidence to support the presumption that such programmes directly improve driver safety (Kinneer et al., 2013). While there was some evidence of short-term attitudinal change, the vast majority of programmes are not evaluated sufficiently, or at all, to determine if this is a consistent finding.

 - Peck (2010) reanalysed data from historical pre-driver education studies and suggests that road safety education could have a small effect at reducing crash risk in countries adopting GDL. The requirements of GDL would negate the risk of early licensure for those receiving the pre-driver intervention.

- Learning to drive
 - The vast majority of drivers who pass the driving test have some form of driver training prior to taking the test (Wells et al., 2008). Driving instruction in this sense seems to be useful in helping to develop the skills necessary to pass the practical driving test. However it should be noted that there has been little formal assessment of the effectiveness of driving instruction in GB either at preparing learner drivers for the practical test, or in terms of its impact on safety.

 - There is some evidence that hazard perception skill may be important in safety terms. Wells et al. (2008) and Boufous et al. (2011) have both shown that better performance on the hazard perception test is associated with a lower risk of crashing when driving post-licence. However it is not clear if this is due to training, or simply due to the fact that the hazard perception test measures an important competency for safety, therefore delaying access to driving to those drivers who lack the required level of skill.

 - There is not yet a consensus for how to best train, or test, higher order cognitive skills such as hazard perception. Studies have shown for example that hazard perception can be trained by having drivers undertake on-road training (McKenna & Crick, 1994), by listening to a commentary drive accompanying video (e.g. McKenna & Crick, 1997), and by interacting with hazards in a simulator (Wang et al., 2010).

- Post-licence
 - New drivers are at the highest risk of being crash involved when they first receive their full drivers licence – higher than at any other time in their driving career. Their crash risk drops sharply with on-road experience, and with increasing age.
 - Several reviews and meta-analyses of driver training and education targeted at improving the safety of new drivers have been conducted. The findings are consistent. All of the reviews have concluded that driver education and training has little or no reliable direct effect on road safety in terms of reductions in collision risk for new drivers (e.g. Brown, Groeger, & Biehl, 1987; Christie, 2001; Clinton & Lonerio, 2006; Helman et al., 2010; Kinnear et al., 2013; Mayhew, Simpson & Robinson, 2002; Mayhew, Simpson, Williams, & Ferguson, 1998; Roberts & Kwan, 2001; Vernick, Li, Ogaitis, Mackenzie, Baker & Gielen, 1999).
 - Since these reviews, similar findings continue to emerge. For example in China, Senserrick et al. (2012) carried out a randomised controlled trial of an intervention for recently licenced drivers. The intervention was a DVD-based education program on novice-specific risks, and six hours of in-vehicle training. The intervention group showed no reduction in crashes relative to the control group, and showed trends (although non-significant) for having greater exposure to risk, and inflated perceptions of their ability.
- In the absence of strong evidence of effectiveness, the most important advice for those seeking to administer training and education interventions for pre-drivers, learner drivers, and novice drivers is to ensure that such interventions are based on formal theory and knowledge from relevant domains such as psychology and the other behavioural sciences, and to ensure that such interventions are properly evaluated using scientifically robust designs (e.g. Helman et al., 2010; Kinnear et al., 2013.; Lonerio & Mayhew, 2010; McKenna, 2010; Thomas et al., 2012).
- Driver improvement
 - A systematic review of post-licence driver training (Ker et al., 2003) looking largely at remedial education courses in the United States, came to the same conclusion as novice driver training reviews; there is no strong evidence that such interventions reduce crashes, and only very weak evidence that they reduce re-offending. There are some promising findings from recent research (e.g. af Wåhlberg, 2011), but as yet firm evidence showing consistent positive benefits of such training are lacking.

- Certificate of Professional Competence
 - This is a requirement for professional drivers, but there is limited critical analysis or evaluation of this or other HGV training programmes (Murphy & Leach, 2013). These authors also note that there is scepticism in the industry that the EU Directive will have any impact on road safety.
 - Drivers do seem aware of the need for CPC training to address fatigue and stress (two key risk factors in vocational driving), and think that better training would be of benefit (Murphy & Leach, 2013).
 - More evaluation work is needed to establish the actual effects of Driver CPC on safety.

Why does driver training not demonstrate safety benefits?

- One reason for the lack of demonstrable safety benefits could be that so few programmes are evaluated. It is possible that some aspects of a programme are effective but are unnoticed as no evaluation is performed, or where one is, a scientifically valid methodology is not employed to draw firm conclusions.
- McKenna (2010) has provided a list of potential reasons why driver education has not produced any clear benefits:
 - Many programmes are not designed on a theoretically sound basis.
 - Many drivers are aware of the risks many programmes seek to inform them about and increasing knowledge does not necessarily change behaviour.
 - Programmes are often short (e.g. half a day) and cannot compete with more day-to-day motivations that impact on driver behaviour.
 - For some the programme may have the opposite effect to that which is desired. For example, some may take pleasure from increased risk, or the programme may increase confidence without increasing skill.
 - Communicating what normally happens (e.g. young driver behaves recklessly) may normalise that behaviour and lead to drivers acting as others expect them to.
 - Pre-driver programmes may encourage earlier licensure, which may inadvertently expose drivers to risk earlier than might otherwise have occurred.

- Economic conditions often dictate the value placed on evaluation (i.e. a weak methodology is employed to complete it cheaply, or it is not funded at all).
- Unclear aims. If the general aim is to improve safety then the programme must be evaluated against crashes and injuries. More specific and defined aims are often necessary.

New approaches to driver training and education

- Despite the general conclusion that driver training and education remain unproven as safety interventions, research work is beginning to reveal some areas of promise. It is important that such new techniques are properly evaluated so that a robust evidence base can be built to guide their content and implementation in the future.
- More recent approaches to driver training and education have focused on what are termed 'higher order cognitive skills' (e.g. perception, motivation and insight) rather than traditional control skills. One such study tested two groups of young, inexperienced drivers (Isler, Starkey and Sheppard, 2011). One group received higher-order driving skill training and the other received car control skill training. The participants who received higher-order driving skill training showed a statistically significant improvement in relation to visual search, improvement in hazard perception, safer attitudes to close following and to dangerous overtaking, and a decrease in driving related confidence. The participants who received vehicle handling skill training showed significant improvements in relation to their on-road direction control and speed choice. However, this group showed no improvement in hazard perception, attitudes to risky driving or driver confidence. Such training shows promise and potential for further research and evaluation in relation to behaviours related to safety.
- Washington, Cole and Herbel (2010) reviewed changes to post-licence training in some European countries noting that a focus on teaching drivers about self-assessment and anticipation of risk, as opposed to teaching drivers how to master driving at the limits of tire adhesion is demonstrating some promise. Such programs focus on factors such as self-actualisation and driving discipline, rather than low-level mastery of driving skills.
- Molesworth and Prabhakaran (2012) have similarly sought to apply experiential training, trialled within the aviation industry, to improve drivers' speed management. This training method is founded on the principles of cognitive engagement where individual's self-beliefs and skills are directly challenged. Though limited, this series of studies complement a general movement away from direct vehicle control skills and towards insight, life skills, and higher order cognitive skills.
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- One study found that 'brain training' software improved performance in lab tests (the useful field of view test, on which the training is modelled) but did not transfer to driving outcomes consistently (Dobres et al., 2013).
- Another study has sought to test e-learning as an alternative to classroom-based education schemes or fines-only for offending young drivers (af Wåhlberg, 2011). It found some evidence for a reduction in offending in those taking e-learning compared with the other groups, and also a possible reduction in self-reported crashes (although a regression to the mean could not be ruled out). af Wåhlberg is careful to point out that such findings, while promising, are not necessarily generalizable to all drivers, since the focus of the study is on offenders.
- De Groot et al. (2012) showed that reducing tyre-grip in driving simulator training sessions (using young and inexperienced drivers) led to later reductions in speed in rural road driving in the simulator when tyre grip was normal, both in an immediate transfer session after the training, and a later transfer session the next day. However, historical studies of real world skid pan training have previously been associated with increased crash risk due to increased driver confidence (see Helman et al., 2010 for a discussion).
- Mynttinen et al. (2010) examined accident data and traffic offences from Finnish and Austrian 2nd-phase driver education systems (mandatory training and education after passing the initial driving test). Self-report attitudes were also assessed. Completers of the 2nd phase education were compared with non-completers (in Finland, those who had not yet completed their course, in Austria those who had not had the opportunity to be involved in the system). Contradictory results were found, with Finnish 2nd phase education showing no impact on safety, while Austrian completers showed a safety benefit. For both groups, self-report measures showed almost no differences. The authors conclude that more work is needed to establish the best content and approach for 2nd phase driver education.

Redefining the role for driver training and education

- While driver training and education has failed to demonstrate effectiveness for improving safety directly, researchers nevertheless acknowledge that training and education play an extremely important role in developing cultural values, beliefs, skills and legitimising safety relevant legislation such as speed enforcement and graduated driver licensing.
- Driver training and education to date (because it has been asked to) has focused on preventing crashes and casualties and has therefore been evaluated with this as an outcome measure. Researchers have questioned however whether it is realistic to expect a (typically) short educational programme such as a half day workshop or track session to have any direct effect on crashes, especially given that the research base overall shows that even much larger programmes often have no effect.
- Another focus that has been suggested for driver training and education is the improvement of specific attitudes to legislation and enforcement activities that we know are related to crash risk (e.g. McKenna, 2010). For example, a driver programme could set out to improve and legitimise young peoples' attitudes to enforcement (by law or by parents) or to a graduated driver licensing system (that restricts their exposure). If the aim of programme is to improve attitudes to risk factors known to be related to safety (enforcement and reduced exposure) then there is a plausible mechanism for improving safety and also manageable aims for evaluation – the improvement of attitudes to enforcement and the licensing system, not crashes and casualties.
- Kinnear et al. (2013) summarise that driver training and education should not be expected to improve safety on its own. Ideally, driver training and education should occur within a holistic system such as graduated driver licensing and a developmental curriculum, providing support and legitimacy for the things that do reduce risk, for example enforcement and reduced exposure. The views expressed within Kinnear et al. (2013) are an extension of those put forward by McKenna (2010).
- The value of training and education is likely to be achieved in collaboration with other measures, as is believed to be the case in other areas of road safety. For example the annual drink drive campaign is believed to be effective because it is delivered in combination with associated enforcement. Similarly, there is a case that education about seat-belt wearing helped legitimise the legislation that was introduced in the UK in 1983 (see e.g. Helman et al., 2010).

- Lonerio and Mayhew (2010) suggest that another way in which driver education needs to be 'done differently' is in its use of theory (see also McKenna, 2010). According to Lonerio and Mayhew theory in driver education "...is still weak and shows little improvement. Driver education delivery is highly fragmented, and both consolidation and further fragmentation appear to be taking place simultaneously. Driver education needs to be more firmly based in sound research and theory concerning young drivers and, at the same time, in the principles of effective behavior change. It needs better management of the linkage of driver education with parental and community influences, graduated licensing, and other behavioral influences such as incentives and cultural factors." (Lonerio and Mayhew, 2010, p41). This is another example of researchers calling for a more holistic and comprehensive approach, that moves away from the notion (largely discredited by the evidence) that driver training and education can achieve safety benefits without being set within a wider context of road safety (see also Helman et al., 2010; Kinnear et al., 2013).

Evaluation

- A well designed resource and evaluation are crucial to know whether a programme is improving the attitudes, behaviours and skills being targeted, and whether the resource needs improving or whether it needs scrapping because it is doing harm (e.g. attitudes are getting worse or it is leading to increased exposure to risk).
- The value to society of driver training and education is probably not in direct prevention of crashes and casualties, but in the legitimising of other activities, and improving safety culture, so that it can provide the mechanisms that do reduce the risk of crashes and casualties. Evaluation in this context is manageable (i.e. the aims are more easily tested) and critical to determine that maximum benefit is being derived from programme resources.
- The DfT/RoSPA E-valu-it tool (<http://www.roadsafetyevaluation.com/introduction/purpose-of-evalu-it.html>) is a useful resource for those road safety professionals who are looking for support in their evaluation activities.

References

The following references relate to the core research, identified through the initial sifting process, used within this synthesis.

Title:	Education in Road Safety: Are we getting it right?
Published:	McKenna, F.P. (2010). Education in Road Safety: Are we getting it right? Report No. 10/113. London: RAC Foundation.
Link: Free/priced:	http://www.racfoundation.org/assets/rac_foundation/content/downloadables/education%20in%20road%20safety%20-%20mckenna%20-%20080910%20-%20report.pdf Free
Objectives:	Think piece about the role of education in road safety
Methodology:	Literature review and expert opinion
Key Findings:	“The conclusion here is not that no educational interventions can work, but rather that the evidence must be provided.”
Keywords:	Driver education, young drivers, public health

Title:	How can we produce safer new drivers? A review of the effects of experience, training and limiting exposure on the collision risk of new drivers.
Published:	Helman, S., Grayson, G.B. & Parkes, A.M. (2010). How can we produce safer new drivers? A review of the effects of experience, training and limiting exposure on the collision risk of new drivers. TRL Insight Report INS005. Crowthorne: Transport Research Laboratory.
Link: Free/priced:	https://trl.co.uk/reports/INS005 Free
Objectives:	This insight report reviews evidence for the effectiveness of post-licence driving experience, driver education and training, and limiting the exposure of new drivers to risk through graduated driver licensing in lowering new-driver collisions.
Methodology:	This is a literature review of the effects of experience training and limiting exposure on the collision risk of new drivers.
Key Findings:	Driver education and training has little or no direct effect on the collision risk of new drivers. The exception to this is training that focuses on the cognitive skills involved in hazard perception skills as part of driver licensing.
Keywords:	Driver education, driver training, public health, new drivers, novice drivers, young drivers, hazard perception, graduated driver licensing, GDL

Title:	Novice drivers: evidence review and evaluation – pre-driver education and training, graduated driver licensing, and the New Drivers Act.
Published:	Kinnear, N., Lloyd, L., Helman, S., Husband, P., Scoons, J., Jones, S., Stradling, S., McKenna, F. and Broughton, J. (2013). Published Project Report (PPR673).Transport Research Laboratory.
Link:	https://trl.co.uk/news/prev/4238
Free/priced:	Free
Objectives:	This project sought to appraise and review the evidence for interventions to improve the safety of novice drivers in GB and reduce the number of associated collisions and casualties on GB's roads. Three areas of focus were predetermined: 1. Pre-driver education and training; 2. Graduated Driver Licensing 3. The 'New Drivers Act'. The project sought to determine the quality of the literature and the consistency of the evidence to determine the effectiveness of pre-driver education and training and GDL. Analysis of DVLA and STATS19 data was necessary to evaluate the impact of the New Drivers Act. A survey of drivers who had, and had not, had their licence revoked was also undertaken.
Methodology:	Systematic literature review, analysis of STATS19 data and DVLA data, driver survey.
Key Findings:	The over-representation of young novice drivers in road collisions is a public health risk in Great Britain (GB), and worldwide. The key contributory factors to this problem are known and are cross-cultural; they are youth and inexperience. This report reviewed and synthesised evidence of effectiveness for three approaches to tackling young and novice driver safety, for consideration in GB: 1.Pre-driver education and training for those under 17 years old; 2.Graduated Driver Licensing (GDL); 3.The Road Traffic (New Drivers) Act (1995). While provision of pre-driver education and training is widespread, evidence of effectiveness is absent. Conversely, evidence of the effectiveness of GDL from countries where it has been implemented is strong and consistent. The New Drivers Act appears to have had a beneficial effect on offending patterns in GB and may have had a safety benefit through deterrence from driving. Based on the evidence, it is recommended that licensing in GB be based on a full GDL system. Analysis of STATS19 data and evidence of effectiveness in other countries suggests that a GDL system in GB could save 4,471 casualties and £224 million annually based on 17-19 year old drivers only.
Keywords:	Driver education, driver training, public health, new drivers, novice drivers, young drivers, Graduated Driver Licensing, GDL

Title:	Cohort II: a study of learner and new drivers. Volume 1: Main Report.
Published:	Wells, P., Tong, S., Sexton, B., Grayson, G.B. & Jones, E. (2008a). Road Safety Research Report No.81. London: Department for Transport.
Link: Free/priced:	http://webarchive.nationalarchives.gov.uk/20120606181145/http://www.dft.gov.uk/publications/cohort-ii-a-study-of-learner-and-new-drivers/ Free
Objectives:	<p>'Cohort II' was a major six-year study, funded by the Department for Transport, providing an up-to-date picture of how 'cohorts' of learner drivers in Great Britain undertake driver training and testing, and of their subsequent experiences as new drivers. It builds upon and further develops the evidence base from the smaller Cohort I study in 1988 – 89.</p> <p>The aims of the study were:</p> <ul style="list-style-type: none"> • to investigate how people learn to drive, including the number of hours of tuition and practice, and to compare this to outcomes from the theory and practical driving tests; • to assess the impact of changes to the testing regime, specially the hazard perception test which was introduced during the period of study; • to explore new drivers' experiences and attitudes to driving; and • to identify their level of accident involvement over time.
Methodology:	<p>Every three months, from November 2001 to August 2005, a random sample of 8,000 practical test candidates was drawn by the Driving Standards Agency (DSA) from candidates in a given week (this was approximately one-third of those taking their test in that week). For the purposes of the study, the resulting 16 cohorts were labelled A to P. Postal questionnaires were sent to these candidates and, if they passed their test, follow-up questionnaires were sent at specific points in their driving career. For all questionnaires, reminders were sent if a response was not received within two weeks.</p> <p>The sample initially comprised 42,851 learner drivers, however not all of these passed their practical tests to be involved in the subsequent surveys of new drivers. The sample of new drivers in Cohort II varied from over 10,000 at six months after the practical test to just fewer than 2,000 at three years after taking the test.</p>

Key Findings:	<p>People who pass the test at a young age tend, initially, to drive less safely than others. This effect is strongest soon after the test, and declines during the first three years of driving.</p> <ul style="list-style-type: none"> • The pattern of results is consistent with the notion that residual effects of starting to drive young become diluted by other influences as time progresses. • It shows that there is not something persistently different about those who start to drive very young – in terms of driving safety, they become like other drivers within a year or two. • However, within this period they do have an excess accident liability, and this result re-emphasises the importance of finding ways of targeting safety interventions at very young drivers. • The introduction of the hazard perception component in the theory test appears to have been associated with some reduction in subsequent accident liability, although the size of the estimated effect varies with the type of accident.
Keywords:	Learning to drive, new drivers, novice drivers, young drivers
Comments:	

Title:	Attempts at the Practical On-Road Driving Test and the Hazard Perception Test and the Risk of Traffic Crashes in Young Drivers.
Published:	Boufous, S., Ivers, R., Senserrick, T. and Stevenson, M. (2011). Traffic Injury Prevention, 12, 475-482.
Link: Free/priced:	http://www.tandfonline.com/doi/abs/10.1080/15389588.2011.591856?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%3dpubmed Priced
Objectives:	Identify relationship between test attempts (practical test, and hazard perception test) and crash risk in Australian novice drivers
Methodology:	20,822 driver surveys in large Cohort study. Multivariate analysis of relationship between test attempts and late crash risk (state recorded crashes).
Key findings:	Those novices who had failed the on-road practical test at least four times, or the hazard perception test at least twice, had a greater risk of a traffic crash in their first two years of driving, compared with those who passed these tests first time.
Keywords:	Motor vehicle crash, driving test, hazard perception test, young drivers.
Comments:	One of the two large and relatively recent Cohort studies of novice drivers (the other being Wells et al., 2008), showing very similar findings.

Title:	Hazard Perception in drivers: A methodology for testing and training.
Published:	McKenna, F. P., & Crick, J. L. (1994). TRL Contractor Report (CR313). Crowthorne: Transport Research Laboratory.
Link:	https://trl.co.uk/reports/CR313
Free/priced:	Free
Objectives:	Develop test of hazard perception based on simple video-clip methodology, and examine ways of training HP skill.
Methodology:	Video clips of hazards, with comparison of experienced and novice drivers, and examination of RoSPA-trained drivers.
Key findings:	Experienced and RoSPA-trained drivers performed better than novices.
Keywords:	Hazard Perception, training, novice drivers, experienced drivers.
Comments:	Early work on hazard perception in UK.

Title:	A comparative study of two hazard handling training methods for novice drivers.
Published:	Wang, Y. B., Zhang, W., & Salvendy, G. (2010). Traffic injury prevention, 11(5), 483-491.
Link:	http://www.tandfonline.com/doi/abs/10.1080/15389588.2010.489242
Free/priced:	Priced.
Objectives:	To compare two methods of training hazard perception – simulator error training and video error training.
Methodology:	Two groups of participants were trained using either desktop simulator (active hazard error condition) or watching videos of errors being made by other people. Later both groups tested in full mission simulator.
Key findings:	Simulator trained group showed better hazard respond and handling than video trained group.
Keywords:	Novice drivers, Error training, Driving simulation, Hazard handling, Hazard perception
Comments:	Recent work on the role of simulators in HP training.

Title:	Is driver training contributing enough towards road safety?
Published:	Brown, I.D., Groeger, J.A. & Biehl, B. (1987). In J.A Rothengatter and R.A de Bruin (eds), Road users and traffic safety. ASSEN: VAN GORCUM, 135-156.
Link:	http://trid.trb.org/view.aspx?id=284995
Free/priced:	Priced
Objectives:	To appraise the contribution of novice driver training to road safety.
Methodology:	Review
Key Findings:	<ul style="list-style-type: none"> • Efforts in the field of road safety are often categorized as the 'three e's': education, engineering and enforcement. • Driver training is subsumed under 'education', which includes the teaching of safe road user behaviour to schoolchildren and the improvement of road users' knowledge, attitudes and behaviour via publicity, propaganda, exhortation and, occasionally, legal sanctions. • This chapter focuses largely on the contribution of novice driver training to road safety. However, one should not overlook the fact that such training usually represents only a brief, if specific, contribution to the range of social and technical skills acquired by most members of the adult population. • To be successful, driver training must build on earlier learning and be compatible with current and subsequent learning, if driver behaviour is to meet society's, as well as the individual's, needs for the safe handling of road vehicles. • One should also not forget that effects of driver training and education are not completely independent of the other two 'e's' of road safety effort, engineering and enforcement, in spite of the fact that responsibility for the three 'e's' is usually divided in practice between authorities from different disciplines. • Enforcement certainly shapes driver behaviour and most accident countermeasures employed by traffic engineers effectively depend for their success on behavioural manipulations. • Any consideration of the contribution made to road safety by driving instruction must therefore take account of these other general and specific influences on the way drivers subsequently behave in traffic, if we are to understand the real needs of driver training. (Author/TRRL)
Keywords:	Behaviour; Driver education; Driver training; Drivers; Highway engineering; Traffic law enforcement; Traffic safety

Title:	The effectiveness of driver training as a road safety measure. A review of the literature.
Published:	Christie, R. (2001). Victoria, Australia: Royal Automobile Club of Victoria.
Link: Free/priced:	http://www.education.vic.gov.au/Documents/school/teachers/health/effectdriver.pdf Free
Objectives:	To inform road safety professionals, and the public at large, about the merits and effectiveness of driver training as a crash countermeasure.
Methodology:	International literature review
Key Findings:	<ul style="list-style-type: none"> • The effectiveness of driver training as a road safety measure is a controversial issue within the professional and public arena. • The worth of driver training for car drivers as a means of improving driver behaviour and reducing road crash involvement is continually debated in Australia and overseas. • In an effort to inform road safety professionals, and the public at large, about the merits and effectiveness of such training as a crash countermeasure, RACV commissioned RCSC Services Pty Ltd to perform an extensive review of the international literature concerning driver training. In particular, the effectiveness of driver training programs for learner drivers, young/recently licensed drivers and experienced drivers were investigated. • The review suggests that driver training cannot be considered an effective crash countermeasure and that other approaches such as increased supervision and graduated licensing for novice drivers are likely to make greater and more lasting contributions to road safety.
Keywords:	Driver training, advanced driver training, accident countermeasure, driver behaviour, learner driver, recently qualified driver, accident rate, driver testing and licensing.
Comments:	

Title:	Guidelines for evaluating driver education programs.
Published:	Clinton, K. & Lonerio, L. (2006). AAA Foundation for Traffic Safety.
Link: Free/priced:	https://www.aaafoundation.org/sites/default/files/EvaluatingDriverEducationProgramsGuidelines.pdf Free
Objectives:	To provide a detailed background for planning and conducting effective evaluation of beginner driver education, and for integrating evaluation into program development and policy. The Guidelines cover a range of evaluations from simple to complex, and are written primarily for program evaluators, researchers, and other technical audiences. Actual tools, such as surveys, focus group guides, and log books that can be used or adapted for evaluating beginner driver education programs are included.
Methodology:	Review of past evaluations and consultation
Key findings:	<ul style="list-style-type: none"> • The Guidelines cover a range of evaluations from simple to complex, and are written primarily for program evaluators, researchers, and other technical audiences. • Actual tools, such as surveys, focus group guides, and log books that can be used or adapted for evaluating beginner driver education programs are included.
Keywords:	Evaluation, driver education, driver safety, road safety
Comments:	

Title:	The safety value of driver education and training.
Published:	Mayhew, D.R., Simpson, H.M. & Robinson, A. (2002). Injury Prevention, 8 (supplement II), ii3-ii8.
Link:	http://injuryprevention.bmj.com/content/8/suppl_2/ii3.abstract
Free/priced:	Priced
Objectives:	To summarize the evidence on the safety value of such programs and suggest improvements in program delivery and content that may produce safety benefits.
Methodology:	The empirical evidence was reviewed and summarized to determine if formal instruction has been shown to produce reductions in collisions, and to identify ways it might achieve this objective.
Key Findings:	<ul style="list-style-type: none"> • The international literature provides little support for the hypothesis that formal driver instruction is an effective safety measure. It is argued that such an outcome is not entirely unexpected given that traditional programs fail to address adequately the age and experience related factors that render young drivers at increased risk of collision. • Education/training programs might prove to be effective in reducing collisions if they are more empirically based, addressing critical age and experience related factors. At the same time, more research into the behaviors and crash experiences of novice drivers is needed to refine our understanding of the problem.
Keywords:	Driver education, driver training, public health, new drivers, novice drivers, young drivers,
Comments:	

Title:	Effectiveness and role of driver education and training in a graduated licensing system.
Published:	Mayhew, D.R., Simpson, H.M., Williams, A.F. & Ferguson, S.A. (1998 Journal of Public Health Policy, 19, 51-67.
Link:	http://www.ncbi.nlm.nih.gov/pubmed/9581430
Free/priced:	Priced
Objectives:	This article provides a contemporary review of the value of driver education/training, particularly in relation to new licensing systems such as graduated ones.
Methodology:	The article examines the safety benefits of driver education/training and considers the merits of integrating driver education/training programs with new approaches to the licensing of young drivers.
Key Findings:	<ul style="list-style-type: none"> • Formal driver education/training programs exist in almost all jurisdictions around the world. • They are generally accepted as an efficient and effective means for learning to drive, and, more importantly, for learning to drive safely, although empirical evidence for safety benefits is lacking. • Recently, there has been a heightened interest in driver education/training, largely as a result of the adoption of graduated licensing in a few jurisdictions in North America and elsewhere. • These jurisdictions have effectively elevated the status of driver education/training by integrating it into the licensing system. Implicitly, this suggests that driver education provides safety benefits.
Keywords:	Driver training, driver licensing, driver education, learning to drive
Comments:	

Title:	School-based driver education for the prevention of traffic crashes.
Published:	Roberts, I.G. & Kwan, I. (2001). Cochrane Database of Systematic Reviews, Issue 3. Art. No.:CD003201.DOI: 10.1002/14651858. CD003201.
Link:	http://www.thecochranelibrary.com/userfiles/ccoch/file/Safety_on_the_road/CD003201.pdf
Free/priced:	Free
Objectives:	To quantify the effect of school-based driver education on licensing and road traffic crashes.
Methodology:	Systematic literature review
Key Findings:	<ul style="list-style-type: none"> • Teenagers have a higher risk of road death and serious injury than any other group. • egypt to reduce the number of road crashes involving teenagers. The results of this systematic review show that driver education in schools leads to early licensing. • They provide no evidence that driver education reduces road crash involvement, and suggest that it may lead to a modest but potentially important increase in the proportion of teenagers involved in traffic crashes.
Keywords:	Systematic review, driver education, school, traffic crashes, teenagers, licensing
Comments:	

Title:	Post-licence driver education for the prevention of road traffic crashes: a systematic review of randomised controlled trials
Published:	Ker, K., Roberts, I., Collier, T., Beyer, F., Bunn, F., & Frost, C. (2005). Accident Analysis & Prevention, 37(2), 305-313.
Link:	http://www.sciencedirect.com/science/article/pii/S0001457504000958
Free/priced:	Priced
Objectives:	A systematic review of randomised controlled trials of post-licence driver education.
Methodology:	Systematic review
Key Findings:	<ul style="list-style-type: none"> • No evidence (with combined sample size of over 300,000) of any safety benefits of remedial post-licence driver education.
Keywords:	Driver education, injury prevention, meta-analysis, motor vehicle, systematic review, road traffic crash.

Title:	Effects of high school driver education on motor vehicle crashes, violations and licensure.
Published:	Vernick, J.S., Li, G., Ogaitis, S., MacKenzie, E.J., Baker, S.P. & Gielen, A.C. (1999). American Journal of Preventative Medicine, 16, 40-46.
Link:	http://www.ncbi.nlm.nih.gov/pubmed/9921385
Free/priced:	Priced
Objectives:	Sought evidence in the research literature to determine if (1) high school-aged persons who enrol in a driver education course have fewer motor vehicle-related crashes or violations, or are more likely to obtain a driver's license, than those who do not enrol in driver education courses, and (2) the availability of high school driver education courses is associated with lower community rates of motor vehicle crashes among young drivers.
Methodology:	Systematic literature review.
Key Findings:	<ul style="list-style-type: none"> • Nine studies met our inclusion criteria. Based on these studies, there is no convincing evidence that high school driver education reduces motor vehicle crash involvement rates for young drivers, either at the individual or community level. In fact, by providing an opportunity for early licensure, there is evidence that these courses are associated with higher crash involvement rates for young drivers. • Although few driver education curricula have been carefully evaluated, in the absence of evidence that driver education reduces crash involvement rates for young persons, schools and communities should consider other ways to reduce motor vehicle-related deaths in this population, such as graduated licensing.
Keywords:	Systematic review, driver education, school, traffic crashes, teenagers, licensing
Comments:	

Title:	Teen driver safety: Review of the literature on driver education evaluation 2010 update.
Published:	Lonero, L. & Mayhew, D. (2010). Washington, D.C.: AAA Foundation for Traffic Safety.
Link: Free/priced:	https://www.aaafoundation.org/large-scale-evaluation-driver-education-review-literature-driver-education-evaluation-2010-update Free
Objectives:	To review the evidence for driver education and evaluation.
Methodology:	Literature review
Key Findings:	<ul style="list-style-type: none"> • When looking critically at past evaluations, one is struck by how little they have contributed to developing and improving driver education. • Evaluation research in driver education has been unsystematic, in the sense that studies typically failed to build on earlier research. • Surprising negative findings, and even credible positive findings, were not followed up by further research. • Scientific knowledge usually develops through systematic replication of research, but that has not yet happened in driver education evaluation research.
Keywords:	Systematic review, driver education, school, traffic crashes, teenagers, licensing
Comments:	

Title:	Examination of supplemental driver training and online basic driver education.
Published:	Thomas, F. D., Blomberg, R. D., Korbela, K., Stutts, J., Wilkins, J., Lonero, L., Clinton, K., & Black, D. (2012, June). (Report No. DOT HS 811 609). Washington, DC: National Highway Traffic Safety Administration.
Link: Free/priced:	www.nhtsa.gov/staticfiles/nti/pdf/811609.pdf Free
Objectives:	A review of various types of driver training provided in the United States and around the world.
Methodology:	Search of literature and provision of education and training, including online courses.
Key Findings:	<ul style="list-style-type: none"> • Wide range of courses available, with little oversight of regulation, and little formal evaluation.
Keywords:	Driver Training Supplemental, Young Drivers, Internet Driver Education, Online Training, Advanced Driver Training

Title:	Research challenges and findings from a driver training pilot study in China.
Published:	Senserrick, T., Yu, J., Boufous, S., Stevenson, M., & Ivers, R. (2012). In Australasian Road Safety Research Policing Education Conference, 2012, Wellington, New Zealand.
Link:	http://acrs.org.au/publications/conference-papers/database/
Free/priced:	Free
Objectives:	To examine the effect of a DVD and in-car-based education and training package for newly licensed drivers.
Methodology:	Randomised controlled trial of driver education DVD and in-vehicle intervention.
Key Findings:	No change in intervention group on crash rate, and non-significant trends (in the direction of less safety) on attitudes to risk and perceived ability.
Keywords:	Driver education, novice drivers, new drivers.

Title:	Road safety and in-vehicle monitoring (black box) technology.
Published:	RoSPA (2013). Retrieved March 22, 2013, from http://www.rospa.com/roadsafety/info/black-box-technology.pdf
Link:	http://www.rospa.com/rospaweb/docs/advice-services/road-safety/vehicles/black-box-technology.pdf
Free/priced:	Free
Objectives:	This policy paper explores the rapidly developing use of in-vehicle telematics to monitor and analyse real-life driving behaviour, and its potential road safety advantages and disadvantages. The paper primarily focuses on this technology by two groups: <ol style="list-style-type: none"> 1. motor insurers and the (young) drivers they insure 2. employers and their staff who drive for work.
Methodology:	Literature review, market search and evidence base evaluation
Key Findings:	<ul style="list-style-type: none"> • The use of in-vehicle monitoring technology is increasing very rapidly in the UK. It has great potential to significantly improve driving standards and reduce crash and casualty rates. • Currently, it is largely restricted to two groups, young, novice drivers and at-work drivers, but could also be used with other groups of drivers, and perhaps eventually be standard technology in all vehicles. • There are knowledge gaps that need to be filled in order to achieve the maximum road safety benefits from this technology.
Keywords:	Black box, telematics, young drivers, at-work drivers, monitoring technology

Title:	Pre-driver Education: Survey of Pre-driver Education Provision.
Published:	Launchbury, C., Deighton, C. & Luther, R. (2007). Road Safety Research Report. London: Department for Transport.
Link: Free/priced:	http://webarchive.nationalarchives.gov.uk/20110509101621/http://www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme2/predrivereducationsurvey.pdf Free
Objectives:	The objective of this report is to present the detailed findings of a questionnaire and telephone survey of pre-driver education provision.
Methodology:	The questionnaire survey achieved an acceptable response rate of 38% from a sample of 204 questionnaires issued. The sample comprised: all UK Road Safety Units; seven UK non-government providers; and four international organisations. A follow-up telephone survey investigated the provision of pre-driver education by 111 road safety officers (RSOs) who did not participate in the questionnaire survey.
Key Findings:	<ul style="list-style-type: none"> The combined findings of the questionnaire and telephone survey indicated that out of 173 UK road safety teams, 122 (71%) had a pre-driver education initiative in place and 51 (29%) did not.
Keywords:	Pre-drivers, education, local authorities

Title:	Generating evidence on young driver interventions.
Published:	Warren, F. & Wheaton, K. (2012). Scottish Transport Applications and Research
Link: Free/priced:	http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&ved=0CC0QFjAA&url=http%3A%2F%2Fwww.stsq.org%2Fstar%2F2012%2FWheatonWarren.pdf&ei=xN7OUsTUH8mShgecj4GoCg&usq=AFQjCNHDviuZ_bdlSH5vkB5leZ8q6T2uMA Free
Objectives:	To map and discuss the evidence for young driver interventions in Scotland
Methodology:	Mapping exercise, review of international literature, Expert think piece
Key Findings:	<ul style="list-style-type: none"> This paper outlines the evidence-informed approach adopted to improving the delivery of one Road Safety initiative, that of Young Driver Interventions. It highlights the role of using evidence to consider what could work in the absence of robust evaluations which tell us what does work. It included the challenge of using this evidence - which was at times unexpected and difficult for those delivering young driver interventions to accept - to inform and develop the toolkit, while keeping practitioners on board. The result is an evidence-informed toolkit which it is hoped, will play a part in improving young driver safety in Scotland.
Keywords:	Young drivers, Scotland, road safety, novice drivers

Title:	Consumers' use of nutritional labels: A review of research studies and issues.
Published:	Drichoutis, A.C., Lazaridis, P. & Nayga, R.M. (2006). Consumers' use of nutritional labels: Academy of Marketing Science Review, 9, 93-118.
Link:	http://works.bepress.com/andreas_drichoutis/5/
Free/priced:	Free
Objectives:	The nutritional labelling literature has grown significantly in recent years. This paper reviews this increasingly important literature and addresses some specific issues regarding the determinants of label use, the debate on mandatory labelling, the label formats preferred by consumers, and the effect of nutrition label use on purchase and dietary behaviour.
Methodology:	Literature review and synthesis
Key Findings:	This study synthesizes the results of empirical research related to nutritional label use that spans almost two decades. The summary of results presented in this study provides valuable information for directions for future research and development of theoretical and empirical studies. Among others, we find that provision of information has a positive effect on the consumption of beneficial nutrient components and a negative effect on the consumption of harmful components such as fat and cholesterol.
Keywords:	Consumer behaviour

Title:	Implementing Research Findings into Practice: Beyond the Information Deficit Model
Published:	Marteau, T.M. Sowden, A.J. & Armstrong D. (2002). In A. Haines & A. Donald (Eds). Getting research findings into practice. London: BMJ Books.
Link:	http://onlinelibrary.wiley.com/doi/10.1002/9780470755891.ch5/summary
Free/priced:	Priced
Objectives:	Discussion of behaviour change models
Methodology:	Literature review
Key Findings:	<ul style="list-style-type: none"> • More consideration needs to be given to which specific behaviours need to be changed and what techniques are used to determine that. Information deficit models are not sufficient to explain behaviour.
Keywords:	Behavioural change; information deficit; psychological models; punishment; clinical variability

Title:	The theory of planned behaviour
Published:	Ajzen, I. (1991). Organisational Behaviour and Human Decision Processes, 50, 179-211.
Link: Free/priced:	http://www.sciencedirect.com/science/article/pii/074959789190020T £39.95
Objectives:	Research dealing with various aspects of the theory of planned behaviour is reviewed, and some unresolved issues are discussed.
Methodology:	Evidence review and theoretical discussion
Key Findings:	<ul style="list-style-type: none"> • In broad terms, the theory is found to be well supported by empirical evidence. • Intentions to perform behaviours of different kinds can be predicted with high accuracy from attitudes toward the behaviour, subjective norms, and perceived behavioural control; and these intentions, together with perceptions of behavioural control, account for considerable variance in actual behaviour. • Attitudes, subjective norms, and perceived behavioural control are shown to be related to appropriate sets of salient behavioural, normative, and control beliefs about the behaviour, but the exact nature of these relations is still uncertain. • Finally, inclusion of past behaviour in the prediction equation is shown to provide a means of testing the theory's sufficiency, another issue that remains unresolved. • The limited available evidence concerning this question shows that the theory is predicting behaviour quite well in comparison to the ceiling imposed by behavioural reliability.
Keywords:	Theory of Planned Behaviour, TPB, attitudes, behaviour, theory, psychology
Comments:	

Title:	How do attitudes guide behaviour?
Published:	Fazio, R.H. (1986). In R.M. Sorrentino and E.T. Higgins (Eds.), Handbook of motivation and cognition (pp. 204-243). New York: Guildford.
Link: Free/priced:	http://www.sagepub.com/upm-data/4874_Brock_Ch_3_Acting_as_we_feel.pdf Priced
Objectives:	To present a model of the attitude-behaviour relationship
Methodology:	Theoretical review
Key Findings:	<ul style="list-style-type: none"> • Previous research sought to determine whether an attitude- behaviour relationship existed but the appropriate work now seeks to determine when and how attitudes might predict behaviour
Keywords:	Attitudes, behaviour, theory, psychology
Comments:	

Title:	Efficacy of the Theory of Planned Behaviour: A meta-analytic review.
Published:	Armitage, C. J. & Conner, M. (2001). British Journal of Social Psychology, 40, 471–499.
Link: Free/priced:	http://www.ncbi.nlm.nih.gov/pubmed/11795063 Priced
Objectives:	The Theory of Planned Behaviour (TPB) has received considerable attention in the literature. The present study is a quantitative integration and review of that research.
Methodology:	Meta-analysis of 185 independent studies
Key Findings:	<ul style="list-style-type: none"> • From a database of 185 independent studies published up to the end of 1997, the TPB accounted for 27% and 39% of the variance in behaviour and intention, respectively.
Keywords:	Theory of Planned Behaviour, TPB, attitudes, behaviour, theory, psychology
Comments:	

Title:	Attitudes and the prediction of behaviour: A meta-analysis of the empirical literature
Published:	Kraus, S.J. (1995). Personality and Social Psychology Bulletin, 21, 58-75.
Link:	http://psp.sagepub.com/content/21/1/58.abstract
Free/priced:	Priced
Objectives:	The relationship between attitudes and behavior has been the topic of considerable debate. This article reports a meta-analysis of 88 attitude-behavior studies.
Methodology:	Meta-analysis of previous independent studies
Key Findings:	<ul style="list-style-type: none"> The practical magnitude of attitude-behavior correlations is considered, as are the future directions of attitude-behavior research. that reveals that attitudes significantly and substantially predict future behavior
Keywords:	Attitudes, behaviour, theory, psychology

Title:	Anticipating the content and circumstances of skill transfer: unrealistic expectations of driver training and graduated licensing?
Published:	Groeger, J.A. & Banks, A.P. (2007). Ergonomics, 50, 1250-1263.
Link:	http://www.tandfonline.com/doi/abs/10.1080/00140130701318723
Free/priced:	£28
Objectives:	There is substantial evidence that driving skills improve during driver training, but the long-term safety benefit of such formal training remains unproven. Restricting the exposure of newly licensed drivers to more hazardous driving circumstances, as in graduated driver licensing (GDL) regimes, demonstrably reduces crash risk, but drivers remain at risk after the restrictions are eased. GDL and most other licensing regimes advocate increased basic training and practice, but thereafter require neither advanced training nor systematic increase in exposure to risk. This assumes that basic skills acquired during formal training will transfer positively to new and more demanding traffic circumstances.
Methodology:	This paper reviews the theoretical basis for these assumptions and offers a way of systematically identifying the extent of transfer desired.
Key Findings:	<ul style="list-style-type: none"> It is concluded that there is little theoretical or empirical foundation for the supposition that what is learned during or after training will have a safety benefit in later driving.
Keywords:	Driver training, transfer, learning to drive, driving theory, graduated driver licensing, GDL

Title:	Developments in hazard perception
Published:	McKenna, F., & Crick, J. (1997). TRL report (TRL297): Crowthorne: Transport Research Laboratory.
Link:	https://trl.co.uk/reports/TRL297
Free/priced:	Free
Objectives:	Examine further developments in hazard perception, especially training.
Methodology:	Participants observed video clips of hazards and were encouraged to listen to commentaries and predict what would happen next.
Key Findings:	<ul style="list-style-type: none"> • Training resulted in improved hazard perception skill.
Keywords:	Hazard Perception, training, novice drivers, experienced drivers.
Comments:	Early work on hazard perception in UK.

Title:	The extent to which heavy goods vehicle driver training is focused on reducing the casual factors of driver stress and fatigue.
Published:	Murphy, S. and Leach, David Z. (2013) In: LRN Annual Conference and PhD Workshop 2013, 4th-6th September 2013, Birmingham, UK.
Link:	http://eprints.hud.ac.uk/19210/
Free/priced:	Free
Objectives:	To determine the extent to which vocational training programmes are aligned with academic research in recognising fatigue and stress as key drivers of risk in vocational driving.
Methodology:	Data gathered from various industry and government bodies, and primary data gathered from drivers and managers in the vocational driving industry.
Key Findings:	<ul style="list-style-type: none"> • Current HGV driver training programmes are not aligned with academic research on stress and fatigue. • Although drivers believe that better training in these areas would help road safety, there is scepticism as to whether the CPC Directive will help road safety in its current form.
Keywords:	Certificate of Professional Competence, CPC, HGV training, fatigue, stress.
Comments:	Not an experimental study, but one of very few studies directly addressing CPC training from the perspective of asking about its theoretical basis (in this case relating to fatigue and stress) and its potential effectiveness.

Title:	Do driver training programs reduce crashes and traffic violations? — A critical examination of the literature.
Published:	Peck, R. C. (2010). IATSS Research, 34, 63-71.
Link:	http://www.sciencedirect.com/science/article/pii/S038611211000021
Free/priced:	Free
Objectives:	To review driver education evidence, primarily from North America.
Methodology:	Literature review
Key Findings:	<ul style="list-style-type: none"> • This review takes a critical view of the previous work in driver education and concludes that driver education may have a small effect on accident rates, but concludes that an effect close to zero cannot be ruled out. • Also concludes that GDL laws are important in controlling possible unintended early licensure that can occur if driver education can be used as a discount for obtaining a licence.
Keywords:	Novice drivers, young drivers, driver training, driver education, accident countermeasures, driver training evaluation designs.
Comments:	

Title:	Do Crashes and Near Crashes in Simulator-Based Training Enhance Novice Drivers' Visual Search for Latent Hazards?
Published:	Vlakveld et al. (2011). Transp Res Rec. 2011 January 1; 2265: 153–160
Link:	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3472432/
Free/priced:	Free
Objectives:	To examine effect of hazard perception training in a simulator, in which hazards developed aggressively during training and later near- and far-transfer drives were examined for eye-scanning behaviour.
Methodology:	Participants randomly assigned to hazard perception training, or 'placebo' training – a pen and paper test on road signs.
Key Findings:	<ul style="list-style-type: none"> • Hazard perception trained participants looked in the appropriate places for latent hazards more often than untrained participants in both near and far transfer scenarios. • They also showed lower confidence.
Keywords:	Hazard perception, driving simulators, novice drivers.

Title:	Effects of higher-order driving skill training on young, inexperienced drivers' on-road driving performance.
Published:	Isler, R. B., Starkey, N. J., & Sheppard, P. (2011). Accident Analysis & Prevention, 43(5), 1818-1827.
Link:	http://www.sciencedirect.com/science/article/pii/S0001457511000984
Free/priced:	Priced
Objectives:	To compare the effects of higher order cognitive skills training and traditional vehicle handling training on driving performance, hazard perception, attitudes to risk driving and confidence levels in young inexperienced drivers.
Methodology:	Random allocation of 36 participants to one of three groups - higher order training, vehicle training, or no training. Participants were assessed on-road and took hazard perception and self-report tests before and after the training period.
Key Findings:	<ul style="list-style-type: none"> Higher order training group showed improvements in on-road assessment, and hazard perception, attitudes to close following and dangerous overtaking.
Keywords:	Hazard perception
Comments:	Author notes that the extensive practice at hazard perception during the training in the higher order group is probably to blame for increases in safe attitudes towards risky activities ('insight' being a key mechanism). Link between hazard perception and risk taking is still a key area of research. Only short term effects shown.

Title:	European advanced driver training programs: Reasons for optimism
Published:	Washington, S., Cole, R. J., & Herbel, S. B. (2011). IATSS research, 34(2), 72-79.
Link:	http://www.sciencedirect.com/science/article/pii/S0386111211000033
Free/priced:	Free
Objectives:	To summarise European approach to driver training and contrast it with North American approach.
Methodology:	Review of European practice.
Key Findings:	<ul style="list-style-type: none"> European practice has moved away from vehicle control skills to focus instead on teaching drivers about self-assessment and anticipation of risk.
Keywords:	Driver education, motor vehicle safety, advanced driver training programs, insight based training, teen drivers, novice drivers.

Title:	Improving Drivers' Risk Management Behaviour: An Assault on Speeding.
Published:	Molesworth and Prabhakaran (2012). NRMA-ACT Road Safety Trust.
Link:	http://trid.trb.org/view.aspx?id=1226018
Free/priced:	Free
Objectives:	Investigating effect of training in which individuals' self-beliefs are challenged, on speed management.
Methodology:	58 participants randomly assigned to one of four groups, taking part in simulated drives before and after training period. 'Experiential' training group experienced various driving errors in simulator, while other groups witnessed others making these mistakes or simply read about the road rules that led to the incidents.
Key Findings:	<ul style="list-style-type: none"> • Experiential group showed reduced speeding tendency compared with other groups.
Keywords:	Experiential training, speeding.
Comments:	Small scale study, but again provides evidence that moving to an 'insight' model is beneficial for training of young drivers.

Title:	Assessing the Impact of "Brain Training" on Driving Performance, Visual Behavior, and Neuropsychological Measures.
Published:	Dobres, J., Potter, A., Reimer, B., Mehler, B., Mehler, A., & Coughlin, J. (2013). Proceedings of the Seventh International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design.
Link:	http://drivingassessment.uiowa.edu/sites/default/files/DA2013/Papers/009_Dobres_0.pdf
Free/priced:	Free
Objectives:	Assess the impact of Posit Science's 'DriveSharp' software on performance in lab tasks and driving in drivers aged 60–75.
Methodology:	16 drivers were trained with the software and 16 were in a control group who received no training. An initial lab and driving session provided a baseline and another two weeks after the first provided the main outcome measure.
Key Findings:	<ul style="list-style-type: none"> • Those trained using the software showed better performance on the useful field of view test.
Keywords:	Brain training, useful field of view.

Title:	Re-education of young driving offenders: Effects on recorded offences and self-reported collisions.
Published:	af Wåhlberg, A. E. (2011). Transportation research part F: traffic psychology and behaviour, 14(4), 291-299
Link: Free/priced:	http://www.sciencedirect.com/science/article/pii/S1369847811000192 Priced
Objectives:	A study examining the effects of three different interventions on young driving offenders (mostly speeders). E-learning was compared with classroom education, and fines.
Methodology:	Quasi-experimental design.
Key Findings:	<ul style="list-style-type: none"> • E-learning group showed a reduction in offending compared with the other two groups. • Also a reduction in collisions in e-learning group.
Keywords:	Evaluation, driver improvement, driver education, driving offence, collision, accident.
Comments:	Regression to mean could not be ruled out for accident reduction. In addition author is careful to point out that while the e-learning seems effective for offenders, this cannot necessarily be generalised to all drivers.

Title:	The effect of tire grip on learning driving skill and driving style: A driving simulator study.
Published:	De Groot, S., Centeno Ricote, F., & De Winter, J. C. F. (2012). Transportation research part F: traffic psychology and behaviour, 15(4), 413-426.
Link: Free/priced:	http://www.sciencedirect.com/science/article/pii/S1369847812000186 Priced
Objectives:	To examine the effects of degrading performance (in this case reduced tyre grip) during training on later retention.
Methodology:	Simulator trial with four training drivers (with low, medium or high grip) followed by transfer drives (one the same day, one the next day) with normal grip tyres.
Key Findings:	<ul style="list-style-type: none"> • Reduced tyre grip during training led to lower speeds in transfer drives.
Keywords:	Driver training, driving skill, driving style, retention performance, driving simulator.
Comments:	This simulator study is interesting in that it potentially shows how giving drivers insight into their limitations can lead to these drivers taking greater care (by reducing speed).

Title:	Two-phase driver education models applied in Finland and in Austria–Do we have evidence to support the two phase models?
Published:	Mynttinen, S., Gatscha, M., Koivukoski, M., Hakuli, K., & Keskinen, E. (2010). Transportation research part F: traffic psychology and behaviour, 13(1), 63-70.
Link: Free/priced:	http://www.sciencedirect.com/science/article/pii/S136984780900076X Priced
Objectives:	To examine the effects of 2 nd phase driver education in Finland and Austria
Methodology:	Survey methodology with examination of accidents, and attitudes to driving-relevant competencies. Completers of the 2 nd phase education compared with non-completers.
Key Findings:	<ul style="list-style-type: none"> • Findings were contradictory, with Finnish completers showing no safety benefit, but Austrian completers showing a safety benefit. • No changes in self-reported competencies found.
Keywords:	Driver education, 2nd phase, novice drivers, driving competence.
Comments:	

28 Calthorpe Road, Edgbaston, Birmingham, B15 1RP

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