Distraction in road-safety interventions.

Challenging social norms without using 'fear appeal'

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The purpose of this paper is to propose an alternative to 'traditional, fear-appeal' approaches in pre-drivers' road safety education. Using positive reframing, interactive games, self-reflective techniques and normalisation of positive behaviour, the pilot intervention successfully challenges two behind-the-wheel-distraction related social norms. Social norms are identified in recent psychology and behavioural literature as a key factor in determining and influencing young people's behaviour (Gerrard, et al., 2008; Carter, et al., 2014). Traditional interventions often use 'fear appeal' techniques to tackle social norms, but these are techniques not proven to work and are more frequently contested. This paper presents results from a pilot which explores and evaluates alternative behaviour change techniques adapted for the target group. Special sessions (incorporating behavioural change techniques such as positive reframing, prompts/cues, action planning and problem solving via interactive games and group discussions) were specifically designed for the target groups and included in a road safety intervention pilot. Two norms were analysed: Phone usage whilst driving and passengers' distraction-related social norms. Movement for both norms was important and statistically significant. The paper provides an example of how new approaches can successfully challenge behavioural influencers and how positive messages, positive reframing, self-reflective techniques and positive models can alter young people's social norms.

Keywords: Behavioural change; Drivers' distraction; Evaluation; Non-fear-appeal interventions; Theory-based intervention.

1. INTRODUCTION

This paper presents a proposal for a new way of altering predictors of risky driving behaviour among novice young drivers using positive, self-reflective behavioural change techniques. The intervention evolved from a previous format and was assessed and re-designed following an evidence-based and theory-informed approach. The paper provides background information about research on young drivers' risk-taking behaviours and behavioural change techniques (BCTs) and their usage in road safety interventions, allowing the reader to overview the context and the bases for the pilot.

1.1. Young drivers and their risk in road safety

The lack of experience and their greater propensity for adopting unsafe driving behaviours and disregarding the traffic regulations make young drivers a high-risk group for road safety (Hanna, et al., 2010). Traffic accidents were found to be the most common cause of death among young people in Canada and United States (Jonah, 1986). World-wide, motor vehicle crashes are the leading cause of death and disability among adolescents, whose crash involvement rate is much higher than for older, more experienced drivers (Simons-Morton, et al., 2011) and that crash risk is highest early in licensure, declining rapidly for approximately 6 months and then slowly for years before reaching stable, adult rates (Mayhew, et al., 2003; McCartt, et al., 2003; Williams, 2003; Hanna, et al., 2010).

In Great Britain, the number of young car drivers (aged 17-24) involved in reported road accidents has fallen significantly, from 90,000 in 1990 to 30,000 in 2013, but young car drivers still constitute a very high risk; they represent 18% of all car drivers involved in reported road collisions, which is considerably higher than the 5% of miles they account for (Department for Transport, UK, 2015), a situation similarly seen in the USA (Durbin, et al., 2014).

1.2. Distractions. Mobile phones and peer distraction

In practice, there is very often a focus on skills training, although research found that learning basic vehicle management requires only a few hours of instruction and practice (Hall & West, 1996), but judgement consistent with safe driving is thought to develop only with substantial driving experience (Groeger, 2000). Distraction is one of the most important measures of risky driving, along with speeding, close following, impairment, and elevated g-force events (Simons-Morton, et al., 2011).

Mobile phone usage while driving is one of the most dangerous and increasingly widespread distractions, especially among young drivers (Durbin, et al., 2014). The impact of using a mobile phone on collision risk is difficult to ascertain (World Health Organization, 2011), but there are several studies revealing some interesting conclusions: mobile phone conversations while driving increase collision risk by 4 to 6 times (Redelmeier & Tibshirani, 1997; Strayer & Drews, 2004); text messaging while driving increases collision risk by 23 times (Lee, et al., 2013); mobile phone conversations impair drivers' reactions to vehicles braking in front of them (Strayer, et al., 2003); mobile phone use while driving increases the odds of a culpable crash by 70% compared with drivers who did not use a mobile phone (Asbridge, et al., 2013). The growing body of evidence, together with an obvious elevated social pressure to 'stay connected' among young drivers in particular, urges road safety professionals to treat mobile phone use while driving as a very important threat that needs to be approached rigorously and effectively in interventions.

The specific role of peer passengers on driver distraction is less understood, given that in-vehicle distractions are more difficult to directly observe. Findings suggesting that passengers might affect drivers' crash risk through both distractions and risk-promoting pathways (Curry, et al., 2012). Research reported an increase in the frequency of speeding, driver error, and single-vehicle crashes among teens in fatal crashes with peer passengers, compared with solo drivers (Williams, et al., 2007), and found that crash-involved teens carrying passengers were more likely to travel at unsafe speeds compared with those driving alone or with passengers of other ages (Aldridge, et al., 1999).

A growing body of recent research confirm that adolescents are highly susceptible to peer influences, with perceived peer approval and actual peer behaviours influencing the risky behaviours, and underlines the importance of considering misperceptions of social norms when designing interventions to decrease peer influence (Carter, et al., 2014). Areas where Graduated Driver Licensing (GDL) systems were introduced, with regulations related to passenger restrictions, had been shown to be effective (Williams, et al., 2016).

1.3. Fear appeal, Behaviour change techniques, and the Prototype Willingness Model

Road safety campaigns are renowned for using physical threats in which drivers and passengers are often shown to be injured and killed as a result of unsafe and/or illegal behaviour (Lewis, et al., 2007). However, the prevalence of fear appeal doesn't necessarily mean that it works, and the inconsistencies in the literature make it difficult to advise practitioners on 'what works' when designing threat appeals, or whether or not threat appeal should feature in road safety campaigns (Carey, et al., 2013). Moreover, recent analysis of experimental literature indicates that threat appeals can lead to increased fear arousal, but do not appear to have the desired impact on driving behaviour (Carey, et al., 2013) and that many threat-based campaigns may produce other emotions such as disgust or disapproval, which may have different behavioural impact (Lewis, et al., 2007).

Interventions to change behaviour are typically complex, involving many interacting components, making them challenging to replicate in research, to implement in practical applications and to synthesize in systematic literature reviews. A group of international researchers in behaviour change developed a BCT Taxonomy, formed of 93 BCTs clustered into 16 groups, aimed to help practitioners, on one hand, in using the most appropriate and proven to work techniques for their interventions and to help theoreticians, on the other hand, in having a common base of comparing, grouping, assessing, analysing and evaluating techniques and theories (Michie, et al., 2013).

Many behaviour change interventions are based on the Theory of Planned Behaviour (Ajzen, 1985) which presumes that decision making is a reasoned and deliberative process that involves consideration of behavioural options and anticipated outcomes.

When applied to adolescents and risky behaviour this seems to be somehow counter-intuitive. The Prototype Willingness Model (PWM), on the other hand, is based on an assumption that there are two types of decision making, two hypothesized paths to adolescent risk behaviour: a reasoned path, which involves more analytic processing; and a social reaction path that is image-based and involves more heuristic processing. Refined especially for young people's risky behaviours, the PWM starts from the existence or absence of previous behaviour which will influence three different elements (also inter-related): attitudes (perceived vulnerability), subjective norms (peer's behaviour), and risk images. These three elements will manifest influence in the formation of behavioural willingness on one hand and, on the other hand, attitudes, norms, and the willingness will influence behavioural intentions. Behavioural intentions and behavioural willingness will determine the state of engagement in the risky behaviour (Gerrard, et al., 2008). The authors suggest that the PWM is not only beneficial for changing behaviour but it also helps theory and research to enhance our understanding of adolescent (and adult) decision making in a variety of ways. Therefore, the model was selected for the development of the intervention (sessions) described in this paper, and also as a means of understanding the processes that lie behind the changes that the intervention is producing in young people's attitudes and willingness towards the risky behaviours.

2. METHODOLOGY

The literature reveals only a small amount of systematic operational guidance about how to develop interventions to reduce the gap between practice and evidence. Multi-step systematic methods for developing interventions designed to change behaviour, based on theoretical frameworks, have been illustrated and tested in the literature (French, et al., 2012). Whilst the case of developing an intervention from scratch is the optimal and desired one, in practice it is often a case of improving or modifying an existing intervention. Hence the need to develop a new systematic approach, tailored for the case. Nevertheless, the systematic approach used for this intervention is based on examples previously presented and tested in literature.

The method used for developing (redesigning) the intervention (sessions) consisted of five steps:

1. Evaluation of existing intervention (process evaluation and outcome evaluation) and identification of problems;
2. Assessment of problems;
3. Development of solutions to overcome problems – redesign intervention;
4. Implementation of solutions (Pilot);
5. Evaluation of the Pilot.

The findings from step one led the team to conclude that there was a risk of the intervention doing harm. The team considered that all the identified problems were critical and that some of the sessions should be redesigned and others should be replaced. New aims and SMART objectives were formulated. Evidence and theory was used to explain how the behaviours occur in young people and to inform the intervention and the objectives. One critical issue that the team identified is that the intervention was trying to change a behaviour that did not yet exist (the participants are pre-drivers). Hence, the novel approach, as well as the aims and objectives, focused on altering those elements more susceptible to ***preventing future adoption of risky behaviour***.

The specific objectives focused on three main aspects:

1) To significantly reduce the average norm among participants by 0.5 on a scale from 1 to 5 and/or statistically significant;
2) To significantly increase the average perceived risk (vulnerability) by 0.5 on a scale from 1 to 5 and/or statistically significant;
3) To significantly decrease the average willingness to engage in dangerous behaviour while driving, by 0.5 on a scale from 1 to 5 and/or statistically significant.

Inspired by the latest research, all threatening and fear appeal (fear arousal) based sessions were eliminated and replaced with positive and self-reflective behavioural change techniques such as prompts/cues, action planning, group discussions and problem solving, incorporated in a number of creative and interactive game-like sessions. The BCTs were specified and coded (Michie, et al., 2013) in the description of the pilot. Some of the most frequently used ones are: (1.2.) Problem solving; (1.4.) Action planning; (7.1.) Prompts/cues; (6.1.) Demonstration of the behaviour; (5.2.) Salience of consequences; (6.3.) Information about others' approval; (5.3.) Information about social and environmental consequences; (1.8.) Behavioural contract; (3.1.) Social support (unspecified); (10.5.) Social incentive; (13.1.) Identification of self as role model.

The intervention was piloted at two consecutive events in the same location. The pilot incorporated three short presentations and eight workshops, all containing interactive discussions, games, activities, and debates where every participant needed to engage. The overall tone of the intervention was positive and fun, making the experience enjoyable and enriching both for the participants and for the team.

Participants (38 in total) completed anonymous (matched based on date of birth and gender) questionnaires at arrival and at the end of the event, allowing the team to measure the short-term effects of the pilot on the targeted behavioural components. The post questionnaires were also a good opportunity for the participants to reflect on the things they did during the day and how it may have changed their beliefs and attitudes. The questionnaires were processed and matched and the differences were tested for

statistical significance and evaluated against the specific objectives. A sample of 18 participants from an intervention with the previous format was also used for comparison.

3. RESULTS

Paired T-tests were conducted to assess the significance of the differences between the pre-intervention and post-intervention responses. The analysis was done on both original intervals, with the median value considered, and on the recoded values.

Histograms were used to analyse the distribution of the differences between pre-answers and post-answers. All four analysed differences described distributions similar to a normal distribution.

Table 1. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PhoneUse_pre	40.329	38	20.052	3.253
	PhoneUse_post	18.618	38	16.031	2.601
Pair 2	PhoneUse_preRec	3.316	38	1.016	0.165
	PhoneUse_postRec	1.974	38	1.000	0.162
Pair 3	Distracted_pre	49.671	38	25.069	4.067
	Distracted_post	22.111	38	19.181	3.112
Pair 4	Distracted_preRec	3.368	38	1.076	0.175
	Distracted_postRec	2.053	38	1.012	0.164

Table 2. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PhoneUse_pre - PhoneUse_post	21.711	21.412	3.474	14.673	28.749	6.250	37	.000
Pair 2	PhoneUse_preRec - PhoneUse_postRec	1.342	1.192	.193	.950	1.734	6.942	37	.000
Pair 3	Distracted_pre - Distracted_post	27.561	30.989	5.027	17.375	37.746	5.482	37	.000
Pair 4	Distracted_preRec - Distracted_postRec	1.316	1.416	.230	.850	1.781	5.727	37	.000

The difference between pre-intervention and post-intervention answers for phone usage social norms is 21.71%: from the perceived average of 40.33% drivers using their mobile

phone while driving, before the intervention to a perceived average of 18.62% drivers using their mobile phone while driving, after the intervention. The paired test reveals a Sig. (2-tailed) of .000 (<.05), which indicate that there is a significant difference between the two sets of answers.

In recoded levels, the perceived norm of drivers using their mobile phone while driving changes from 3.32 (high proportion) to 1.97 (low proportion). The test also reveals a Sig. (2-tailed) of .000 (<.05), meaning that there is a significant difference between the two sets of answers.

Table 3. Paired Samples Statistics - Comparison

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	C_PhoneUse_pre	34.167	18	17.299	4.077
	C_PhoneUse_post	29.722	18	13.030	3.071
Pair 2	C_PhoneUse_preRec	3.000	18	0.970	0.229
	C_PhoneUse_postRec	2.778	18	0.808	0.191
Pair 3	C_Distracted_pre	34.167	18	17.299	4.077
	C_Distracted_post	31.667	18	14.603	3.442
Pair 4	C_Distracted_preRec	3.000	18	0.970	0.229
	C_Distracted_postRec	2.889	18	0.900	0.212

Table 4. Paired Samples Test - Comparison

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	C_PhoneUse_pre – C_PhoneUse_post	4.444	19.089	4.499	-5.048	13.937	.988	17	.337
Pair 2	C_PhoneUse_preRec – C_PhoneUse_postRec	0.222	1.166	0.275	-0.358	0.802	.809	17	.430
Pair 3	C_Distracted_pre – C_Distracted_post	2.500	20.364	4.800	-7.627	12.627	.521	17	.609
Pair 4	C_Distracted_preRec – C_Distracted_postRec	0.111	1.231	0.290	-0.501	0.723	.383	17	.707

For the peer distraction social norms, the difference between pre-intervention and post-intervention answers is 27.56%: from the perceived average of 49.67% drivers being distracted by peers while driving, before the intervention to a perceived average of 22.11% drivers being distracted by peers while driving, after the intervention. The paired

test reveals a Sig. (2-tailed) of .000 (<.05), which indicate that there is a significant difference between the two sets of answers.

In recoded levels, the perceived norm of drivers being distracted by peers while driving changes from 3.37 (high proportion) to 2.05 (low proportion). The test also reveals a Sig. (2-tailed) of .000 (<.05), meaning that there is a significant difference between the two sets of answers.

For the comparison sample, the changing in norms were a lot smaller and not significant (Sig. (2-tailed) > .05) for both norms, for original intervals and for recoded values.

To verify the T-test results, a nonparametric test was also undertaken, the Wilcoxon Signed Rank Test which is the nonparametric equivalent for Paired sample parametric test. The nonparametric test revealed the same findings as the parametric paired sample test, that there is no significant difference between the two sets of answers or recoded answers (Asymp. Sig. (2-tailed) > .05).

Table 5. Wilcoxon Signed Ranks Test

	C_PhoneUse_post - C_PhoneUse_pre	C_PhoneUse_Rec_post - C_PhoneUse_Rec_pre	C_Distractions_post - C_Distraction_pre	C_DistractionsRec_post - C_DistractionsRec_pre
Z	-.925[a]	-.953[a]	-.277[a]	-.535[a]
Asymp. Sig. (2-tailed)	.355	.340	.782	.592

4. DISCUSSION AND CONCLUSIONS

The concern associated with the frequent use (and preference) of strong physical threats to target young people is often criticised among behavioural scientists, health professionals and practitioners. Therefore, exploration of alternative, non-threat-based, approaches is encouraged (Lewis, et al., 2007) and there is an increasing recognition that interventions to change behaviour should draw, in their development, on theories of behaviour and behaviour change (Michie, et al., 2008; Carter, et al., 2014), and evidence and practical issues (French, et al., 2012). Theory helps to understand the behaviour; evidence informs which behaviours can be changed; and practical issues can determine which BCTs are feasible with the available resources (French, et al., 2012).

Using theory in designing interventions provides three important advantages: interventions are likely to be more effective because the mechanisms and the determinants of change are understood; theories can be tested and developed further; and theory-based interventions facilitate an understanding of what works and are a basis for developing better theories (Michie, et al., 2008).

The intervention presented in this paper started from the evidence informing which behaviours needed to be changed. The theory was then used to explain the mechanisms

of behaviour creation and to provide indications for intervention development and design, in order to affect those elements of behaviour more likely to induce the desired behaviour change. The evidence, backed by a growing body of research suggests that distracted driving and especially distracted driving among novice drivers is an increasing issue in road safety (Klauer, et al., 2013; Durbin, et al., 2014; Carter, et al., 2014) with mobile phone use and peer distraction while driving as two of the most prevalent and dangerous distractions (World Health Organization, 2011; Asbridge, et al., 2013; Strayer & Drews, 2004; Lee, et al., 2013).

The newest theoretical frameworks were used to understand how behavioural processes work and how behaviour can be changed or influenced. For this particular age group, the Prototype Willingness Model (Gerrard, et al., 2008) was considered to be the most appropriate framework from at least two perspectives: Firstly the PWM gives special consideration to the characteristics the target age group manifest when engaging in a behaviour, less planned and intended and more socially determined; and secondly the PWM offers indications about the behavioural elements and the way they should be affected in order to change or influence risky behaviour in the target age group. The theory suggests that social norms that mirror high proportions of peers engaging in the behaviour will elevate the willingness to engage in the behaviour and thus, decreasing the perceived social norms level will result in lower levels of willingness to engage in the behaviour.

Using positive, self-reflective behaviour change techniques incorporated in innovative game-like and group activities, the intervention focuses on decreasing social norms for dangerous behaviours among novice drivers. Most of the participants being pre-drivers, the intervention aimed to prevent the future adoption of the behaviour where it is not yet present.

For both the use of mobile phones while driving social norm and the peer distraction while driving social norm, the objectives of lowering the social norms levels were achieved, resulting in a significant decrease in willingness to engage. The social norm for the use of mobile phones while driving decreased from adolescents perceiving, on average, that 40.33% of the drivers use their phones while driving in the pre-intervention questionnaires to a perceived average of 18.62% in the post-intervention questionnaires. Similarly, for the peer distraction social norm, the change was from adolescents perceiving, on average, that 49.67% of drivers are distracted by peers while driving, in the pre-intervention to an average of 22.11% in the post-intervention questionnaires.

The intervention not only successfully fulfilled its objectives, it also reinforced and practically tested a part of the PWM framework. Giving the resources and the size of the samples that currently can be affected, evaluating the actual behavioural change is unrealistic. That is a future step that will require more resources and larger samples.

Conclusion

The primary aim of this paper was to propose an alternative to 'traditional, fear-appeal' approaches in pre-drivers' road safety education. Using positive reframing, interactive games, self-reflective techniques and normalisation of positive behaviour, the pilot intervention successfully challenges two behind-the-wheel-distraction-related social norms. Based on latest research and theory and developed following a robust methodology, the pilot intervention showed better results than previous or comparator interventions, fulfilling its specific objectives and delivering change for the targeted behavioural elements, reinforcing at the same time a part of the PWM framework. The pilot intervention showed that positive and self-reflective BCTs are efficient in altering social norms, lowering at the same time the willingness for young drivers or for pre-drivers to engage in risky behaviours.

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