

2020-02

Evaluating the effectiveness of a young driver-education intervention: Learn2Live

Cutello, CA

<http://hdl.handle.net/10026.1/15396>

10.1016/j.trf.2020.02.009

Transportation Research Part F: Traffic Psychology and Behaviour

Elsevier BV

All content in PEARL is protected by copyright law. Author manuscripts are made available in accordance with publisher policies. Please cite only the published version using the details provided on the item record or document. In the absence of an open licence (e.g. Creative Commons), permissions for further reuse of content should be sought from the publisher or author.

Evaluating the Effectiveness of a Young Driver-Education Intervention: Learn2Live

Clara Alida Cutello¹, Elizabeth Hellier¹, Julian Stander² & Yaniv Hanoch³

¹School of Psychology, University of Plymouth, Plymouth, UK

²School of Engineering, Computing and Mathematics, University of Plymouth, Plymouth, UK

³Business School, University of Southampton, Southampton, UK

Correspondence to: Clara Alida Cutello, School of Psychology, University of Plymouth. Email:

clara.cutello@plymouth.ac.uk

Accepted on 13th February, 2020.

Effectiveness of a Young Driver-Education Intervention

Abstract

Road traffic collisions are the leading cause of death among young adults, and behaviour change interventions play a key role in battling this public health concern. Road safety interventions are often educational and have traditionally relied on fear appeals to alter risky driving behaviour - yet there is a paucity of data regarding their effectiveness. Peer-education has been championed as an additional route to promoting safe driving behaviour. To examine these issues, this study evaluated the effectiveness of a fear appeal intervention in improving young drivers' attitudes towards risky driving behaviour. A total sample of 800 high school and college students (16-20 years old) completed a similar set of questionnaires pre- and post-intervention and at a 3-month follow-up. Two different types of follow-up interventions were also compared: a peer-led and an expert-led road safety educational event. Measures evaluating attitudes towards risky driving behaviour were completed at all 3 time frames, and questions regarding the participants' perception of the follow-up event were asked. Overall, our data showed an improvement in attitudes towards risky driving behaviours both immediately after the intervention and three months later. These changes were especially evident among females. With regard to the follow-ups, both were effective in improving the attitudes towards risky driving. However, the peer-led event was preferred by the participants compared to the expert-led follow-up.

Keywords: Young drivers, road safety intervention, evaluation, peer-led education, risky driving

1. Introduction

Every year, road traffic collisions are responsible for approximately 1.3 million deaths worldwide and young drivers aged 16-25 are significantly overrepresented amongst those killed and seriously injured (WHO, 2018). Novice drivers are twice as likely to have a collision compared to drivers aged 40-49 (Department of Transport, 2017) and road deaths account for 25% of deaths amongst 16-25-year olds, compared to 0.5% of deaths in a wider population. Young male drivers, in particular, account for 80% of young driver fatalities compared to 76% of fatalities for all car drivers in 2017 (Department of Transport, 2017). These statistics highlight the need to address road traffic collisions among young drivers, especially among males.

A variety of factors have been proposed to explain the disproportionate representation of young, particularly male, drivers in road traffic collisions (Borowsky et al., 2013; Cestac, Paran, & Delhomme, 2011). Insufficient skills and a lack of driving experience have frequently been regarded as the main causes of accidents in this age group (Fisher, Pollatsek, 2002; Underwood, 2007). In addition, novice drivers, and in particular young male drivers, tend to overestimate their own driving capability and underestimate the probability of being involved in an accident (i.e. optimism bias; Gosselin, Gagnon, Stinchcombe, & Joannis, 2010; Mynttinen, Sundström, Koivukoski, Hakuli, Keskinen, & Henriksson, 2009; Pedruzzi & Swinbourne, 2009). Gender has also been found to predict unsafe driving behaviours (Harré et al., 2000; Turner & McClure, 2003), with young males being more willing to take risks than females (Bina et al., 2006; Catchpole & Styles, 2005; Fergusson et al., 2003; Harré et al., 1996; McEvoy et al., 2006; Oltedal and Rundmo, 2006; Vassallo et al., 2007).

To address the high rate of collision among this age group, researchers have suggested a range of interventions to improve young drivers safe driving and attitudes, specifically through skill-based training (Horswill & McKenna, 2004; Lenné et al., 2011), public initiatives and mass media campaigns

Effectiveness of a Young Driver-Education Intervention

(Wundersitz & Hutchinson, 2012), in-vehicle telematics (Stevenson, Harris, Mortimer, Wijnands, Tapp, Peppard, & Buckis, 2017) and educational interventions (Adamos & Nathanail, 2016; Lawrence & Loreno, 2008; Poulter & McKenna, 2010). However, despite the abundance of schemes, and the increased emphasis on evaluation (Elvik & Vaa, 2004; Hauer, 2007; McKenna, 2010), there is little consensus on which approach(es), if any, are effective in affecting road-user behaviour.

To address this gap in the literature, we evaluated whether a specific road safety intervention was effective in improving young drivers' risky driving behaviour. We also created a peer-led follow-up intervention and compared it to a traditional professional-led follow-up intervention.

1.1. Educational Road Safety Interventions

Educational road safety interventions (RSIs) are the most commonly used approach to attempt to change young drivers' driving behaviours and to promote road safety. Yet, despite their popularity, the effectiveness of educational RSIs is still under debate (Phillips, Ullberg, & Vaa, 2011). Educational RSIs have been shown to reduce young drivers' collision involvement by approximately 9% (Lonero & Mayhew, 2010; Phillips et al., 2010) and reduce young drivers' engagement in risky driving behaviours in the short-term time (King et al, 2008; Nelson et al, 2005). A review on the effectiveness of 13 educational interventions reported that approximately half of them resulted in a positive, albeit small, change in intentions towards risky driving (Hardeman et al., 2002; Poulter & McKenna, 2010). However, Carcary, Power and Murray (2001) investigated the effects of classroom-based interventions and found little evidence to support their efficacy. Educational RSIs have been demonstrated to not only have little effect on the risk of traffic collision involvement, but in some cases they could even increase risky driving by encouraging pre-drivers to obtain their driving license earlier (Williams, Preusser & Ledingham 2009). In support of this claim, some studies have found that young drivers reported riskier attitudes following an educational intervention (Glendon et al, 2014) and thus

Effectiveness of a Young Driver-Education Intervention

suggested that educational RSIs may only serve to enhance young drivers' overestimation of their own driving ability (Brijs et al., 2014). Moreover, some have suggested that educational RSIs lack the anticipated effect because they are of too short a duration to offer much prospect of having a long-term impact on young drivers' risky driving behaviours (Williams & Ferguson, 2002).

One reason why educational RSIs may have limited or mixed effects is because they are oriented towards negatively-framed messages (Job, 1988), specifically focusing young people on the negative consequences of risky driving (i.e. fear appeals). Fear appeals have been widely adopted by health-promotion professional, in a wide a number of contexts, including risky driving (Carey & Sarma, 2011; Jessop et al., 2008). However, there has been a growing concern over the effectiveness of fear appeals. Tannenbaum and colleagues (2015; see also, Lewis, Watson & White, 2008), for example, have argued that fear appeals may be less effective for young males. Specifically, for young thrill-seeking males, the rewarding sensation they anticipate from risky-taking may outweigh the risks, and fear appeal campaigns focusing on risks may therefore have little impact on reducing their risky behaviours (Tannenbaum et al., 2015). Furthermore, fear appeal campaigns have been shown to lead young people to employ defence mechanisms, such as discounting the veracity of the claims, concluding that the campaign bears no personal relevance, or avoiding exposure to the campaign altogether (Ruiter, Abraham & Kok, 2001). Yet, two meta-analytic examinations have reported positive effects of fear appeal campaigns in terms of emotional reactions and conformity to the message's recommendations, even if for a short time (Witte & Allen, 2000; Xu et al., 2015).

Another possible explanation for the diverging results in the success of educational RSIs is that their effect may be dependent on other factors, such as peer influence (Bingham et al., 2016; Simons-Morton et al., 2015). A number of studies have demonstrated that young drivers who reported committing the most road traffic violations were also more likely to report feeling influenced by their

Effectiveness of a Young Driver-Education Intervention

peers in two specific ways: as a means to attain prestige within their social group and by allowing their peers' to influence their driving (Allen & Brown, 2009; Shope, 2006; Silvia, Chein & Steinberg, 2015). If peers play such a prominent role in influencing young drivers' behaviours, they also provide an opportunity to reduce risky driving. If peers discourage risk-taking behaviours and encourage safer behaviours, this might lessen young drivers' engagement in risky driving. The idea of positive peer influence gives rise to peer-led education, which has been defined as "*the teaching or sharing of health information, values and behaviours by members of similar age or status group*" (Sciacca, 1987, p. 2). Peer-led education has been found to increase knowledge, attitudes, and beliefs, and to promote health behaviours compared to adult-led education (Colby & Haldeman, 2007; Mellenby, Ress & Tripp, 2000). Peers play a critical role in the lives of adolescents by serving as formal and informal models of behaviours, and as trusted sources of information (Maxell, 2002; Whitaker & Miller, 2000). Research suggests that peer education draws on the credibility that peers have, and leverages the power of role modelling, compared to teachers, older adults, or "experts", whom they have no affiliation with, and are less therefore influenced by (Beshers, 2007). Despite these findings, very few studies have examined the effectiveness of peer-led education in educational RSIs.

In summary, there is limited evidence to date regarding the efficacy of educational RSIs and the evaluations that have been carried out provide mixed and inconclusive results. Evaluations are therefore vital to enhance our knowledge of the benefits of these interventions. In response, , the current study adds to the literature by evaluating the extent to which a British educational RSI called Learn 2 Live (L2L) might improve young drivers' risky driving behaviours, and by creating and assessing the effectiveness of a peer-led follow-up educational event (Peer2Peer) compared to an adult-led follow-up event (Question Time).

Effectiveness of a Young Driver-Education Intervention

1.2. The Present Study

The current study reports an evaluation of a 1-day educational RSI targeting 16-20-year olds, focusing on their attitudes towards risks driving. Additionally, we compared the effectiveness of the P2P and QT follow-up events. The study sought to evaluate the intervention program using valid and reliable self-report measures with a comparison control sample. Table 1.1 illustrates the study design diagram.

	Pre-Intervention	L2L (a week later)	Post-Intervention (immediately after L2L)	Follow-Up (3 months after L2L)
Intervention Group	Attitudes towards risky driving (1)	Attended L2L	Attitudes towards risky driving (2)	Peer2Peer, Attitudes towards risky driving (3) Evaluation of Follow-up session
				Question time, Attitudes towards risky driving (3) Evaluation of Follow-up session
Control Group	Attitudes towards risky driving (1)	X	X	Attitudes towards risky driving (2)

Table 1.1. The data collection schedule for each group at each time point. X means data was not collected.

1.3. Learn 2 Live

L2L is a traditional fear appeal, with an interactive and multi-agency (firefighters, police, paramedics, victims of road traffic collisions and their families) educational RSI. It aims to personalise the consequences of risky driving in order to improve risk-taking behaviour among young drivers and passengers, aged 16 to 20. This intervention has been running continuously since 2008 and is delivered to approximately 12,000 students per annum in the South West of the UK (Devon & Cornwall). The intervention is structured in the following manner: after a spoken introduction by a firefighter, a DVD is presented showing a group of friends in the moments leading up to and including a collision. As the emergency services begin to arrive the DVD is paused, and a member of each agency comes on stage to recount a personal experience of a collision they have attended. Family members who have lost loved ones in road traffic collisions provide accounts of their loss, and a driver responsible for a

Effectiveness of a Young Driver-Education Intervention

collision recalls the consequences of their actions. Each speaker highlights a particular risk factor involved in the incident, and where possible the collisions of which they speak are local to the area of delivery and involve places or road names the participants will be familiar with, further personalizing the experience.

Three months after the initial presentation the firefighters and the police return to deliver a follow-up session, Question Time (QT), in which they describe their experiences aiding in road traffic collisions and give a presentation on the biggest dangers on the road for young drivers: drink driving, peer pressure, texting and speeding. The aim of the follow-up is to reinforce the messages given during the L2L event and to provide the students with additional evidence regarding the negative consequences of risky driving behaviours.

1.4. Peer2Peer

The peer-led educational event (P2P) was developed as an alternative to QT on the basis of best practice evidence relating to peer education (Buckley & Watson, 2014; Mellanby et al., 2000). Four undergraduate students were recruited as peer leaders, to design and deliver the intervention. The four peer leaders (2 male and 2 females) were undergraduate psychology students who had attended at least one educational RSI, were geographically proximal to the colleges being studied and had an interest in safe driving. The aim of the P2P event, like QT, was to describe the four biggest dangers for young novice drivers on the road (i.e. drink driving, negative peer influence, distractions & speeding). The peer leaders designed tasks to communicate these themes. They were given road safety educational material and factual content to furnish the activities they designed. The peer leaders created four activities. A road safety quiz with multiple-choice answers was presented at the beginning of the event. The aim of the quiz was to engage participants with the idea of safety on the road, using a relaxed but

Effectiveness of a Young Driver-Education Intervention

informative approach. Example questions included: “*Imagine yourself in the pub with your mates. If you drank 4 pints of 5% strength beer, 3 Large glasses of wine or 4 doubles of regular strength spirits and went to bed at midnight, what time would you be legally allowed to drive the next day?*”. After the road safety quiz, the peer leaders divided the participants into 3 groups, each group performing three further activities (beer goggles, a speeding game and an off-the-shelf road safety video game). At the end of the event, the peer leaders discussed the main themes of the event and recalled personal experiences related to driving. The experiences related by the peer leaders were negative but did not have tragic consequences. As an example, they recalled being arrested while driving under the influence, falling asleep at the wheel with their sibling in the car and driving while texting.

Based on the reviewed literature it was hypothesized that:

- (a) Participants who attended the L2L intervention would exhibit a decrease in their attitudes towards risky driving, compared to the control group;
- (b) Females would show a greater attitudinal change compare to males who attended the L2L intervention program;
- (c) Participants who attended the peer-led follow-up would report a bigger decrease in their attitudes towards risky driving compared to the participants who attended the adult-led follow-up.

2. Methods

2.1. Participants

The intervention group was made up of students attending the Learn2Live event. 1,465 Year 12 students attended the L2L presentation evaluated in this study. Of those, a total of 800 students from Further Education Colleges (i.e. education in addition to that received at secondary school) aged 16-20

Effectiveness of a Young Driver-Education Intervention

($M= 16.64$; $SD= 1.01$) completed the pre-intervention. Of the 800 responses from pre-intervention, 145 provided complete data sets at follow-up.

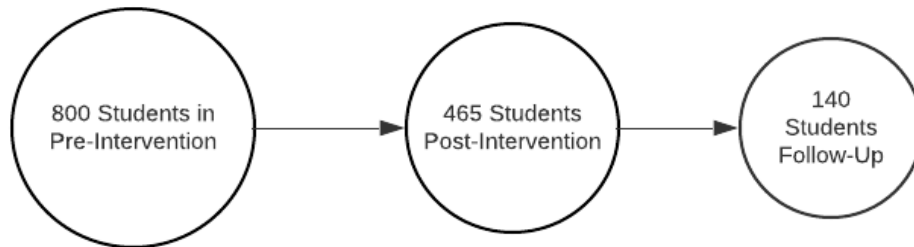


Figure 1.1. Flow chart of the number of participants in the Intervention Group.

Participants were fairly distributed across gender ($M= 349$; $F=451$). In addition, there were no age differences between the groups for either females (intervention $n=45$: $M= 16.7$, $SD = 1.04$; control $n=45$: $M= 16.9$, $SD=0.62$) or for males (intervention $n= 349$: $M= 16.7$, $SD = 0.99$; control $n= 21$, $M= 16.7$, $SD = 0.66$). The control group was made up of students from Further Education Colleges that did not attend the L2L presentation or any other RSI during the time period of the study. For these schools, an educational RSI was scheduled for later in the academic year. 66 students completed the pre-intervention questionnaire ($M= 21$; $F=45$) and 66 completed the follow-up ($M=21$; $F=45$).

The colleges that agreed to participate in the study were all located in the South-West of the UK and the colleges' population had similar demographic and socioeconomic backgrounds.

2.2. Materials

Attitudes towards risky driving and future intentions to drive safely. At each time point attitudes towards risky driving behaviour were assessed using 12 statements, based on the Theory of Planned Behaviour (TPB; Ajzen & Fishbein, 1980), adapted from Burgess et al. (2011). Participants were asked to indicate the extent to which they agreed with each of the statements on a 5-point Likert scale where 1= *strongly agree* and 5= *strongly disagree*. An example statement was “*I think distracting the*

Effectiveness of a Young Driver-Education Intervention

driver in any way could result in a serious crash". Subsequently eight road traffic scenarios, each detailing a specific risky driving situation (drink driving, speeding, seat belt use, overtaking, distraction, peer-influence, texting while driving and night-time driving) were presented. For each scenario, participants were presented with a list of 6 six statements based on the TPB (Ajzen & Fishbein, 1980). The 6 six statements measured behavioural intentions, perceived behavioural control, behavioural beliefs, social norms of friends, social norms of family and regret. Participants had to rate on a Likert scale where 1 = *strongly agree* and 5 = *strongly disagree*, the extent to which they agreed or disagreed with each of the statements. See Table 1.2 for an example.

It's Friday evening and your friend picks you up to go to a house party. While driving down a quiet country road their phone starts to vibrate. Incoming call: Dad. "He'll want to know what time I'm coming home" your friend says sighing and reaches to answer the phone.
<i>Please tell us to what extent you agree or disagree with the following statements:</i>
1. I would ask my friend not to answer their phone while driving
2. My family would approve of me asking my friend not to answer their phone while driving
3. I would regret not asking my friend to ignore their mobile phone whilst driving
4. It would be difficult for me to ask my friend not to answer their phone whilst driving
5. If I asked my friend not to answer their phone, he/she would listen to me and do what I asked
6. My close friends would approve of me asking my friend not to answer their phone while driving

Table 1.2. Example of a road traffic scenario and the list of six statements based on the TPB.

Cronbach's alphas for each of the TPB subscales [behavioural intentions, perceived behavioural control, behavioural beliefs, social norms of friends, social norms of family, and regret] ranged from .61 to .97, across the data collection points, indicating good and very good reliability for all measures.

Evaluation of Follow-Up Sessions 7 statements regarding the effectiveness of the follow-up were presented. Participants were asked to indicate how much they agreed/ disagreed with the statements on a 5-point Likert scale where 1 = *strongly agree* and 5 = *strongly disagree*. Example statements were:

Effectiveness of a Young Driver-Education Intervention

“Do you think today’s session will make you a safe driver?” or “How likely are you to tell a friend about what you have learned today?”.

2.3. Procedure

Prior to its commencement, the study was approved by the authors’ University Human Research Ethics Committee and the required ethical guidelines were adhered to throughout.

Pre-intervention Local schools/colleges that had already consented to participate in the L2L intervention run by the Devon County Council (UK) were contacted, informed of the research and invited to participate. In order to maximise response rates each school/college was given the opportunity to receive paper-based copies of the questionnaire and/or access to a web link containing an online version. The Head of Year informed the students’ parents of the nature and the design of study, asked the parents’ approval and to provide signed consent of their acknowledgement. Three weeks prior to the L2L event, the researcher provided each Head of Year with either an online link or the paper-based pre-intervention (T1) questionnaire to distribute to the students. Before the students were allowed to complete the pre-intervention, they were asked to read information regarding the design of the study.

Post-intervention Immediately after attending the L2L event, the students were invited to remain seated and complete a paper-based post- intervention (T2) questionnaire.

Follow-Up 3 month after the L2L event, the participants were invited to complete the paper-based follow-up (T3) questionnaire. Next, the participants were randomly allocated to either the P2P or the QT follow-up. At the end of the follow-ups the participants were also asked to complete the Evaluation of the follow-up session questionnaire.

Effectiveness of a Young Driver-Education Intervention

The control group were contacted and invited to participate in a research on young driver safety. They were provided with details about the time-frame and voluntary nature of the study, and were asked to confirm if students would be attending any other road safety event during the course of the study's time-frame. Participants completed the questionnaires only in two occasions (T1; T3) separated by a period of three months, with no road safety intervention nor follow-up sessions occurring between the two data collection points.

2.4. Statistical Analysis

The internal consistency of the Attitudes towards risky driving and future intentions to drive safely questionnaire was determined by calculating the Cronbach's α scores for the items of each domain. To test the effectiveness of the intervention, we conducted a Friedman's analysis of variance (ANOVA) on participants' attitudes towards risky driving, with gender and groups as between-subject variables and time of the intervention as within-subject variable. Tukey HSD post hoc comparison was then used to gain further insight on the differences between gender, groups and time of the intervention on participants' attitudes towards risky driving. To test the effectiveness of the follow-up sessions, we conducted a Friedman's analysis of variance (ANOVA) on participants' evaluation of the follow-up sessions. We used an α level of .05 for all our analyses. Furthermore, all analyses were performed in R version 2.15.3.

3. Results

3.1. The effectiveness of the L2L event

Firstly, we examined the effectiveness of the L2L intervention program by considering the impact of the event on attitudes and behavioural intentions. The mean of the summed scores of the attitudes towards risky driving questionnaire was used in the analysis. Higher scores represent riskier attitudes

Effectiveness of a Young Driver-Education Intervention

towards risky driving.

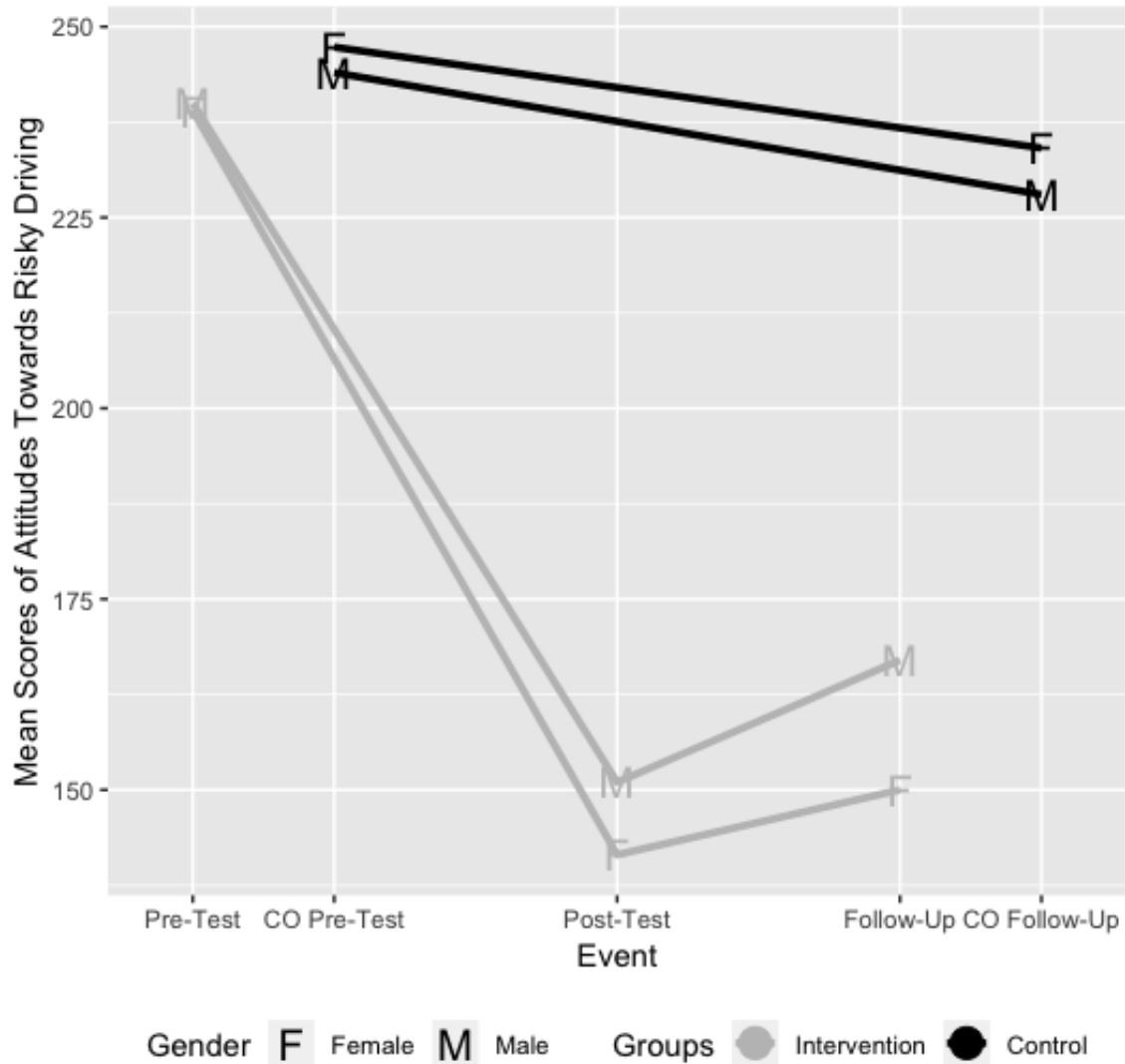


Figure 1.2. Significant main effects of Time and Gender on overall attitudes towards risky driving (intervention group).

A 2x2x3 mixed model ANOVA was used to investigate the effect of the intervention, gender and time of testing on changes to the sum attitudes towards risky driving questionnaire scores. The between-subject variables were 'Group' (Interventions vs control) and 'Gender' (male vs female). The within-group variable 'Time' had 3 levels (pre-test, post-test, and follow-up). A significant three way interaction was found between Time, Gender and Groups $F(1, 1512) = 7.009, p < .001$. There was also

Effectiveness of a Young Driver-Education Intervention

a significant interaction between Time and Gender $F(2, 1512) = 10.662, p < .001$; Time and Groups $F(1, 1512) = 373.696, p < .001$; and finally between Gender and Groups $F(1, 1512) = 5.256, p < .001$. Tukey HSD post-hoc comparison revealed a significant pre-to-post intervention improvement in participants' attitudes towards risky driving ($p < 0.001$). Moreover, the improvement was maintained over time at follow-up ($p < 0.001$), even if the participants reported a deterioration in their attitudes towards risky driving compared to the post-intervention. Nevertheless, there was a significant difference between the Control group and the Intervention group at follow-up ($p < .001$).

Variable	Intervention			Control	
	Pre-Intervention mean (SD)	Post-Intervention mean (SD)	Follow- Up mean (SD)	Pre-Intervention mean (SD)	Follow-Up mean (SD)
Attitudes towards risky driving – Mean Total	238.7 (14)	147.6 (23.2)	156.7 (26.3)	244.8 (13.8)	231.6 (11.6)
Behavioural Intentions	34.2 (3.4)	23.7 (2.8)	24.6 (2.9)	33.8 (3.1)	28.4 (2.2)
Perceived Behavioural Control	30.6 (3.7)	20.9 (4.4)	22.4 (4.4)	33.3 (2.5)	33.3 (3.3)
Behavioural Beliefs	37.1 (3.8)	21.9 (4)	22.7 (4)	36 (3.3)	31 (2.3)
Social Norms of Friends	31 (3)	24.5 (3.5)	25.6 (3.9)	31.4 (2.4)	35.9 (3.3)
Social Norms of Family	39.2 (5.8)	15.8 (5)	17.4 (5.5)	40.7 (5.4)	33.4 (3.9)
Regret	35.3 (4.6)	18.3 (5.7)	20.1 (6.2)	37.3 (5)	37.3 (3)

Table 1.3. Descriptive statistics for participants' scores on the sum of attitudes towards risky driving, and on each of the TPB component scores. The scores are split by groups.

Next, we examined whether there were gender differences. Tukey HSD post hoc comparison revealed that there was only a significant gender difference in the intervention group at post-intervention ($p < .001$), with females reporting a greater improvement in attitudes towards risky driving compared to males. Moreover, there was a significant difference between male students at post-intervention and at follow-up ($p < .001$), where the males reported a worsening in their attitudes towards risky driving over the course of the 3 months.

Effectiveness of a Young Driver-Education Intervention

Variable	Intervention						Control			
	Pre-Intervention mean (SD)		Post-Intervention mean (SD)		Follow- Up mean (SD)		Pre-Intervention mean (SD)		Follow-Up mean (SD)	
	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males
Attitudes towards risky driving – Mean Total	238.2 (13.7)	239.5 (14.4)	143.1 (20.6)	152 (24.7)	150.6 (25.7)	164.2 (25.4)	243.8 (13.6)	245.2 (14)	239.7 (11)	240.1 (11.8)
Behavioural Intentions	34.3 (3.4)	34 (3.4)	23.4 (2.5)	23.9 (3.1)	24.2 (3)	25.1 (2.8)	34.1 (3)	33.7 (3.2)	28.5 (2.2)	28.1 (2.3)
Perceived Behavioural Control	30.5 (3.7)	30.7 (3.7)	20.3 (4.2)	21.5 (4.6)	21.5 (4)	23.4 (4.3)	32.9 (2)	33.6 (2.5)	33.7 (3.4)	32.4 (3.1)
Behavioural Beliefs	37.2 (3.7)	37 (3.8)	21.5 (3.9)	22.3 (4.1)	21.9 (3.7)	23.6 (4.2)	35.3 (3)	36.4 (3.2)	31.1 (2.4)	30.9 (2.1)
Social Norms of Friends	30.8 (2.9)	31.2 (3)	24 (3.4)	25 (3.6)	24.9 (4.2)	26.4 (3.3)	31.5 (1.8)	31.3 (2.6)	36.4 (3.2)	35.0 (3.4)
Social Norms of Family	39.8 (5.8)	38.3 (5.6)	14.9 (4.5)	16.6 (5.2)	16.2 (5.1)	18.9 (5.6)	40.9 (5.1)	40.7 (5.6)	33.6 (3.8)	32.9 (4.2)
Regret	35.1 (4.6)	35.5 (4.6)	17.3 (5.3)	19.4 (5.9)	18.7 (5.6)	21.9 (6.4)	36.7 (5)	37.5 (5.1)	37.4 (2.9)	37.1 (3.1)

Table 1.4. Descriptive statistics for participants' scores on the sum of attitudes towards risky driving, and on each of the TPB component scores. The scores are split by gender.

3.3. The Effectiveness of the Follow-ups

A 2x2 ANOVA was conducted to investigate the effect of follow-ups and gender on students' attitudes towards risky driving. The between-subject variable was 'Gender' (male vs females). The within-subject variable was 'Session Attended' (P2P vs QT). The mixed ANOVA did not show any interaction between gender and session attended $F(1,136) = 0.1460$, $p=0.7$. The ANOVA also showed a non-significant difference of session attended $F(1,136)= 1.1138$, $p=0.2$. However, there was a significant effect of gender $F(1,136)=8.9565$, $p<.01$, where male students reported riskier attitudes towards risky driving in both follow-ups compared to the female students.

Effectiveness of a Young Driver-Education Intervention

Furthermore, a 2x2 ANOVA was performed to assess how the students evaluated the follow-up sessions, by using the mean summed scores of the evaluation of the follow-up questionnaires. The ANOVA reported a significant difference only of the Session Attended $F(1,136)=11.9203$, $p<.01$. Specifically, the participants evaluated the Peer2Peer as preferred when compared to the Question Time follow-up.

4. General Discussion

With a considerate amount of young adults being killed or injured in road traffic collisions, identifying interventions that are effective is of paramount importance. Yet, despite the prevalence of young driver road safety interventions worldwide, there are very few evaluations of which intervention works, with L2L representing such an example. The aim of the present study was to evaluate the effectiveness of the L2L road safety intervention and evaluate the success of two different follow-ups, on young drivers' self-reported attitudes towards risky driving. The prediction that participants who attended the L2L intervention would report a decrease in their risk attitudes at post- intervention was corroborated by the data: both males and females reported safer attitudes after attending the intervention, specifically with females reporting much safer attitudes compared to males. Furthermore, the attendees maintained safer attitudes over time, reporting safer attitudes after 3 months compared to the control group.

Furthermore, our data showed that males who attended the L2L intervention reported less improvement in their attitude to risk, in accordance with our prediction. In fact, females showed safer attitudes not only immediately after attending L2L but also 3 months later. In contrast, males reported riskier attitudes 3 months later compared to immediately after the L2L event. Thus, while females retained the benefits of the L2L educational intervention over time, males only exhibited an immediate

Effectiveness of a Young Driver-Education Intervention

impact. These findings are important for at least two reasons. First, it reveals that intervention programs do not affect participants equally. That is, focusing on the overall data would have suggested that the intervention program was successful in changing attitudes among all participants. Yet, a closer look at the results reveal that the promising results were driven predominantly by the female participants. More importantly, it illustrates that the high risk group—namely, males—are less susceptible to this particular intervention program. This highlights the need to develop bespoke programs to address the high risk drivers.

The results presented are in line with previous research (Hoekstra & Wegman, 2011; Tannenbaum et al., 2015; Wauters & Brengman, 2013), which found that fear appeal campaigns are successful at influencing attitudes, intentions, and behaviours. Moreover, as with research by Laapotti and Keskinen (2004; see also, Mynttinen et al. 2009) we found that the intervention appeared to be more successful in improving females' attitudes and intentions. Given that young males tend to be higher sensation seekers (Cross et al., 2013), and less likely to respond to fear-appeal-style persuasion (Lewis et al., 2007), this may explain why they were less likely to report improved attitudes after the intervention. Alonso et al., (2019) also found that males are more directed/permissive towards aggressive behaviours compared to women, which provides further evidence on the differences in young people's risk perception. Furthermore, previous studies have found that females are more likely than males to feel that safety messages are relevant and effective for them (Glendon & Walker, 2013) and there is some evidence that fear appeals are more effective for females than for males (Goldenbeld, Twisk & Houwing, 2008; Tay & Ozanne, 2002). Tay and Ozanne (2002) evaluated an Australian road safety intervention and found that young females and older males (aged 35 – 54) had reduced collision rates following the intervention, but the main target group – young males – remained unaffected. Therefore, the present findings nicely match previous studies concerning young females'

Effectiveness of a Young Driver-Education Intervention

responses to fear appeals and it might be that they responded well because they felt personally involved in the messages that were conveyed.

In line with the Extended Parallel Process Model (EPPM; Witte, 1992) it might be that the females perceived the threat of risky driving to be high following the L2L intervention but also perceived themselves able to behave in line with the messages conveyed. Further to this, although we found some safer intentions amongst the males who attended the L2L intervention, it can be debated that young male drivers recognize that fear appeal style interventions are trying to scare them (Cohn, 1998) and this might lead them in a “rebound effect”. They know that they are trying to be scared into changing their behaviour, and as a result may rebel against the expected outcome (Glendon & Walker, 2013; Nestler & Egloff, 2010).

The results of this study did not support the hypothesis that participants who attended the Peer2Peer follow-up would report a bigger decrease in their attitudes towards risky driving compared to the Question Time follow-up. There were slight differences between the two follow-ups, where the students in the Question Time follow-up reported safer attitudes compared to those attending the Peer-led educational follow-up. However, their scores were not significantly different, so this study cannot provide conclusive support for the use of such peer-led education interventions in deterring risky driving behaviour. However, the peer-led educational event was globally preferred by the students compared to the adult-led event. This result could help give more insight on what students overall prefer and, therefore, what could potentially influence them to perform safer in-car behaviours.

The results should be understood within the limitations of the study. All the measures were self-reported, thus raising concern that the possibility of social desirability influences could not be accounted for. However, this study has road safety practice implications. The evaluation reported that participation in the educational RSI was associated with safer attitudes and intentions to behave safely

Effectiveness of a Young Driver-Education Intervention

in a car both short-term and long-term. The results suggest that whilst the intervention may be effective in improving young females' attitudes towards risky driving an alternative approach may be necessary to better engage young males. The young males in this study were less affected by the fear-inducing threats of long-term negative consequences. One option could be to design and introduce combined interventions with both expert speakers and peer leaders, which might make young male's attitudes towards risky driving safer. An alternative approach would be to investigate different types of intervention altogether to target young male drivers and, thus, aid at narrowing the gender gap in young novice drivers.

5. Acknowledgments

We would like to thank the participating schools and the students for allowing us to collect data for this study. We also would like to thank the Devon County Council, the Devon and Somerset Fire and Rescue service as well as all the firefighters, police, paramedics and survivors of road traffic collisions and their families for their considerable cooperation and for telling their stories.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Ajzen, I. (1985). "From Intentions to Actions: A Theory of Planned Behavior", in *Action Control: From Cognition to Behavior*, J. Kuhl and J. Beckmann (eds.), Springer Verlag, New York.
- Adamos, G., & Nathanail, E., (2016). Predicting the effectiveness of road safety campaigns through alternative research designs. *Journal of Safety Research*, 59, 83- 95 doi: 10.1016/j.jsr.2016.10.003

Effectiveness of a Young Driver-Education Intervention

- Allen, J. P., & Brown, B. B., (2008). Adolescents, peers, and motor vehicles: The perfect storm? *American Journal of Preventive Medicine*, 35(3 Suppl), S289-S293
- Alonso, F., Esteban, C., Montoro L., & Serge, A., (2019). Conceptualization of aggressive driving behaviors through a Perception of aggressive driving scale (PAD). *Transportation Research Part F: Traffic Psychology and Behaviour*, 60, 415-426
<https://doi.org/10.1016/j.trf.2018.10.032>
- Beshers, S.C., (2008). Where Are the Guys in Peer Education? A Survey of Peer Education Programs Related to Adolescent Sexual Health in New York State. *American Journal of Sexuality Education* 3, 3, 277-294
- Bina, M., Graziano, F., Bonino, S., (2006). Risky driving and lifestyles in adolescence. *Accident Analysis and Prevention* 38, 472–481
- Bingham, C. R., Simons-Morton, B. G., Pradhan, A. K., Li, K., Almani, Falk, E. B., Shope J. T., Buckley L., Ouimet, M.C., & Albert, P.S., (2016). Peer passenger norms and pressure: Experimental effects on simulated driving among teenage males. *Transportation Research Part F: Traffic Psychology and Behaviour*, 41(A), 24-137
- Borowsky, A., & Oron-Gilad, T. (2013). Exploring the effects of driving experience on hazard awareness and risk perception via real-time hazard identification, hazard classification, and rating tasks. *Accident Analysis and Prevention*, 59, 548 – 565
- Brijs, K., Cuenen, A., Brijs, T., Ruiter, R.A.C., Wets, G. (2014). Evaluating the effectiveness of post-license education program for young novice drivers in Belgium. *Accident Analysis and Prevention* 66, 62-71.
- Buckley, L., & Watson, B., (2014). Best practice in peer-led curriculum content: informing an interactive program to improve passenger safety among high school seniors. In

Effectiveness of a Young Driver-Education Intervention

- Proceedings of the 2014 Australasian Road Safety Research, Policing and Education Conference, Grand Hyatt, Melbourne, VIC
- Burgess, C. (2011). An evaluation of the Learn2Live Road Safety Intervention for Young People. Retrieved from http://people.exeter.ac.uk/cnwburge/pages/2011_Executive_summary.pdf;
- Carey, R. N., & Sarma, K. M. (2011). The impact of threat appeal messages on risky driving intentions: A Terror Management Theory perspective. *Journal of the Australasian College of Road Safety*, 22(4), 51-56. Retrieved from: <http://acrs.org.au/wp-content/uploads/ACRS-Journal-22- No54.pdf#page=53>.
- Carcary, W.B., Power, K.G., Murray, F.A., (2001). *The New Driver Project*. Scottish Executive Central Research Unit, Edinburgh.
- Catchpole, J., Styles, T., (2005). Young drivers: Who takes risks and why? ARRB Group Ltd, Vermont South, Victoria
- Cestac, J., F. Paran, F., & Delhomme, P., (2011). Young Drivers' Sensation Seeking, Subjective Norms, and Perceived Behavioral Control and Their Roles in Predicting Speeding Intention: How Risk-Taking Motivations Evolve with Gender and Driving Experience. *Safety Science*, 49, 424-432
- Colby, S.E., & Haldeman L., (2007). Peer-led theater as a nutrition education strategy. *Journal of Nutrition Education and Behavior*, 39: 48-9
- Cohn, Jason. (1998). Don't just say no—Berkeley research Dr. Joel Brown questions effectiveness of the federal government's anti-drug education program, San Francisco Bay Guardian, August 5, 1998. Retrieved April 10, 2009, from: www.cerd.org/press/press03.html.
- Cross, C. P., Cyrenne, D. L., & Brown, G. R. (2013). Sex differences in sensation-seeking: a meta-analysis. *Scientific Reports*, 3, 24-86

Effectiveness of a Young Driver-Education Intervention

Department of Transport. (2017). Annual Report and Accounts 2017 to 2018. Retrieved from:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/741685/dft-annual-report-18-tagged.pdf

Delhomme, P., De Dobbeleer, W., Forward, S., Simões, A., (2009). Manual for Designing, Implementing, and Evaluating Road Safety Communication Campaigns, Directorate-General for Energy and Transport, European Commission, Brussels

Elliott, M.A. (2004). The attitudes and behaviour of adolescent road users: An application of the theory of planned behaviour. TRL Report TRL601. Crowthorne: TRL Limited

Elvik, R., & Vaa, T. (2004). The Handbook of road safety measures. Amsterdam: Elsevier

Fergusson, D.M., Swain-Campbell, N., Horwood, J., (2003). Risky driving behaviour in young people: Prevalence, personal characteristics and traffic accidents. *Australian and New Zealand Journal of Public Health*, 27, 337–342

Fisher, D. L., Laurie, N. E., Glaser, R., Connerney, K., Pollatsek, A., Duffy, S. A., et al. (2002). Use of a fixed-base driving simulator to evaluate the effects of experience and PC-based risk awareness training on drivers' decisions. *Human Factors*, 44, 287–302.

Forward, S. (2010). Influencing and changing driver behaviour. In: *Moving towards more effective road safety campaigns*, Kibedi-Varga, L., Budimpešta: Premium Relations Communications Consulting Ltd.

Forward, S., Kazemi, A. (Ed.) (2009). *A theoretical approach to assess road safety campaigns: Evidence from seven European countries*. Belgian Road-Safety Institute: Brussels, Belgium.

Glendon, A.I., McNally Jarvis, A., Chalmers, S.L., & Salisbury, R.L. (2014). Evaluating a novice driver and pre-driver road safety intervention. *Accident Analysis and Prevention*, 64, 100 –

Effectiveness of a Young Driver-Education Intervention

- Glendon, A. I., & Walker, B. L. (2013). Can anti-speeding messages based on protection motivation theory influence reported speeding intentions? *Accident Analysis and Prevention*, 57, 67–79
doi:10.1016/j.aap.2013.04.004
- Goldenbeld, C., Twisk, D. A. M., & Houwing, S. (2008). Effects of persuasive communication and group discussions on acceptability of anti-speeding policies for male and female drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, 11(3), 207–220
- Gosselin, D., Gagnon, S., Stinchcombe, A., & Joanisse, M. (2010). Comparative optimism among drivers: An intergenerational portrait. *Accident Analysis and Prevention*, 42, 734-740
- Hardeman, W., Johnston, M., Johnston, M., et al. (2002) Application of the theory of planned behaviour in behaviour change interventions: A systematic review. *Psychology and Health*, 17, 123-158. doi:10.1080/08870440290013644a
- Hauer, E. (2007). A case for evidence-based road safety delivery. American Automobile Association Foundation for Traffic Safety
- Harre, N. (2000). Risk Evaluation, Driving, and Adolescents: A Typology. *Developmental Review*, 20, 206 – 226
- Harré, N., Field, J., Kirkwood, B., (1996). Gender differences and areas of common concern in the driving behaviors and attitudes of adolescents. *Journal of Safety Research*, 27, 163–173
- Hoekstra, T., & Wegman, F., (2011) Improving the effectiveness of road safety campaigns: Current and new practices. *IATSS Research* 34 (2011) 80–86
- Horswill, M. S., & McKenna, F. P. (2004). Drivers' hazard perception ability: situation awareness on the road. In S. Banbury and S. Tremblay (eds.). *A Cognitive Approach to Situation Awareness: Theory and Application*. Aldershot; Ashgate Publishing, 155-175
- Jessop, D. C., Albery, I. P., Rutter, J., & Garrod, H. (2008). Understanding the impact of

Effectiveness of a Young Driver-Education Intervention

mortality-related health-risk information: A terror management theory perspective.

Personality and Social Psychology Bulletin, 34(7), 951-964. doi:

10.1177/0146167208316790

Job, R.F.S. (1988). Effective and Ineffective Use of Fear in Health Promotion Campaigns. *American Journal of Public Health*, 78, 163 – 167.

King, K.A., Vidourek, R.A., Love, J., Wegley, S., Alles-White, M. (2008). Teaching adolescents safe driving and passenger behaviours: Effectiveness of the You Hold the Key Teen Driving Countermeasure. *Journal of Safety Measure*, 39, 19 – 24

Laapotti, S., Keskinen, E., & Rajalin, S. (2003). Comparison of young male and female drivers' attitude and self-reported traffic behaviour in Finland in 1978 and 2001. *Journal of Safety Research*, 34(5), 579-587 <http://dx.doi.org/10.1016/j.jsr.2003.05.007>

Lenné, M. G., Liu, C. C., Salmon, P. M., Holden, M., & Moss, S. (2011). Minimising risks and distractions for young drivers and their passengers: An evaluation of a novel driver– passenger training program. *Transportation research part F: Traffic Psychology and Behaviour*, 14(6), 447-455

Lewis, I., Watson, B., & White, K., (2008). An examination of message-relevant affect in road safety messages: should road safety advertisements aim to make us feel good or bad? *Transportation Research Part F: Traffic Psychology and Behaviour*, 11(6), 403-417

Lawrence, P., & Lonero, M.S., (2008). Trends in Driving Education and Training. *American Journal of Preventive Medicine*, 35(3), 316-323.

Lonero, L., & Mayhew, D., (2010). Review of the literature on driver education evaluation 2010 update. *AAA Foundation for Traffic Safety* Retrieved from

<https://www.aaafoundation.org/sites/default/files/LSEDElitReview.pdf>

Effectiveness of a Young Driver-Education Intervention

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors.

Journal of Youth and Adolescence, 31(4), 267-277

McEvoy, S.P., Stevenson, M.R., Woodward, M., (2006). The impact of driver distraction on road safety: Results from a representative survey in two Australian states. *Injury Prevention* 12, 242–247

McKenna, F. P. (2010). Education in road safety. Are we getting it right? Report number 10/113.

RAC Foundation

Mellanby, A.R., Rees, J.B., & Tripp, J.H., (2000). Peer-led and adult-led school health education: a critical review of available comparative research. *Health Education Research*, 15: 533-45

Mynttinen, S., Sundström, A., Koivukoski, M., Hakuli, K., Keskinen, E., & Henriksson, W. (2009).

Are novice drivers overconfident? A comparison of self-assessed and examiner-assessed driver competences in a Finnish and Swedish sample. *Transportation Research Part F: Traffic Psychology and Behaviour*, 12, 120 –130

Nelson, E., Leibenluft, E., McClure, E., & Pine, D., (2005). The social re-orientation of adolescence:

A neuroscience perspective on the process and its relation to psychopathology. *Psychological Medicine*. 35, 163–174.

Nestler, S., & Egloff, B. (2010). When scary messages backfire: Influence of dispositional cognitive

avoidance on the effectiveness of threat communications. *Journal of Research in Personality*, 44, 137–141

Oltedal, S., Rundmo, T., (2006). The effects of personality and gender on risky driving behaviour and accident involvement. *Safety Science*, 44, 621–628

Pedruzzi, R., and Swinbourne, A.L. (2009) "It won't happen to me:" optimism, biases, and recall of road-risk information. In: Proceedings of the Australian College of Road Safety

Effectiveness of a Young Driver-Education Intervention

- Conference, pp. 1-12. From: *Australian College of Road Safety Conference 2009: road safety 2020: smart solutions, sustainability, vision*, 5-6 November 2009, Perth, WA, Australia
- Philips, R.O., Ullberg, P., & Vaa, T., (2010). Meta-analysis of the effect of road safety campaigns on accidents. *Accident Analysis and Prevention*, 43 (3), 1204-1218, [10.1016/j.aap.2011.01.002](https://doi.org/10.1016/j.aap.2011.01.002)
- Poulter, D., & McKenna, F., (2010). Evaluating the effectiveness of a road safety education intervention for pre-drivers: An application of the Theory of Planned Behaviour. *British Journal of Educational Psychology*, 80, 163-181
- Ruiter, R. A. C., Abraham, C., & Kok, G. (2001). Scary warnings and rational precautions: A review of the psychology of fear appeals. *Psychology and Health*, 16(6), 613-630.
<http://dx.doi.org/10.1080/08870440108405863>
- Sciacca, J.P., (1987). Student peer health education: a powerful yet inexpensive helping strategy. *The Peer Facilitator Quarterly*, 5: 4-6.
- Shope, J.T., (2006). Influences on youthful driving behavior and their potential for guiding interventions to reduce crashes. *Injury Prevention*, 12, 9-14.
- Silva, K., Shulman, E., Chein, J., & Steinberg, L. (2015). Peers increase late adolescents' exploratory behavior and sensitivity to positive and negative feedback. *Journal of Research on Adolescence*, 26(4), 696-705
- Simons-Morton, B. G., Ouimet, M. C., Chen, R., Klauer, S. G., Lee, S. E., Wang, J., & Dingus, T. A. (2012). Peer influence predicts speeding prevalence among teenage drivers. *Journal of Safety Research*, 43(5-6), 397-403
- Stevenson, M., Harris, A., Mortimer, D., Wijnands, J.S., Tapp, A., Peppard, F., & Buckis, S. (2017). The effects of feedback and incentive-based insurance on driving behaviours: study

Effectiveness of a Young Driver-Education Intervention

- approach and protocols. *Injury Prevention* ePub(ePub): ePub
- Tannenbaum, M. B., Hepler, J., Zimmerman, R. S., Saul, L., Jacobs, S., Wilson, K., & Albarracín, D. (2015). Appealing to fear: A meta-analysis of fear appeal effectiveness and theories. *Psychological Bulletin*, *141*(6), 1178-204
- Tay, R., & Ozanne, L. (2002). Who are we scaring with high fear road safety campaigns? *Asia Pacific Journal of Transport*, *4*, 1-12
- Thompson, L.E., Barnett, J.R., & Pearce, J.R. (2008). Scared straight? Fear-appeal anti-smoking campaigns, risk, self-efficacy and addiction. *Health, Risk and Society*, *11*(2), 181-196.
- Turner, C., & McClure, R. (2003). Age and gender differences in risk taking behaviour as an explanation for high incidence of motor vehicle crashes as a driver in young males. *Injury Control and Safety Promotion*, *10*, 123-130.
- Underwood, G. (2007). Visual attention and the transition from novice to advanced driver. *Ergonomics*, *50*, 1235–1249.
- Vassallo, S., Smart, D., Sanson, A., Harrison, W., Harris, A., Cockfield, S., McIntyre, A., (2007). Risky driving among young Australian drivers: Trends, precursors and correlates. *Accident Analysis and Prevention* *39*, 444-458.
- Wauters, B., & Brengman, M., (2013). The Effect of Priming on the Effectiveness of Threat Appeals. *Contemporary Management Research*, *9*(1), 47-66
- Williams, A. F., & Ferguson, S. A. (2002). Rationale for graduated licensing and risks it should address. *Injury Prevention*, *8*(Suppl. II), 9 – 16
- Williams, AF, Preusser, DF, Ledingham, KA (2009) Feasibility Study on Evaluating Driver Education Curriculum. Washington, DC: National Highway Traffic Safety Administration
- Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public

Effectiveness of a Young Driver-Education Intervention

health campaigns. *Health Education and Behavior*, 27, 591–615.

<http://dx.doi.org/10.1177/109019810002700506>

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model.

Communication Monographs, 59(4), 329-349.

<http://dx.doi.org/10.1080/03637759209376276>

Whitaker, D. J., & Miller, K. S. (2000). Parent-adolescent discussions about sex and condoms

impact on peer influences of sexual risk behavior. *Journal of Adolescent Research*, 15(2), 251-273.

WHO (2018). Global Status Report on road safety 2018. Geneva: World Health Organization.

Retrieved from: https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/

Wundersitz L. N., & Hutchinson T. P. (2012). Risky behaviours - Preferable to crashes for

evaluating road safety mass media campaigns? Australasian College of Road Safety "A Safe System: expanding the reach", Sydney, 9-10 August.

Xu, X., Alexander, R. L., Jr., Simpson, S. A., Goates, S., Nonnemaker, J. M., Davis, K. C., &

McAfee, T. (2015). A cost-effectiveness analysis of the first federally funded anti-smoking campaign. *American Journal of Preventive Medicine*, 48, 318 –325.

<http://dx.doi.org/10.1016/j.amepre.2014.10.011>