Investigating perceived control over negative road outcomes: Implications for theory and risk communication

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Key findings

- Drivers perceived high control over their own road behaviours such as speeding
- These perceptions were not related to beliefs in ability to control road crashes
- Similar findings found in a second study where individual fault was made salient
- Behavioural control strongly related to beliefs in ability to control fine outcomes

Abstract

Road safety advertising in Australia is largely based on the assumption that more fear results in greater persuasion. As such, the portrayal of violent road crashes remains the status quo. The current research aimed to investigate if individuals perceive they can influence such outcomes, as theory suggests that efficacy perceptions are central to fear appeal success. Results from two studies demonstrated that participants believed their behaviours would influence financial and point penalty outcomes but not the occurrence of road crashes. This research demonstrates why the portrayal of car crash outcomes in road safety messages needs to be reconsidered.

Keywords

Fear appeal, threat appeal, efficacy, control perceptions, road safety advertising, Extended Parallel Process Model

Introduction

At their most basic, ‘fear appeals’ are communication attempts that present the negative consequences of engaging in risky behaviours. The message aims to elicit fear by presenting a threat in an attempt to encourage motivation for the performance of protective behaviours (Ruiter, Abraham, & Kok, 2001). While threat and fear are terms that are used interchangeably, threat is more accurate as ‘threat’ is a stimulus and ‘fear’ is a response. Furthermore, a threat can produce a variety of emotions and cognitions beyond fear (Donovan & Henley, 1997). However, the terms have become somewhat blurred and unclear in the literature (Hastings, Stead, & Webb, 2004).

In Australia, road safety advertising frequently employs the use of ‘fear appeals’ that demonstrate severe consequences of risky driving in graphic ways (Donovan & Henley, 2003; Lewis, Watson, & White, 2008; O’Rourke, 2000; Tay, 2005). The consequences portrayed often involve horrifying pictures of mangled cars, bloodied victims and even the death of children (Algie & Rossiter, 2010). While some advertisements have focused on legal sanctions such as fines and demerit points (Donovan, Jalleh, & Henley, 1999) and others have appealed to perceptions of social acceptability (see the ‘Pinkie’ campaign, New South Wales Government, n.d.), outcomes portraying crashes, injury and death certainly remain the status quo (Algie & Rossiter, 2010; Carey, McDermott, & Sarma, 2013; Lewis, Watson, & White, 2013). It seems that Australia is not alone in this endeavour, with countries such as New Zealand (Walton & McKeown, 2001), the UK (Harman & Murphy, 2008; Tay, 2011) and parts of the USA also favouring this approach (Hoekstra & Wegman, 2011).

The use of ‘fear appeals’ in Australian road safety advertising became particularly popular in the 1990s. At this time, the Victorian Transport Accident Commission (TAC) had employed a series of hard hitting advertisements that demonstrated graphic scenes of road carnage, accompanied by depictions of the physical and emotional consequences (Donovan et al., 1999; Lewis, Watson, Tay, & White, 2007). These advertisements were expensive to create with estimated costs between $AUD 250,000 and 450,000 per advertisement. The TAC won international recognition for these advertisements and their approach was swiftly adopted by several other Australian jurisdictions (Donovan et al., 1999).

While experts have recommended that theoretical foundations and prior research are necessary to create successful road safety campaigns (Delaney, Lough, Whelan, & Cameron, 2004; Delhomme et al., 2009; Woolley, 2001), in practice this rarely occurs (Elliott, 2011; Tay, 1999; Tay & Watson, 2002; Wundersitz, Hutchinson, & Woolley, 2010). This is despite the potential pitfalls of ‘fear appeals’ as a method of risk communication in road safety being emphasised for some time (Castillo-Manzano, Castro-Nuño, & Pedregal, 2012; Elliott, 2003, 2005; Henley & Donovan, 1999; Hoekstra & Wegman, 2011; Job, 1990; Wundersitz & Hutchinson, 2011). Designing appeals that portray personally relevant threats are hampered by biases. For example, overestimations of driving ability are quite common in motorists (Harré, Foster, & O’Neill, 2005; Job, 1990; Pedruzzi & Swinbourne, 2009) and may even lead individuals to perceive that road risk messages are intended for other people (Walton & McKeown, 2001). Due to the significant challenges in road safety risk communication, understanding the factors that influence the relationship between fear and persuasion may be more valuable to investigate (Lewis et al., 2007). Proponents of this view have employed a number of theoretical models of behaviour change to analyse road safety messages and their effects, and, make recommendations on message design. This work has included the Extended Parallel Process Model, Protection Motivation Theory, the Health Belief Model and the Elaboration Likelihood Model (D’Souza & Tay, 2016; Tay, 2011).

One particular model, the Extended Parallel Process Model (EPPM; Witte, 1992) has long received attention as a theoretical foundation upon which to base research (Lewis, Watson, & White, 2010; Lewis et al., 2013; Tay & Watson, 2002). The strength of this model (which distinguishes it from others) is that it aims to explain both successes and failures of fear appeals (Witte, 1992). Inherent to this model is the idea that the perception of threat is needed to generate fear which, in turn, motivates processing of a message. However, it is coping appraisal which determines whether the message is accepted or rejected (Lewis et al., 2007; Maloney, Lapinski, & Witte, 2011). The coping appraisal component of the EPPM concerns evaluations of self efficacy and response efficacy. Self efficacy can be defined as a person’s belief or confidence in performing a behaviour while response efficacy refers to a person’s belief that the behaviour will be effective in preventing the threat (Boer & Seydel, 1996; Maloney et al., 2011). The relationship between threat perception and coping appraisal hypothesised by the EPPM is an interactive one. That is, threatening information will only result in adaptive behaviour (message acceptance) if there are positive coping appraisals. Without positive coping appraisals, threatening information is hypothesised to lead to maladaptive behaviour (message rejection) (Ruiter, Verplanken, Kok, & Werrij, 2003).

Empirical evidence for the proposed theoretical relationship has been inconsistent. Meta analyses from the broader health literature have demonstrated main effects of threat and efficacy but have provided no support for the proposed interaction between these variables (de Hoog, Stroebe, & de Wit, 2007; Witte & Allen, 2000). These findings indicate that higher threat alone can facilitate message acceptance.

Peters, Ruiter, and Kok (2012) hypothesised that the inconsistent evidence could be due to poor selection of the target audience, as audience profiles on threat and efficacy are not considered prior to delivering a threatening message. Thus, a review of empirical evidence by these authors included only studies that manipulated both variables. Results demonstrated an interaction effect between threat and efficacy whereby threat only had an effect on adaptive behaviour when efficacy was high. Likewise, the effect of efficacy was only significant when threat was high. This research suggests that unless efficacy perceptions are high at baseline (or effectively enhanced via an intervention), threatening communications can be ineffective at influencing adaptive behaviour (Peters et al., 2012).

The implications of this work are important to consider when discussing road safety outcomes. Research in this field has used various methods to examine the effect of threat and efficacy on behavioural intentions. The focus of the efficacy appraisal in much of this work has been 'message efficacy' (e.g. Cathcart & Glendon, 2016; Glendon & Walker, 2013; Lewis et al., 2007; Lewis et al., 2013; Tay & Watson, 2002). This construct has been measured by aggregating scores on self-efficacy (participants' beliefs that a message provided strategies they could adopt) (Lewis et al., 2013) and response efficacy (participants' beliefs that a message provided strategies to effectively reduce a threat (Lewis et al., 2008, 2013; Tay & Watson, 2002). Results from this research have demonstrated the important role of efficacy in message design to reduce maladaptive intentions. However, as mentioned earlier, road safety advertising focuses largely on threat, and efficacy components are not addressed. The work of Peters et al. (2012) suggests that the effectiveness of these messages may depend upon pre-existing perceptions of driving behaviours to influence negative outcomes. This is rarely examined in the road safety field. Audiences do not passively take on information. If threat perceptions are already high prior to viewing the advertisement (and surpass efficacy beliefs) threatening messages may only be effective for those who are best equipped to deal with the message from the outset (Hastings, Stead, & Webb, 2004; Rimal & Real, 2003; Witte, 1996). Therefore, the nature of the efficacy profiles of target audiences may be integral to message effectiveness (Muthusamy, Levine, & Weber, 2009; Pedruzzi, Swinbourne, & Quirk, 2016; Witte, Berkowitz, Cameron, & McKeon, 1998).

As noted by Pedruzzi, Swinbourne, and Quirk (2012) risk communication in road safety may be particularly challenging as a negative road outcome can be perceived, correctly, as a function of other people's behaviour. Therefore, individuals may feel they have limited ability to influence outcomes. Road behaviours fall into two broad categories. Those an individual has control over (e.g. their own speeding behaviour) and those an individual has no control over (e.g. a speeding driver in another car). Road campaigns tend to target the former by demonstrating how the viewer's driving behaviour can result in negative outcomes. However, the EPPM generates different predictions depending upon the threat targeted. Individuals may perform appropriate road behaviour but negative road outcomes can still occur in the presence of this behaviour. Such a situation will likely affect efficacy appraisals. This situation is easily overlooked when using the EPPM due to the summative nature of the efficacy component. It therefore makes sense to evaluate individuals' belief in their ability to influence road outcomes. Understanding efficacy appraisals could provide valuable insight into audience beliefs about road risks, and, the most appropriate outcomes to target in road safety research and advertising employing threat as a stimulus.

The current research thus aimed to investigate if belief in one's ability to perform a set of road behaviours is in fact related to beliefs in influencing the occurrence of negative road outcomes. In order to do this participants were asked to estimate control perceptions, specifically their confidence in their ability to control or influence a set of road behaviours and outcomes. Relationships between these constructs were then examined. Numerous road safety advertisements focus on crash or fine outcomes, therefore these outcomes were the subject of this investigation. As the occurrence of fine penalties are ultimately due to individual behaviour, it was hypothesised that perceived control over road risk behaviour and perceived control over the occurrence of fines would be similarly high, and related to each other. In contrast, it was hypothesised that perceived control over the occurrence of crash outcomes would be relatively low and have a weak relationship with perceived control over road risk behaviours.

Study 1

Method

Participants

A sample of 236 participants was recruited from the Townsville region in North Queensland via the advertisement of an online survey. The survey link was largely advertised on online social networks, university newsletters, and community events pages. Participants could click on the advertised link to proceed to the survey. Of this sample, 31 participants requested to fill out a paper questionnaire.

The sample consisted of 156 females and 76 males (4 participants did not indicate their gender) ranging in age from 18 to 73 years ($M = 38.97$, $SD = 13.89$, $Mdn = 36.00$). Eight percent of the respondents reported their highest level of education was year 10 in secondary school. A further 22% reported completing year 12. Almost 33% had completed an undergraduate degree. About 8% of the sample reported having a trade qualification while the remaining 27% reported completing some other form of education. Cases were examined for missing values. A total of 29 participants were missing data on one or more of the variables of interest and were excluded. These participants were older than those without missing data ($t_{(233)} = -2.01$, $p = .05$). However the distribution of gender did not differ between groups (c^2 (1, N = 232) = 2.19, $p = .15$). Six participants with missing data had been involved in a car crash compared to fifty participants without missing data. These proportions were not significantly different (c^2 (1, N=235) = .10, *p* = .75). Missing data was dealt with using list wise deletion. Of the 207 remaining participants, 175 were Queensland residents and 25 participants reported living elsewhere in Australia. Seven participants were further excluded as they either reported living overseas or gave no information about their place of residence. The final sample therefore consisted of 200 participants.

Measures

This study was embedded within a broader project, and only the behaviours and outcomes specific to this report are grouped and listed below. Specifically, three target variables were examined. These were control over road behaviours, and control over fine and crash outcomes.

Control over road behaviours

Participants were presented with a number of road behaviours. These behaviours included ‘driving without talking on a mobile phone,’ ‘driving without texting,’ ‘driving over the speed limit,’ and ‘driving with a blood alcohol level over the legal limit.’ Participants were asked to consider each behaviour happening to them, and indicate their confidence in their ability to control or influence each one. Participants responded on a 7 point Likert scale (1 = no confidence, 7 = complete confidence).

Control over fine and crash outcomes

A number of road related outcomes pertaining to fines were presented to the participants. These outcomes included ‘being booked for speeding,’ ‘being booked for drink driving,’ ‘being booked for talking on a mobile phone while driving,’ and ‘being booked for texting while driving.’ One item ‘being involved in a car crash’ assessed control over a crash outcome. Participants were asked to think about the outcomes happening to them and indicate their confidence in their ability to control or influence each one. Participants responded on a 7 point Likert scale (1=no confidence, 7 = complete confidence). Participants were also asked to indicate whether or not the event had happened to them.

Procedure

Ethics approval was obtained through the James Cook University Ethics Committee (H4576). Participants were directed to an online version of the survey which was hosted at Survey Gizmo. Participants were asked to think about the behaviours and outcomes described as actually happening to them before indicating their confidence in their ability to control or influence each one.

Statistical methods & data preparation

Data was analysed using both SPSS and AMOS (version 22). In order to test the effects of behavioural control on fine and crash outcomes, Structural Equation Modelling (SEM) with AMOS was used. The strength of this approach, in comparison to creating composite variables, is that latent variables can be tested and a Confirmatory Factor Analysis (CFA) can be performed simultaneously. Furthermore, SEM can provide more accurate estimates of relationships as it models the error variance specific to each variable. The overall models were tested with Maximum Likelihood Estimation using the covariance matrix. Univariate and multivariate non normality were assessed by examining normality statistics in AMOS (see Byrne, 2010). To adjust for inflated standard errors when data was identified as multivariate non normal, Bollen-Stine bootstrapping procedures were performed with 2000 bootstrapped samples at 95% confidence intervals (Bollen & Stine, 1992). A bootstrap is an acceptable approach to deal with non normal data (Byrne, 2010). Sample size considerations for SEM require at least 10 participants per estimated parameter as less than this can result in power and model stability issues (Kline, 2011). In consideration of this, no more than 20 estimated parameters were modelled with the current sample.

Model fit was assessed with chi square indices, Bentler’s Comparative Fit Index (CFI; Bentler, 1990), the Adjusted Goodness of Fit Index (AGFI), the Root Means Square Error of Approximation (RMSEA) and the Standardised Root Mean Square Residual (SRMR). A non-significant chi square is indicative of good model fit. The post hoc adjustment made by the Bollen –Stine bootstrap also yields a non-significant p value to indicate good model fit. For CFI, values obtained should be greater than .95 (.90 at minimum) AGFI should be above .90, RMSEA less than .06 and SRMR less than .05 (Byrne, 2010). Latent variables were created for ‘control over behaviours’, and ‘control over fine outcomes’. CFA was performed to evaluate the validity of the latent variables used in the structural model.

Results

Control appraisals

Participants’ average ratings of control for the behaviours and both fine and crash outcomes are presented in Table 1. The table also includes the average ratings for each item. Internal consistencies are presented for the latent variable measures.

Tests of the hypothesised model

The conceptual framework guiding the hypothesised model was that behavioural control would be strongly related to one’s perceived ability to bring about or avoid a fine outcome. In comparison, it was expected that behavioural control would be weakly related to one’s ability to bring about a crash outcome. Further, we decided to investigate a pathway between perceived control over fine outcomes and perceived control over crash outcomes. This was performed in order to understand if beliefs in one’s ability to control fine outcomes generalized to crash outcomes.

Normality testing demonstrated significant evidence of multivariate non normality. Mardia’s multivariate kurtosis index was 85.15 (C.R. = 42.79). As such Bollen-Stine

Table 1. Means, standard deviations and internal consistencies for each item and measure

Control appraisals	Mean (SD)	α
Driving without phone	5.97 (1.49)	
Driving without texting	6.26 (1.35)	
Speeding	5.77 (1.35)	
Drink driving	6.27 (1.56)	
Control over behaviours	6.06 (1.05)	.71
Booked for phoning	5.97 (1.58)	
Booked for texting	6.04 (1.60)	
Booked for speeding	5.70 (1.44)	
Booked for drink driving	6.47 (1.13)	
Control over fine outcomes	6.04 (1.19)	.84
Control over a car crash	3.60 (1.49)	

Note: All items were measured on a 7 point scale with higher scores indicating greater perceived control

bootstrap was employed to adjust for the lack of multivariate normality. The hypothesised model and pathways are illustrated in Figure 1 along with their standardised coefficients. Only the direct relationships between variables were tested.

The direct pathway between the latent variables 'control over behaviours' and 'control over fine outcomes' was significant ($p < .001$). This relationship indicates that as perceived control over road behaviours increases, perceived control over fine outcomes tends to increase as well. The pathway between 'control over fine outcomes' and control over 'being involved in a car crash' was not significant

Table 2. Item reliabilities for items in the measurement model

Item	Estimate
Driving without talking on a mobile phone	.76
Driving without texting	.73
Driving over the speed limit	.19
Driving with a blood alcohol level over the legal limit	.10
Being booked for speeding	.27
Being booked for drink driving	.26
Being booked for talking on a mobile phone while driving	.97
Being booked for texting while driving	.88

($p = .10$). The relationship between 'control over behaviours' and control over 'being involved in a car crash' was also not significant ($p = . 92$). The factor loadings for each item onto the respective latent factors were all significant ($p < .001$). The item reliabilities are reported in Table 2. In particular, control over speeding and control over drink driving seem to be poor measures of the 'behaviours' construct. Likewise, control over being booked for speeding and control over being booked for drink driving are also weak measures of the 'control over fine outcomes' construct. These items require further investigation. Model fit statistics indicated a poor fitting model with c^2 (25) = 171.61, $p < .001$; CFI = .84; AGFI = .71; RMSEA = .17 (90% CI = .15; .20); SRMR = .12. Bollen-Stine bootstrap produced an adjusted p value < .001 further supporting poor model fit.

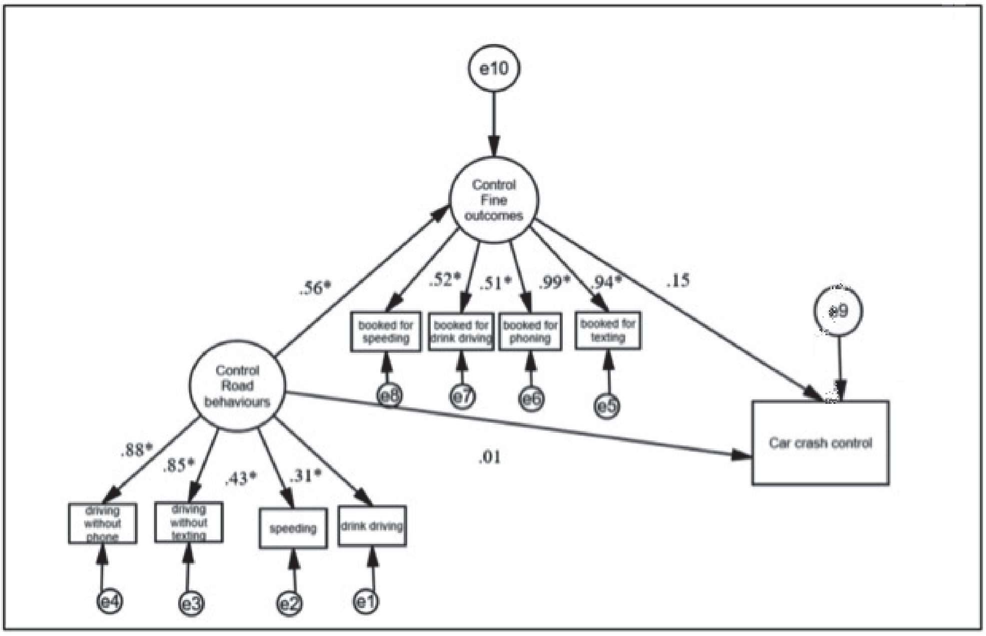

Figure 1. Road model including standardised coefficients for structural pathways and measurement model
***p < .001**

Table 3. Correlations between items in the measurement model

Item	1	2	3	4	5	6	7	8	9
1. Speeding	1								
2. Driving without phone	.42	1							
3. Driving without texting	.39	.74	1						
4. Drink driving	.39	.25	.34	1					
5. Booked for speeding	.55	.30	.30	.26	1				
6. Booked for drink driving	.31	.27	.27	.46	.47	1			
7. Booked for phoning	.33	.54	.52	.32	.46	.46	1		
8. Booked for texting	.34	.48	.59	.32	.40	.40	.90	1	
9. Being involved in a car crash	.13[a]	.07[a]	.07[a]	.04[a]	.15[b]	.11[a]	.12[a]	.13[a]	1

Note. All correlations are significant at the 0.01 level unless otherwise indicated.
[a] indicates $p>.05$; [b] indicates $p=.04$

The zero order correlations between the behavioural control and fine outcome control items were further investigated. These correlations (using Spearman's rho) are presented in Table 3. These relationships were investigated due to the poor model fit, and poor item reliability of the speeding and drink driving items for both the behaviours and fine outcome constructs. Of interest here is the finding that the behavioural items correlated significantly with the perceived likelihood of their respective fine outcomes. For example, perceived control over speeding and perceived control over being booked for speeding was significantly and positively correlated. All behavioural items were significantly and positively correlated with their corresponding fine items.

The model output suggests that the items assessing use of a phone while driving or being booked for using a phone while driving account for most of the variance in the control over behaviours and fine outcomes factors. The correlation between control over 'driving without talking on a mobile phone,' and control over 'driving without texting' was significant, positive and particularly strong, suggesting the items assessed similar behaviours. In addition, the significant positive correlation between control over 'being booked for talking on a mobile phone while driving,' and control over 'being booked for texting while driving' is suggestive of a similar situation. There were significant positive correlations between the remaining road behaviours. Specifically, as control over one road behaviour increased, control over another road behaviour tended to increase as well.

Discussion

The aim of the current study was to investigate relationships between behavioural control and negative road outcomes frequently communicated in road safety advertising. This was conducted in order to understand if an individual's perceived ability to perform road behaviours was in fact able to influence the occurrence of negative road outcomes. Understanding these relationships would provide insight into the best threats to portray in road safety advertising. It was found that ratings for perceived control over behaviours and perceived control over fine outcomes were, on average, quite high. This result was not unexpected. The road behaviours employed in this study are enforced by compliance frameworks which will affect motivation to carry out such behaviours. Likewise, being booked for speeding or drink driving cannot occur unless an individual performs the risky behaviour. Specifically, as beliefs in the ability to control road behaviours increased, so did beliefs in the ability to control fine outcomes. This is in contrast to a situation where the individual did not wholly determine outcomes. For example, control over being involved in a car crash was comparatively low, and not related to control over behaviours. This could be because a car crash outcome can occur in the presence of a risk mitigation behaviour due to the behaviour of other drivers on the road.

The implications of these findings are straightforward and impact upon theory and practice. The first consideration involves control perceptions, efficacy and the hypotheses of the EPPM. Perceived control over an outcome or situation is a function of one's perceived ability to enact a set of behaviours, and the belief that the behaviour will be effective in influencing the outcome. These beliefs are reflected in self-efficacy and response efficacy respectively (Boer & Seydel, 1996; Maloney et al., 2011). These components are extremely important to fear appeal theory which hypothesises that without high efficacy, message acceptance is unlikely, rendering the fear appeal ineffective (Witte, 1992, 1996). However, much of the road safety literature does not consider the efficacy profiles of audiences when testing the EPPM. The investigation of different control targets in this study, allowed for the identification of a negative or threatening outcome characterised by high perceived control, specifically, a fine outcome. Of particular importance here is understanding whether self-efficacy for performing a behaviour is in fact related to bringing about an outcome. These appraisals are important to consider prior to message delivery as they may determine the effectiveness of threatening messages (Pedruzzi et al., 2016; Peters et al., 2012; Rimal & Real, 2003). Outcomes that have little or no relationship with perceived behavioural control could be particularly susceptible to message rejection effects (Pedruzzi et al., 2016).

Results from the current study suggest that messages focusing on outcomes such as road crashes would be ill informed as such outcomes have no relationship with perceived control over behaviours. Rather, there was a strong relationship between control over road behaviours and fine outcomes demonstrated here. It would therefore seem that in order to best influence behaviour, outcomes related to graphic crashes and deaths should instead be replaced with outcomes related to financial and point penalties. Further, the correlations between the behavioural items indicates that the perceived ability to control a risky or protective road behaviour allows an individual to influence other road related behaviours. Interventions targeting at least one risk behaviour may therefore have some benefit in reducing other behaviours. Instead, fine and crash outcomes differed substantially in their average ratings and were not related to each other. This pathway was tested to rule out the possibility that feelings of control over fine outcomes may lead an individual to believe they can control crash outcomes. Such a relationship could occur for a number of reasons and would require further investigation. For example, being able to control the occurrence of fine outcomes may give rise to feelings of being a particularly skillful or safe driver, therefore crash outcomes may be perceived as unlikely to occur.

While this study has important implications for the focus of road safety campaigns, there are some limitations. First, the item assessing control over a car crash allowed for the perception that another person can cause a crash. Future work should employ items that exclude this possibility. If the relationship between behavioural control and occurrence of a car crash changes when perceiving fault, it has direct implications for interventions. The finding would suggest that making fault salient could result in more effective campaigns. This was addressed in Study 2. Further, some of the items used in the model were not reliable indicators of the latent variables. For example, the items related to speeding and drink driving were poor indicators of their constructs. This may be a consequence of the phone offence items used for each construct. These items were very similar, highly correlated, and as such accounted for most of the variance in both the behaviour and fine variables. Additionally, the behavioural items were not framed consistently. Two items were framed as protective behaviours while the remaining two were framed as risk behaviours. It could be that the poor reliability of the items may be an effect of frame. These issues were also addressed in Study 2.

Study 2

Study 2 aimed to retest the structural model developed in Study 1 with a new sample. Study 1 allowed individuals to perceive that a car crash outcome could be due to the fault of another person. Study 2 corrected for this assumption by making fault salient. The item reliability issues from Study 1 were also addressed. It was hypothesised that behavioural control would have a strong and positive relationship with control over fine outcomes as previously demonstrated. It was further expected that making crash fault salient would change the nature of the relationship between behaviour and crash outcomes, whereby behavioural control would be related to the occurrence of crash outcomes.

Method

Participants

Participants were recruited mainly from the North Queensland region in Australia. Recruitment occurred via advertisements on local radio and news channels, online forums, newsletters and local car enthusiast websites and Facebook pages. Advertisements were also put up around the University and psychology students could participate for credit points. As the survey was conducted as an online survey, advertisements included the address of the online URL. Initially, 339 participants chose to participate by clicking the start button. Of these, 43 participants did not provide any further information. Another 24 of the participants indicated they lived outside of Australia and were thus removed from the analysis. A further 44 participants did not record scores on the variables of interest and were also excluded, resulting in a final sample size of 228 participants. There were 77 males and 133 females in the sample (18 people did not give information about gender). Participants ranged in age from 17 years to 71 years (M = 34.89, SD= 15.17, Mdn = 31.00) and approximately 30% of participants indicated their highest level of education was an undergraduate degree.

Measures

This study was embedded within a broader project, and only the variables specific to this report are described. To assess perceived control over road behaviours, 7 items were used employing different frames. Four items were framed as protective behaviours and three items were framed as risk behaviours. Examples of protective items included 'driving to the speed limit,' and 'driving without using a mobile phone.' Examples of risk items included 'driving over the speed limit' and 'being distracted by a mobile phone whilst driving.' Three items assessed perceived control over fine outcomes. These were 'being booked for speeding,' 'being booked for using a mobile phone while driving' and 'being booked for drink driving.' One item 'having a crash as the driver at fault' assessed perceived control over a crash outcome. Participants responded on a 7 point Likert scale (1 = no confidence, 7 = complete confidence). Participants were also asked questions about their driving history.

Procedure

Ethics approval was obtained through the James Cook University Ethics Committee (H5043). The survey was hosted at Survey Monkey and participants were directed to an online link 'Road threats: Feelings, thoughts and behaviours' which first described the study. As per Study 1, participants were asked to think about the behaviours and outcomes happening to them before indicating their ability to control or influence each one.

Sample characteristics

About 90% of the sample reported having access to a car for their own personal use. Approximately 10% reported having access to a motorbike while 4 participants reported access to a scooter. Participants reported being licenced for .5 to 59 years (M = 17.04, SD = 15.00) and also reported high amounts of driving activity. On average participants spent over 9 hours driving as a driver per week (SD = 9.26). Approximately 60% of respondents reported they had been booked for a traffic offence. The most frequently reported offence was speeding. While 40% of respondents indicated they had never been in an accident as a driver, the remainder had been in at least one accident as a driver. When asked to think about the most severe accident they had been involved in, 66% of respondents reported being the driver. Almost half (48%) of these individuals reported they were at fault. About 18% of respondents reported having an insurance claim made against them in the past and 10% reported losing their licence at some stage.

Statistical methods

Data was analysed using SPSS and AMOS (versions 22). For the analyses employing SEM techniques latent variables were created for 'control over behaviours' and 'control over fine outcomes'. For control over behaviours, protective items were grouped separately to risk items. Therefore, any effects of frame could be included and accounted for. Model fit was assessed using the same indices described in Study 1.

Results

Retest of the measurement model and structural pathways

In a similar manner to study 1, control over road behaviours and control over fine outcomes were modelled as latent variables. However, in this study the road behaviour items were grouped by the frame employed. This resulted in two separate latent variables, 'control over risk behaviours,' and 'control over protective behaviours.' Participants' average ratings of control for each item and their corresponding latent variables are presented in Table 4. Internal consistencies are also presented for the latent variables.

CFA was performed in AMOS to again evaluate the validity of the latent variables used in the structural model. The latent variable 'control over risk behaviours' was chosen in this analysis. This measure had a greater estimate of reliability (Table 4), but most importantly control over risk behaviours is more appropriate to use due to the risk frame largely employed in road campaigns[1]. Normality statistics in AMOS demonstrated evidence of multivariate non normality – specifically positive kurtosis (Mardias coefficient = 32.02, C.R. = 21.54). As such Bollen-Stine bootstrapping procedures were performed with 2000 bootstrapped samples at 95% confidence intervals (Bollen & Stine, 1992). The final model consisted of 19 estimated parameters. The measurement model and pathways under investigation are presented in Figure 2. The standardized coefficients for the structural pathways are included in the figure. There was no relationship between control over risk behaviours and control over having a car crash as the driver at fault. The direct pathway between control over risk behaviours and control over fine outcomes was significant. This relationship indicated that as perceived control over risk behaviours increased, so did control over fine outcomes. This accounted for 45% of the variance in control over a fine outcome (R^2 = .45). There was a significant and positive relationship between control over fine outcomes and control over having a crash as the driver at fault. This relationship indicated that as control over fine outcomes increases, control over a car crash at one's own fault tends to increase as well.

Table 4. Means, standard deviations and internal consistencies for each item and measure

Measures	Mean (SD)	α
Driving over the speed limit	5.46 (1.55)	
Being distracted by a mobile phone whilst driving	5.21 (1.76)	
Driving with a blood alcohol content (BAC) over legal limit	4.86 (2.55)	
Control over risk behaviours	5.18 (1.60)	.72
Driving to the speed limit	6.11 (1.18)	
Driving without using a mobile phone	6.03 (1.41)	
Refraining from drinking and driving	6.64 (.99)	
Ensuring you are not tired when driving	5.30 (1.36)	
Control over protective behaviours	6.02 (.86)	.64
Control over fine outcomes	5.80 (1.36)	.81
Control over having a crash as the driver at fault	4.86 (1.57)	

Note: All items were measured on a 7 point scale with higher scores indicating greater perceived control

The factor loadings for each item onto their respective latent variable are displayed in Figure 2. All factor loadings were significant (p<.001). Item reliabilities are reported in Table 5. Modification Indices were examined to assess any source of model mis-specification. These indices give an indication of the residual covariance, and represent the decrease in the value of the chi-square that would result if the parameter was freed. An examination of the modification indices

Table 5. Item reliabilities for items in the measurement model

Item	Estimate
Control over driving over the speed limit	.50
Control over being distracted by a mobile phone whilst driving	.67
Control over driving with a blood alcohol level over the legal limit	.39
Control over being booked for speeding	.40
Control over being booked for using a mobile phone while driving	.75
Control over being booked for drink driving	.65

having access to a motorbike while 4 participants reported access to a scooter. Participants reported being licenced for .5 to 59 years (*M* = 17.04, *SD* = 15.00) and also reported high amounts of driving activity. On average participants spent over 9 hours driving as a driver per week (*SD* = 9.26). Approximately 60% of respondents reported they had been booked for a traffic offence. The most frequently reported offence was speeding. While 40% of respondents indicated they had never been in an accident as a driver, the remainder had been in at least one accident as a driver. When asked to think about the most severe accident they had been involved in, 66% of respondents reported being the driver. Almost half (48%) of these individuals reported they were at fault. About 18% of respondents reported having an insurance claim made against them in the past and 10% reported losing their licence at some stage.

Statistical methods

Data was analysed using SPSS and AMOS (versions 22). For the analyses employing SEM techniques latent variables were created for 'control over behaviours' and 'control over fine outcomes'. For control over behaviours, protective items were grouped separately to risk items. Therefore, any effects of frame could be included and accounted for. Model fit was assessed using the same indices described in Study 1.

Results

Retest of the measurement model and structural pathways

In a similar manner to study 1, control over road behaviours and control over fine outcomes were modelled as latent variables. However, in this study the road behaviour items were grouped by the frame employed. This resulted in two separate latent variables, 'control over risk behaviours,' and 'control over protective behaviours.' Participants' average ratings of control for each item and their corresponding latent variables are presented in Table 4. Internal consistencies are also presented for the latent variables.

CFA was performed in AMOS to again evaluate the validity of the latent variables used in the structural model. The latent variable 'control over risk behaviours' was chosen in this analysis. This measure had a greater estimate of reliability (Table 4), but most importantly control over risk behaviours is more appropriate to use due to the risk frame largely employed in road campaigns[1]. Normality statistics in AMOS demonstrated evidence of multivariate non normality – specifically positive kurtosis (Mardias coefficient = 32.02, C.R. = 21.54). As such Bollen-Stine bootstrapping procedures were performed with 2000 bootstrapped samples at 95% confidence intervals (Bollen & Stine, 1992). The final model consisted of 19 estimated parameters. The measurement model and pathways under investigation are presented in Figure 2. The standardized coefficients for the structural pathways are included in the figure. There was no relationship between control over risk behaviours and control over having a car crash as the driver at fault. The direct pathway between control over risk behaviours and control over fine outcomes was significant. This relationship indicated that as perceived control over risk behaviours increased, so did control over fine outcomes. This accounted for 45% of the variance in control over a fine outcome (R^2 = .45). There was a significant and positive relationship between control over fine outcomes and control over having a crash as the driver at fault. This relationship indicated that as control over fine outcomes increases, control over a car crash at one's own fault tends to increase as well.

Table 4. Means, standard deviations and internal consistencies for each item and measure

Measures	Mean (SD)	α
Driving over the speed limit	5.46 (1.55)	
Being distracted by a mobile phone whilst driving	5.21 (1.76)	
Driving with a blood alcohol content (BAC) over legal limit	4.86 (2.55)	
Control over risk behaviours	5.18 (1.60)	.72
Driving to the speed limit	6.11 (1.18)	
Driving without using a mobile phone	6.03 (1.41)	
Refraining from drinking and driving	6.64 (.99)	
Ensuring you are not tired when driving	5.30 (1.36)	
Control over protective behaviours	6.02 (.86)	.64
Control over fine outcomes	5.80 (1.36)	.81
Control over having a crash as the driver at fault	4.86 (1.57)	

Note: All items were measured on a 7 point scale with higher scores indicating greater perceived control

The factor loadings for each item onto their respective latent variable are displayed in Figure 2. All factor loadings were significant (*p*<.001). Item reliabilities are reported in Table 5. Modification Indices were examined to assess any source of model mis-specification. These indices give an indication of the residual covariance, and represent the decrease in the value of the chi-square that would result if the parameter was freed. An examination of the modification indices

Table 5. Item reliabilities for items in the measurement model

Item	Estimate
Control over driving over the speed limit	.50
Control over being distracted by a mobile phone whilst driving	.67
Control over driving with a blood alcohol level over the legal limit	.39
Control over being booked for speeding	.40
Control over being booked for using a mobile phone while driving	.75
Control over being booked for drink driving	.65

suggested to co-vary the error terms as specified in Figure 2. The highest cross loading was between e3 and e6 (coeff = .31). Model fit statistics indicate good model fit with c^2 (9) = 17.19, $p = .05$; CFI = .99; AGFI = .94; RMSEA = .06 (90% CI = .01; .11); SRMR = .03. The Bollen-Stine bootstrap procedure to correct for non normality produced an adjusted *p* value of .27, thus also suggestive of adequate model fit. The entire model accounted for 29% of the variance in control over a road crash outcome ($R^2 = .29$).

Discussion

The aim of this study was to understand if individuals' beliefs in their ability to control the performance of risky road behaviour were related to beliefs about controlling the occurrence of negative road outcomes. This study built upon study 1 by making fault salient and aiming to overcome some of the item reliability issues in the measurement model. The relationship between perceived control over risk behaviours and perceived control over fine outcomes was particularly strong, accounting for 45% of the variance in perceived control over being fined. This finding suggests as belief in the ability to control risky road behaviours increases, so does belief in the ability to control fine outcomes. Specifically, being able to control the performance of risky road behaviours such as speeding, distraction, and drink driving, was generally perceived as being effective in controlling whether or not an individual is fined for such behaviour. In contrast no relationship between perceived control over risk behaviours and perceived control over a crash outcome was detected. This relationship was not evident even though this study rectified the limitation of Study 1.

The crash outcome in this study was clearly framed as the respondent's fault, that is, as a consequence of the respondent's behaviour. The lack of relationship between behavioural control and crashing at fault is surprising and deserves further attention. It could be that several biases are involved. For example, overestimations of driving ability are quite common in motorists (Harré et al., 2005; Job, 1990; Pedruzzi & Swinbourne, 2009). These beliefs may have lead individuals to perceive they are unlikely to crash at fault or that road crashes are due to the fault of others. Perhaps then, crashes are only thought of in the context of other drivers on the road, making fault frames redundant. These findings should provide a warning against the consistent use of crash imagery in Australian road safety campaigns. Further, making fault salient in messages by linking individual behaviour to crash outcomes may not have the desired effect.

The significant and positive relationship between perceived control over fine outcomes and perceived control over crashing at fault was different to study 1. This relationship indicated that increases in the perceived ability to control fine outcomes were related to increases in the perceived ability to control crashing as the driver at fault. In order to explain this relationship, it is helpful to consider the hypotheses proposed by the EPPM (Witte, 1992). In the context of the EPPM, if an individual perceives high risk of a fine, it is suggested that s/he will be motivated to act to decrease their fear (Witte & Allen, 2000). This action could include carrying out a behaviour that alleviates the threat but does not comply with driving laws. For example, if the location of a speed camera is known, an individual may speed but take an alternate route to avoid a fine. The avoidance of fine outcomes may lead to beliefs of superior driving ability. If an individual overestimates their driving ability, crashing at fault would again be perceived as an unlikely occurrence. This hypothesis may explain the relationship between the fine and crash outcome variables. If motorists perceive that they are unlikely to crash at fault, it also gives rise to the possibility that the model employed in this study was unable to adequately capture the hypothesised relationship between behavioural control and control over crashing at fault. Future work should aim to understand if overestimations of driving ability affect this pathway.

The increased reliability of the measurement model, compared to Study 1, could be a result of the more consistent frame employed for the items in this study. In Study 1 the behavioural control variable consisted of behaviours framed in both positive and negative ways. The model employed in this study used items that were framed consistently as risk behaviours. Additionally, some of the item reliability issues were addressed in the current study. For example, two separate (and highly correlated) items were used in Study 1 to assess perceived control over talking or texting while driving. The current study instead replaced these items with one item assessing perceived control over mobile phone related behaviours. The current study freed pathways between the respective behaviour and fine outcomes as suggested by the modification indices. This was not performed in Study 1 due to sample size considerations. This likely contributed to the better model fit in the current study. Correlated error terms in a measurement model indicate overlap in the unique variance of items, therefore the approach is usually reserved for error terms within latent factors. In this situation, it makes sense that residual error would be shared by the items specified in the model. For example, perceived control over speeding behaviour allows an individual to control the occurrence of being booked specifically for speeding. However, the relationship between each factor and control over crashing at fault demonstrates that they are qualitatively different measures. It is also possible that the better reliability of the measurement model is due to the change in sample.

The strength of this research is that the framework employed allows inferences to be made regarding the selection of outcomes for the development of effective road messages prior to message delivery. This work also has implications for theory, demonstrating how the EPPM may need to be expanded in road safety research. Instead of focusing on 'message efficacy' as previously done in the literature, the work instead examines the nature of efficacy beliefs in audience members, which has been demonstrated to influence the effect of threatening communications (Pedruzzi et al., 2016; Peters et al., 2012). This framework could also be used to predict message acceptance outcomes frequently employed in the literature. Most research using models such as the EPPM (Witte, 1992) sums the components of self-efficacy and response efficacy in order to test the relationship between efficacy and message acceptance or message rejection. The current research demonstrates how this could be problematic in a road context. Ensuring the relationship between self-efficacy for performing a behaviour is in fact related to controlling an outcome is necessary for adaptive behaviour. This research demonstrates that the predictions of the EPPM will be different depending upon the road outcome targeted. This insight could be lost, and potentially result in inconsistent evidence, if efficacy components are simply combined. Instead, the relationships between the components need to be defined in the model.

The main limitation of this work regards the selection of the sample. While research examining road safety behaviour in regional samples has been called for (Veitch, Sheehan, Turner, Siskind, & Pashen, 2005) it might be hasty to generalise to large metropolitan areas. The environment in North Queensland requires drivers to switch driving strategies more often than metropolitan drivers. Specifically, the region consists of smaller urban areas connected by long stretches of highway driving. These roads have considerably less traffic and fewer lanes, however more random road risks are prevalent. For example, highways can be crossed by wildlife at any time of the day thus impacting on driving conditions without warning. Poorly designed roads are often damaged or inaccessible as a result of severe weather events such as storms and cyclones. These events contribute to a high risk environment that can be more unpredictable than some metropolitan areas. Consequently, these experiences may have contributed to the perception that road behaviours were not able to influence the occurrence of crashes. Future work should be carried out in an urban environment to ensure the validity of the framework across diverse driving environments and thus samples.

Certainly, there will be subpopulations (e.g. repeat offenders and young male drivers) where efficacy beliefs may be especially useful to investigate to inform targeted education practices. Due to sample size constraints, this work was unable to examine the potential influence of variables such as driving history or gender. The samples from both studies had high proportions of female drivers (approximately 65%) and this limitation needs to be addressed in future work. Further work should also aim to expand upon the road outcomes investigated. There are many types of crashes (e.g. braking suddenly due to an unexpected object, head on collisions, 'fender bender' collisions) and these may be associated with distinct efficacy appraisals.

In terms of recommendations for practice, this research suggests that campaign designers should concentrate their efforts on increasing the perception that people will be penalized with financial and point penalties for risky road behaviours. As these outcomes are largely appraised as controllable by individuals, risk mitigation behaviours should increase in an effort to avoid fine outcomes. Engaging in these behaviours will consequently reduce the number of road crashes. It is also suggested that such messages be used carefully, reminding audiences that they are responsible for the occurrence of fine outcomes by providing clear and controllable behavioural directives to prevent such outcomes. Factors in the environment may activate beliefs that interfere with pre-existing control perceptions. For example, there are groups in the community that actively seek out concealed speed cameras and warn others of their whereabouts ("Masked protesters," 2014). Likewise, social media campaigns exist to block fine efforts by the police (O'Rourke, 2015). Radar scrambling devices can be easily purchased which stop traffic cameras from detecting speeding cars. Anecdotal evidence suggests that many motorists perform these behaviours because they believe that hidden traffic cameras exist for 'revenue raising.' It could be suggested that groups such as these are less likely to believe that fines are appropriate enforcement activities. As such, advertising efforts should remind people that these outcomes are ultimately due to their own behaviour and potentially focus on the point deduction component. The implementation of such efforts

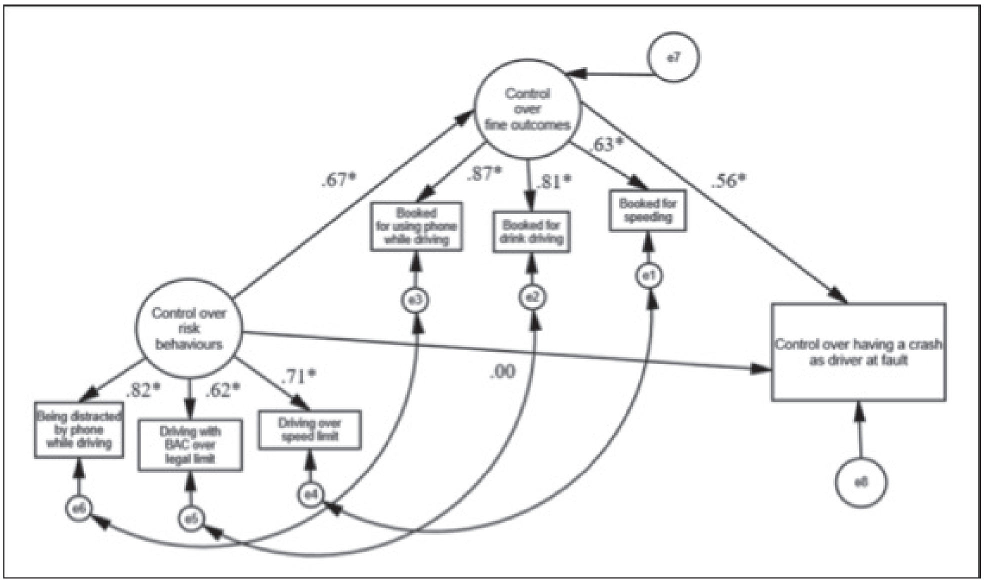

Figure 2. Measurement model and structural pathways tested for hypothesised model of road control
***p<.001**

may involve roadside billboards, messages, and increased policing efforts. For example, the use of speed monitoring devices on the road are an instant cue to slow down. This feedback method may also act to remind people that they will be caught if they continue to speed.

Conclusions

This study demonstrates that the portrayal of crash outcomes in road safety advertising is counterintuitive because even high perceptions of self-efficacy for road behaviours are perceived to have little bearing on crash outcomes. Participants tended not to consider that crashes were in their control, or that engaging in risk mitigation behaviours such as driving within the speed limit would have any benefit in terms of preventing crashes – even when the crash was framed as the fault of the individual. These findings are quite surprising and somewhat alarming. Beliefs such as these may be particularly problematic for road safety promotion efforts, acting as potential barriers to message acceptance. The identification of controllable outcomes (such as fines) should instead be the focus of risk communication attempts. Assessing control in a multidimensional fashion within the context of the EPPM, as done here, could be especially useful in identifying appropriate road outcomes to target in road risk communication.

Footnotes

1. For interest the hypothesised model employing 'control over protective behaviours' has been included as an appendix. Standardized coefficients for the structural pathways and factor loadings for the measurement model have been provided along with indices of model fit. Item reliabilities for items in the measurement model are also provided (See Appendix).

2. All factor loadings were significant (p <.001). Model fit statistics indicate poor model fit with c^2 (16) = 38.77, p < .001; CFI = .96; AGFI = .90; RMSEA = .08 (90% CI = .05; .11); SRMR = .05. A Bollen-Stine bootstrap procedure to correct for non normality produced an adjusted p value of .04, also suggestive of poor model fit.

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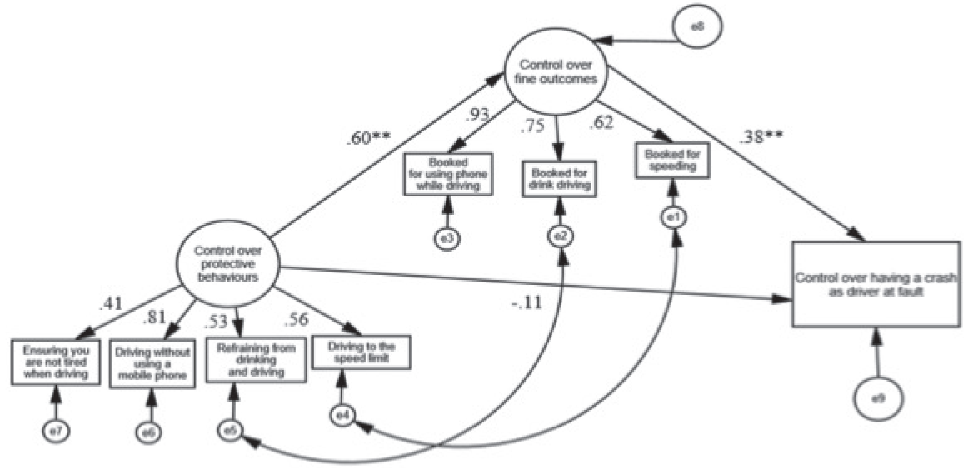
Appendix



Factor loadings and structural pathways for model employing control over protective (safe) behaviours[2]
$^{**}p < .001$