Exploring the influence of message framing and image valence on the effectiveness of anti-speeding posters

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Declaration

I hereby declare that this thesis is of my own composition, and that it contains no material previously submitted for the award of any other degree or examination at another University.

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Date: 31th March 2015

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Abstract

Road safety advertisements that generate emotions have been acknowledged to increase the potential persuasiveness of an advertisement message. Nonetheless, there has been much debate about which message framing and image valence strategy is the most robust and influential persuader. In the current study, 40 UK vehicle users completed a simulated driving experiment and a series of self-report measures exploring the influence of three different types of anti-speeding advertisements: a negative loss-framed poster accompanied with a negative valence image, a positive gain-framed poster paired with a positive valence image, and a neutral anti-speeding poster. No significant differences were found between the three different types of anti-speeding advertisements and participants' visual attention, memory or speeding behaviour. The results, however, showed that the negative anti-speeding advertisement was rated as significantly more effective in its ability to convince both other vehicle users and the vehicle user themselves to adhere to the legal speed limit. The influence of the differential advertisement strategies also appeared to fluctuate depending on several distinct factors and the disposition of the vehicle user. These findings suggest that emotionally-laden anti-speeding advertisements based on theoretical frameworks may effectively reduce the likelihood for participants to engage in risky driving behaviours and increase vehicle users' intentions to adhere to the legal speed limit.

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Chapter 1: Advertising and Emotions

1.1 Introduction

This chapter outlines the role of emotions in advertising and provides a historical overview of how the subject of emotions became prominent in advertising literature. A theoretical background to the main concepts of message framing and image valance that are associated with advertising and emotions are the presented.

1.2 An introduction to the role of emotion in advertising

From the moment one wakes up in the morning to the moment one settles down to sleep, individuals are showered with a wide-range of announcements, commercials, digital and in-print advertisements, fliers, posters and static roadside advertisements. It is estimated that an individual can be exposed to several hundred, or even a thousand advertisements everyday (Milosavljevic & Cerf, 2008). With an influx of visual and/or auditory information competing for our attention on a day-to-day basis, the ultimate goal of advertising is to formulate an effective message that captures attention and leads the target audience to adopt the desired behaviour (Wundersitz, Hutchinson, & Woolley, 2010). Emotion, ”one of the most central and persuasive aspects of human experience” (Ortony, 1990, p3), is thought by many psychologists and marketing researchers to be an essential facet in this process (Ajzen, 2001; Poels & Dewitte, 2006; Slovic, Finucane, Peters, & MacGregor, 2007).

In the psychology and marketing literature, several theoretical models of emotion have been proposed including discrete and dimensional models. Discrete models posit that humans have a small number of basic universal emotional states (for example, joy, happiness, sadness, fear, guilt, surprise and

interest) (Levenson, 2011). Dimensional models, in contrast, view emotion as several continuous psycho-physiologic dimensions such as emotional valence (varying from negative to positive) and emotional arousal (varying from low to high) (Fontaine, Scherer, Roesch, & Ellsworth, 2007; Kassel et al., 2007). Despite the fundamental differences, both models describe emotions as an internal complex state of feeling that generates psychological and physical reactions and motivates individuals to behave in specific ways by energising, directing and sustaining thoughts and behaviour (Baumeister, Vohs, DeWall, & Zhang, 2007; Phelps & LeDoux, 2005). With self-report measures based on dimensional models, in particular, found to be useful when exploring the emotional processing of stimuli (see Citron, Gray, Critchley, Weekes, & Ferstl, 2014).

Ad-elicited emotions serve various goals and play a significant role in determining how an individual thinks and behaves. Advertisements that elicit strong emotions can cause individuals to make decisions they would not typically make. Avoid situations that they generally enjoy or perform behaviours that may not be viewed as beneficial but is of a greater benefit to the wider community, such as adhering to the legal speed limit (Elliott, 2011). Individuals also may undertake behaviours depicted in advertisements to experience positive emotions (for example, happiness, joy or interest) or reduce the chances of experiencing negative emotions (for example, sadness, fear or guilt) (Shen & Dillard, 2007).

1.3 Historical context

1.3.1 Early models and theories

One of the first advertising models, AIDA (Attention -> Interest -> Desire -> Action), originating in 1898 (Strong, cited in Hall, 2002) noted the importance of emotions in advertising. In the AIDA model, an individual's emotional desire was believed to play a fundamental role in the four steps individuals' progress

through before engaging in a behaviour following exposure to an advertisement. This premise was augmented by Lavidge and Steiner's (1961) Hierarchy of Effects model (awareness -> knowledge -> liking -> preference -> conviction -> purchase). In the six sequential steps of the Hierarchy of Effects model the emotional response of 'liking' emerged. In this model, however, the emotional response of 'liking', though acknowledged, was not considered to be the first or most prominent step in effective marketing communication (Feldman & Lynch, 1988).

The assumption that individuals respond to an advertisement in an ordered linear fashion, with cognition at the forefront ahead of emotion, lead to the domination of hierarchy of effects models in marketing literature for over a century (Yoo, Kim, & Stout, 2004). However, according to Milosavljevic & Cerf (2008), early hierarchical advertising models such as AIDA and the Hierarchy of Effects model overlooked the direct influence of emotions on cognitions by asserting that individuals' respond to the advertising messages in ordered stages with cognitions prioritised over emotion. While hierarchy of effects models still remain prominent in literature today, in the 1980's the paramount importance of emotional content in advertising and persuasion began to gain recognition.

The significance of emotion in mediating cognitive and behavioural responses was elevated by the works of Zajonc (1980) who challenged earlier conceptions of hierarchical ordering with his affective-primacy hypothesis. Zajonc (1980) argued that an individuals' emotions have prominence over cognition and asserted that emotional responses to stimuli could occur both prior to, and independent of cognitions. Explicitly, Zajonc believed that the emotionally-laden stimuli could be processed extremely rapidly and efficiently, and independent of extensive perceptual and mental encoding. Therefore, an individual's emotional response to stimuli was often made before and with greater conviction than many cognitive judgements (Zajonc, 1980, 1984).

Following Zajonc's primacy affect hypothesis, the role of emotion in advertising effectiveness was propelled by the Hedonic Experiential Model (Holbrook & Hirschman, 1982) and the Elaboration Likelihood Model (Petty, Cacioppo, & Schumann, 1983). In the Hedonic Experiential Model (HEM) the authors asserted that consumer behaviour was primarily driven by emotions relating to pleasure but could be influenced by a variety of emotions including 'love, hate, fear, joy, boredom, anxiety, pride, anger, disgust, sadness, sympathy, lust, ecstasy, greed, guilt, elation, shame and awe' (Holbrook & Hirschman, 1982, pg 137). Whereas, according to the Elaboration Likelihood Model (ELM) of persuasion, Petty and Cacioppo (1986) suggested that persuasion could occur through two main routes; the central and peripheral.

In advertising, under the central route of the ELM individuals are persuaded by the advertisement content and think "elaborately" about the facts, then evaluate the message. Under the peripheral route, however, individuals are not motivated by the facts but instead are influenced by external characteristics and positive and negative cues which appealed directly to the individuals' mood (for example, an image or phrase that elicits happy or negative emotions). The route that is chosen is dependent on the perceived relevance of the advertisement and the individual's motivation to process the message content in full (Petty et al., 1983; Petty, Schumann, Richman, & Strathman, 1993). The proposals that emotions could be pivotal in advertising generated new-found interest (Batra & Ray, 1986; Brown & Stayman, 1992; Edell & Burke, 1987; Rossiter, Percy, & Donovan, 1984).

1.3.2 Early 20th century research

During the mid-1990's the idea that emotions could serve as a gate-keeper for cognitions and behaviours was reinforced by pioneering research in

neuroscience. Advanced investigations on emotional behaviour by Damasio (1995) and LeDoux (1995b; 1998) provided greater insights into how people may respond to advertising.

Guided by the unusual behaviours exhibited by patients with bilateral lesions in the orbitofrontal cortex area of the brain Damasio (1995) put forward a somatic marker hypothesis. According to Damasio emotions can help guide our responses not only by directing our attention to stimuli but also by conditioning our behaviours and affecting what we subsequently recollect via somatic markers. In healthy patients somantic markers provide critical information about whether the associated event or object has previously induced a positive or negative physiological or emotional state. These physiological and emotional responses influence an individual's future thoughts and behaviours, particularly when it comes to issues associated with conflict and risk (Damasio, Everitt, & Bishop, 1996; Shiv, Loewenstein, Bechara, Damasio, & Damasio, 2005).

Supporting this notion, LeDoux's (1995b) highly experimental animal studies on the amygdala and fear conditioning demonstrated how defensive behaviours and physiological responses are elicited when adverse stimuli is associated with negative outcomes. Explicitly, it was suggested that when memories associated with a stimulus induce a positive emotional charge people are likely to feel attracted, however, when a negative emotional charge is evoked the individual is likely to feel repelled (LeDoux, 1995; 1998). It is this internal complex state of feeling that generates psychological and physical reactions which motivate individuals to behave in specific ways by energising, directing and sustaining their thoughts and behaviour (LeDoux, 2003; Phelps & LeDoux, 2005).

1.3.3 Contemporary research

In the 21st century, advertising theories and models have advanced from the view of the target user as an irrational, susceptible creature, to the recognition that an individual is an active participant in the advertising process who is selective about the information they decide to absorb or ignore (Barker, Valos, & Shimp, 2012). Researchers now recognise that emotions play a significant role in driving an individual's decision-making from the type of advertising messages we choose to attend to, to whether or not we adopt the recommended behaviour.

A wide range of studies from varying disciplines, for example, cognitive psychology, neuroimaging and marketing have strengthened the view that emotions can assist in facilitating advertisement effectiveness. In literature advertising effectiveness has been measured by both direct (visual awareness and memorability) and indirect (perceptions or self-reports) measures of behaviour. Methods to investigate how emotions enhance visual attention and processing when compared to neutral stimuli include research using direct measures such as visual processing tasks (Fredrickson & Branigan, 2005; Ihssen & Keil, 2009) and eye-tracking technology (Sheikh & Titone, 2013; Wadlinger & Isaacowitz, 2006). Recall and recognition tasks (Strasser, Tang, Romer, Jepson, & Cappella, 2012) as well as neuroimaging investigations using direct measures such as fMRI have also shown that emotionally-laden stimuli can reinforce recognition and recall (Ambler & Burne, 1999; Citron et al., 2014) and memory (Bakalash & Riemer, 2013).

Nonetheless, so far there is limited research investigating the role of emotional advertisements on direct measures of effectiveness in terms of actual tangible behaviours. In spite of this, indirect measures of advertisement effectiveness such as participants' self-reported engagement with emotionally-laden messages has helped to provide insights into how emotions may aid advertisement effectiveness (Cauberghe et al., 2009). To include, a recent study using structural

equation modelling (SEM) on an excess of 23,000 responses to 240 television, radio and print advertising messages by Morris, Woo, Geason and Kim, (2002). Here the authors found that emotions have more predictive power than cognitions when it comes to conative attitudes and actions such as brand interest and purchase intentions. In the study, participants emotions were measured with a visual self-report measure called AdSAM. AdSAM uses illustrative character scales called Self-Assessment Manikins (SAM) (Bradley & Lang, 1994) to assess subjective feelings (pleasure-to-displeasure and high-to-low emotional arousal) based on the dimensional theory of emotion (Fontaine et al., 2007).

1.4 Conclusion

This chapter provided an overview of the role of emotions in advertising including a historical overview of how emotions became prominent in advertising literature in assisting effective message persuasion through aiding attention, memory and behavioural outcomes.

Chapter 2: Message Framing and Image Valence

2.1 Introduction

Chapter two discusses the two central concepts of advertising persuasiveness. First the function of message framing, and second the role of image valence in advertising persuasiveness.

2.2 Message framing

Social persuasion marketing that combines emotional arousal and commercial marketing strategies to promote safe behaviours has grown in use and popularity (Brennan & Binney, 2010; Delhomme, De Dobbeleer, Forward, & Simões, 2009) because of its ability to reach and affect large audiences (Andreasen, 2002; Grier & Bryant, 2005; Storey, 2008; Wundersitz et al., 2010). This influence has triggered an abundance of advertisements to draw on communication strategies that elicit emotions in order to promote socially beneficial behaviours. One communication strategy that has gained notoriety in social persuasion marketing literature (Laskey, Fox, & Crask, 1995; Rothman, Bartels, Wlaschin, & Salovey, 2006), yet, has received mixed reviews, concerns the framing of the advertisement argument (Block & Keller, 1995; McQuarrie & Mick, 1999; Meyers-Levy & Maheswaran, 2004; Schneider et al., 2001).

Advertisements can be framed using neutral, positive or negative wording. The message content may also use goal framing to encourage individuals to engage in a behaviour (for example, adhere to the legal speed limit) by depicting the positive consequences of performing the action (positive, gain-framing) or the negative consequences of not performing the action (negative loss-framing). For instance, in an anti-speeding advertisement a positive gain-framed message may read “slower speeds = happy people”, whereas, a negative loss-framed message

could be “slow down before your life comes to an abrupt stop”. The type of framing used in a message is believed to influence an advertisement’s effectiveness and lead individuals to make different choices, a phenomenon known as ‘the framing effects’ (Akl et al., 2011). Fear appeals, that centre on the negative consequences of not performing the action and evoke negative emotions in the hope to stimulate attention and encourage individuals to take up the advertised recommendation (Cauberghe et al., 2009; Ruiter, Abraham, & Kok, 2001; Witte & Allen, 2000) are considered to be an extreme form of negative loss-framing (Wundersitz et al., 2010).

An array of studies that have been conducted to investigate the influence of message framing on advertisement engagement (Brennan & Binney, 2010; Dillard & Peck, 2000; Frazer, Sheehan, & Patti, 2002; Maciejewski, 2004; Noble, Pomering, & Johnson, 2014; Rossiter & Thornton, 2004). However, the extent by which people are persuaded by negative or positive framing and accept the message by altering their attitudes, intentions or behaviours to be attuned with the advertisement’s content is to date inconclusive (Dillard & Anderson, 2004; Dillard, Weber, & Vail, 2007; Williams, 2012). Preceding studies posit that both positive gain-frames and negative loss-frames can enhance the appraisal of the issue being advertised and aid persuasion when compared with information bestowed in a neutral form (Lewis, Watson, & White, 2010; Sheth & Pham, 2008). Yet, one question that remains unanswered in literature is which type of framing strategy is the most robust and influential enhancer (Levin, Schneider, & Gaeth, 1998).

In spite of the profuse and growing body of literature in the domain of public health, research examining the effects of negative and positive framing too often produces mixed or conflicting results (Delhomme et al., 2009). Zhao and Pechmann (2007) conducted two experiments examining over 1000 adolescent’s responses to anti-smoking advertisements. The authors found that for non-

smokers, who were prevention-focused (motivated to avoid threats to their health), negatively framed advertisements were significantly more effective than positively framed advertisements when preventing intentions to initiate smoking. In contrast to Zhao and Pechmann's (2007) findings, however, a meta-analytical review conducted by Gallagher & Updegraff (2012) found that positive gain-framed messages were significantly more likely to change people's behaviours when the goal was related to illness prevention behaviours such as smoking initiation.

The negative outcomes of risky driving behaviours are also frequently depicted in road safety advertisements. Yet, despite a common finding in public health and social persuasion literature that negative loss-framed advertisements are more effectual when it comes to perceptions to act and message acceptance than positively framed advertisements (Chang & Lee, 2010; Chang & Lee, 2009; Krishnamurthy, Carter, & Blair, 2001),positively framed advertisements that focus on the benefits of adopting a safe behaviour have been found to be more successful than negative framed advertisements in several road safety studies (Millar & Millar, 2000; Sibley & Harré, 2009). This is evidenced by a study investigating the effects of message framing on drunk-driving behaviours by Sibley and Harre (2009). Here the authors found that positively framed drunk-driving advertisements that depicted safe driving behaviours (for example, taking a taxi) were more likely to have a significant impact on self-enhancement bias (the desire to maintain good feeling about oneself) in driving ability and caution than negatively framed advertisements that depicted negative outcomes (for example, injuries or fatalities caused by driving whilst under the influence of alcohol).

Moreover, some studies have found that negative loss-frames are useful when attempting to capture an individual's attention (Cacioppo, Gardner, & Berntson, 1997; Lewis, Watson, Tay & White, 2007), produce greater message engagement

(Meijnders, Midden, & Wilke, 2001; Pham et al., 2013) and motivate action (Nabi, Dillard, & Pfau, 2002). Other studies, however, have suggested quite the reverse (Cauberghe et al., 2009; Fiske & Taylor, 2013; O'Keefe & Jensen, 2008). For example, in a study employing eye-tracking technology and a masked recall test to investigate how framed messages affect participants' visual attention and cognitive processing abilities by O'Malley and Latimer-Cheung (2013), the authors found that positive gain-framed messages had the advantage over negative loss-framed messages. With the positive gain-framed messages used in the study found to facilitate a greater amount of fixations, dwell time and advertisement recall than the negative loss-framed messages. Even so, in a contemporary pilot study using a Tobii eye-tracking device to examine participants' visual attention to gain and loss-framed anti-smoking advertisements no significant differences were observed. Nonetheless, Vlasceanu and Vasileno (2015) did find circumstantial evidence to suggest that negatively framed advertisements are attended to more by smokers with lower nicotine dependence but have no intentions to quit, whereas, greater attendance to positive gain messages was observed for smokers who intended to quit smoking with the next six months. The circumstantial evidence in this area and apparent lack of consensus has forced researchers to re-evaluate other dominant factors that may impact on message framing and persuasion effects. To include, an individual's emotional state, an area that has received considerably less attention in message framing research (Bolls, Lang, & Potter, 2001).

2.2.1 Advertisement likability and individual mood states

It has been said that both the thoughts and feelings that someone experiences when viewing an advertisement can affect whether an individual accepts a message recommendation or not. The pleasing and attractive qualities of an advertisement, or an individual's emotions measured by advertising likability, is

believed to impact on an advertisement's ability to gain an individual's attention and remain in their memory, with these memories influencing future intentions to act (Elliott, 2011). Indeed, advertisement likability has been found to be a significant predictor of advertisement effectiveness, measured by market awareness and purchase intent, in more than one advertisement research project (Ewing, Napoli, and DuPlessis, 1999 cited in Williams, 2011; Haley & Baldinger, 2000). In contemporary literature too, the emotion 'liking' has also been found to influence the processing of an advertisements message (Chung & Zhao, 2003) and increase positive arousal, which in turn, has been found to create positive attitudes towards an advertisement's recommendation (Smit, van Meurs & Neijens, 2006).

Another closely related viewpoint is that the perceived effectiveness of a message frame is dependent on the mood, or affective state, of the individual at the time of viewing the advertisement. It must be noted, however, that whilst moods and emotions are closely related concepts that are often used interchangeably in the literature there are several notable distinctions. Whereas emotions are described as intense short-lived psychological and physical reactions directed at a stimulus that varies in levels of positive to negative valence and arousal (Megías, Di Stasi, Maldonado, Catena, & Cándido, 2014). Moods, in contrast, are considered to be non-expressive positive or negative feelings (affective states) that often encompass more than one emotion and are liable to change depending on a number of distinct factors (Matthews, Jones & Chamberlain, 1990). For example, an individual may wake up in a good mood and have it ruined by an unpleasant statement or begin the day in a bad mood but have it altered by a pleasant outcome or stimuli.

According to the hedonic contingency framework (Wegener & Petty, 1994) people in a positive mood are more likely to be attentive towards an advertisement than people in neutral or bad moods because they are more

aware of the congenial effects of their actions. It is proposed, therefore, that people in a happy mood are more influenced by positive gain-framed messages than negative loss-framed messages as they are more likely to absorb uplifting messages and ignore depressing ones (Wegener, Petty, & Smith, 1995). This notion has been supported by several more recent research articles (Keller, Lipkus, & Rimer, 2003; Yan, Dillard, & Shen, 2010). For example, a study conducted by Yan, Dillard and Shen (2010) exploring the effects of mood, message framing and health behaviour promotion on persuasion with a sample of 134 undergraduate communication students from an American University. Parallel to Wegener, Petty and Smith's (1995) proposal, the authors identified a related congruence effect, with gain-framed messages found to be more persuasive for students in a happy mood and loss-framed messages more persuasive for students in sad moods. This notion, however, is not supported by everybody. For instance, in stark contrast Chang (2007) argues that for people in a negative mood, positively framed advertisement messages can be more effectual than negatively framed messages, and for people in a positive mood the reverse is observed.

2.2.2 Fear appeals

Another area where emotional states have been acknowledged has been in the 'fear appeal' literature. 'Fear appeals' endeavour to arouse fear in an individual using extreme versions of negative loss-framing where severe threats or losses are presented to the viewer. Several theories and models have been put forward to describe the influence of emotional arousal in fear appeal advertisements, including several adaptations of drive theories such as the fear-as-acquired drive model, family of curves and non-monotonic models (see Eagly & Chaiken, 1993) and Leventhal's (1970) Parallel Response Model. Two of the more influential fear appeal models in literature today are Rodgers (1975) Protection Motivation Theory and Witte's (1992) Extended Parallel Process Model (EPPM).

Rodgers (1975) Protection Motivation Theory was novel at this time in conceptualising an interaction between an individual's fear arousal and their cognitive appraisal of the situation in terms of: severity (how severe someone believes the situation is), susceptibility (how susceptible to the threat someone believes they are), self-efficacy (how capable someone believes they are at performing the given behaviour) and response-efficacy (how convinced someone is that the behaviour will avert the threat). According to Rodgers (1975) these cognitive constructs contribute towards whether or not an advertisements message is accepted. Minimal support for Rodger's theory, however, led to the development of Witte's (1992) Extended Parallel Process Model (EPPM).

The EPPM, developed further by Witte in 1994, aimed to predict how people react when confronted with fear inducing stimuli. It was suggested that when an individual confronts fear inducing stimuli they produce two evaluations of the message which could result in different behavioural outcomes. In the first evaluation, people appraise the risk highlighted in the advertisement. The more susceptible they believe they are to the risk, the more motivated they are to change their behaviour. The second evaluation is related to the perceived level of threat. This can produce two different outcomes; if the perceived threat is low then there is no additional motivation to process the message any further and it is ignored, however, if the threat is perceived as severe, fear initiates action. What action occurs depends on the person's self-efficacy and response-efficacy. For example, if the person believes; they are able to perform the suggestion and the suggestion will alleviate the threat they are likely to adopt the proposed advertisement recommendation. In contrast, if they do not believe; they are able to make the changes proposed in the advertisement or that the recommendation will work in averting the threat they are likely to control the fear by rejecting the message through the use of denial strategies (for example, asserting the statement is not true) or avoidance (Witte, 1992; 1994).

To summarise, according to the EPPM, for an advertisement to be effective the individual must perceive that they are susceptible to the risk. The risk must be severe enough to produce moderate to high levels of arousal and there must also be high levels of perceived self- efficiency and response efficiency (see Figure 1).

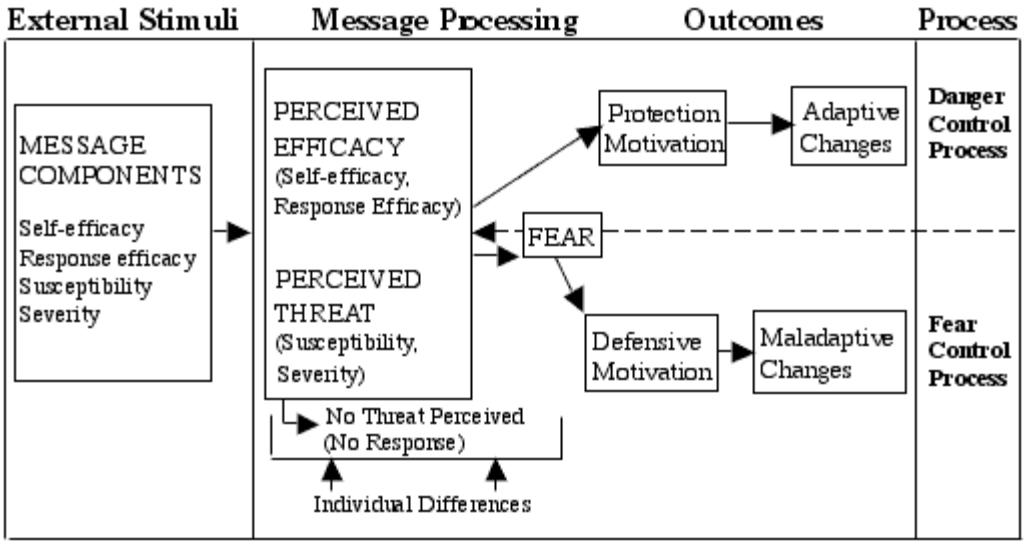

Figure 1: Extended Parallel Process Model (EPPM) (Witte, 1992)

Research has shown some support for the EPPM (Dillard & Anderson, 2004; Cauberghe, De Pelsmacker, Janssens, & Dens, 2009; Maloney, Lapinski, & Witte, 2011; Peters, Ruiter, & Kok, 2013). A meta-analytical review on fear appeals across almost 50 years of research found a reliable correlation between fear and persuasion (Witte & Allen, 2000). Fear appeals that produced high levels of fear, high perceived risk and high efficacy were identified as the strongest predictors of persuasion and behavioural change (Witte & Allen, 2000). Moreover, in a focus group setting where participants were asked to provide ratings on six fear appeals, including one on distracted driving, Witte's EPPM was found to have explained over 70% of the variation in perceived fear appeal effectiveness. With the most influential predictors being fear arousal (p<.001) and graphic content (p<.002), followed by perceived susceptibility (p<.01) (Lennon & Rentfro, 2010).

The widespread use of fear evoking strategies in road safety advertising, nonetheless, remains contentious (Lewis, Watson, White, & Tay, 2007). For example, when Carey, McDermott and Sarma, (2013) conducted a meta-analysis on a series of experimental road safety research conducted between 1990 and 2011 they found that although experimental groups reported significantly more fear arousal than control groups, the effects on driving outcomes was non-significant. Leading the authors to conclude that, ultimately, fear arousal does not have the desired impact on promoting safe driving behaviours. Despite the controversy surrounding the use of fear appeals in road safety advertising, there is little debate about the influence of perceived risk (severity and susceptibility) and efficacy (response-efficacy and self-efficacy) in facilitating advertisement persuasiveness and behavioural change. Accordingly, these concepts have received considerable attention in both advertising and message framing research as detailed below.

2.2.3 Perceived risk and level of involvement

It has been suggested that the effectiveness of positive gain or negative loss-framed information is dependent on the perceived risk (an individual's perceptions of susceptibility and severity) associated with the recommended behaviour (Ferrer, Klein, Zajac, Land, & Ling, 2012; Hull, 2012; Van't Riet et al., 2014; Wansink & Pope, 2015).

According to the Prospect Theory, (Kahneman & Tversky, 1984, 1986) an early but prominent theory that depicts different reactions to information presented as either a loss or gain-frame; when the risks are low or people are certain of the outcomes, individuals will base their decisions on perceived gains rather than losses for the reason that they do not wish for the choice to affect their mood. Several authors have supported this notion (Hoekstra & Wegman, 2011;

Rothman et al., 2006; Yang, 2013). For example, Rothman et al., (2006) suggest that a gain-framed message that endorses the benefits of prevention behaviours are more effective than a loss-framed message when the behaviour is viewed by the individual as low risk, whereas, loss-framed messages have the advantage when the prevention behaviour is associated with high risks or disagreeable outcomes. Research has also shown that perceived outcomes can moderate responses to message frames. For instance, when people are certain of the behavioural outcomes, gain-framed messages have been found to be more persuasive than loss-framed messages. In contrast, when people are less certain of the outcomes more in-depth-processing is stimulated and loss-frames are more influential (Apanovitch, McCarthy, & Salovey, 2003).

It has been suggested that the effects of perceived risk on message framing can also be influenced by the individuals' level of involvement with the subject matter (Wansink & Pope, 2015). When a person is highly involved or interested in the area depicted in an advertisement they are more motivated to methodically process the message than people who are not (Rossiter, Donovan, & Jones, 2000). In a road safety context, for behaviours that enhance driver safety and reduce risk (for example, correct seatbelt use or driving at the legal speed limit) it is proposed that when an individual is highly involved with the issue, positive gain-framed messages are more effective than loss-framed messages. This is reflected in a road safety study where Millar and Millar (2000) found that when drivers had been involved in a road traffic collision in the past or believed that it was possible that they could be involved in an accident, sustain injuries or be killed in the future, gain-framed messages that encouraged safe driving behaviours promoted significantly higher levels of agreement with the message content and a greater intention to driving safely than did loss-framed messages.

2.2.4 Perceived self-efficacy and response-efficacy

According to Bandura (1989), a person's level of self-efficacy (or a belief in one's ability to perform or produce results) can either enhance or impede persuasion. Indeed, a range of studies indicate that perceived self-efficacy can influence the perceived effectiveness of gain-framed or loss-framed messages (Choe, Lee, Munson, Pratt, & Kientz, 2013; Covey, 2014; Danaher, Smolkowski, Seeley, & Severson, 2008; Updegraff & Rothman, 2013). In a recent systematic review of 47 published articles exploring the effects of gain-framed or loss-framed health messages by Covey (2014) an interaction between self-efficacy beliefs and message frame effectiveness, measured by attitude change, intentions or behaviour, was identified. However, the authors suggest that the relative perceived effectiveness of gain-and-loss-framed messages, on a whole, are dependent on the disposition differences of each individual.

Nonetheless, there is evidence to suggest that when self-efficacy is low people are predisposed to present defensive reactions to negatively framed messages which can prevent action (Ruiter, Abraham, & Kok, 2001). Whereas, for individuals with high self-efficacy beliefs (a strong belief that they will be able to perform the behaviour), there is a greater inclination to act on the advocated behaviour after receiving a loss-framed message than after receiving a gain-framed message. This was evidenced in a study by Van't Riet, Ruiter, Werrij and De Vries (2010) were the authors evaluated the influence of self-efficacy on the effects of gain-and-loss-framed messages on skin cancer detection using 124 undergraduate students. Whilst no perceptions of action differences were revealed between gain-and-loss-framed messages, for participants with high self-efficacy, the loss-framed message used in the study resulted in significantly higher intentions to perform self-skin examinations than did the gain-frame message. Moreover, in a 2009 anti-speeding threat appeal evaluation, where 170 young adults between the ages of 18 and 27 years were asked to rate low to high threat anti-speeding public service announcement messages on several indirect

effectiveness outcome measures, including message engagement, anti-speeding attitudes and future intentions (including adhering to the speed limit and convincing friends not to drive over the speed limit). Perceived self-efficacy was found to independently influence participants' self-reported engagement with the anti-speeding message (Cauberghe et al., 2009).

Another closely related cognitive construct to self-efficacy, which is also believed to mediate the outcome measures of the frame of a message, is response-efficacy. Response-efficacy (the degree to which one believes that an advertisement recommendation will avert a threat) has also been conceptualised in literature as both a message characteristic and something that varies depending on the dispositional differences of an individual (Witte, 1992). In road safety literature, high levels of response-efficacy (a strong belief that the suggestion depicted in the advertisement will avert the threat) have been found to be negatively correlated with message rejection and positively correlated with self-reported intentions to adopt the recommendation in the advertisement (Tay & Watson, 2002). Response efficacy, too, has been found to be a significant predictor of advertisement message effectiveness measured by message acceptance and behavioural intentions (Lewis et al., 2003; Tay & Watson, 2002), and, in several studies, revealed to be a more powerful predictor of behavioural intentions and persuasion than negative emotions such as fear (Floyd et al., 2000; Witte & Allen, 2000). Moreover, Lewis et al., (2010) conducted an online study with 406 licensed drivers and found that response-efficacy was recognised as a factor that mediated the acceptance or rejection of both negative and positive emotion-based anti-speeding messages.

2.3 Image valence and effective advertising

Non-verbal stimuli such as pictures are commonly used in advertisements to reinforce the message (Unnava & Burnkrant, 1991). The addition of an image can enhance an advertisement's appeal or likeability. Eye-tracking (Yantis, 2005) and brain imaging research has revealed that visual cues are highly salient in the early stages of human perception, particularly emotional images (Ihssen & Keil, 2009; Peyk, Schupp, Keil, Elbert, & Junghöfer, 2009; Schupp, Schmälzle, Flaisch, Weike, & Hamm, 2013), and thus, direct heighted levels of visual awareness (Geise & Baden, 2014; Most, Chun, Widders, & Zald, 2005; Sheth & Pham, 2008). Moreover, both early (Childers & Houston, 1984) and more recent (Öhman, Flykt, & Esteves, 2001; Vuilleumier, 2005) literature in the field posits that pictures are more effortlessly recalled than words and can affect message learning by enhancing the memorability of information. This is especially true of emotional stimuli which has been found to assist the recall and processing of an advertising message (Öhman et al., 2001; Vuilleumier, 2005).

Whilst image valence has received considerably less attention in marketing and advertising literature in comparison to textual information, several studies have alluded to its potential influence in mediating message framing and advertisement success. For example, in a study investigating the influence of message framing and image valence on charitable appeals, Chang and Lee (2009) found that when a negative image was paired with a negative message frame greater donation intentions and likelihood to participate in voluntary work was observed. This was more effective than when a positive image was paired with a positive message frame, or when an image was paired with an incongruent message frame. Moreover, in an eye-tracking study investigating participants visual attention to traditional and graphic tobacco warning labels, Peterson, Thomsen, Lindsay and John (2010) found that although there were no significant differences in dwell time between the negative or neutral advertisements. That is, participants spent equal amounts of time viewing both types of advertisement

regardless of the type of message frame used. When the negative messages contained graphic images significantly higher levels of visual attention were directed towards the advertisement message.

Similarly, Strasser et al., (2012) examined differences in participants' visual allocation and recall of graphic and text-only cigarette warning advertisement labels via the use of eye-tracking technology and a masked recall task. In their study, participants were randomised into one of two conditions. In one condition participants saw a cigarette advertisement containing graphic warning labels. In the other condition participants were shown a text-only advertisement labels. Akin to earlier research, the results of this study revealed that the graphic cigarette warning labels facilitated significantly greater levels of visual attention than the text-only advertisement labels. With the graphic cigarette warning labels that were faster at drawing participants' visual attention and resulted in greater amounts in dwell time found to be associated with superior message recall.

2.4 Conclusion

Chapter two has provided a review of the literature exploring the functionality of message framing and image valence in advertising persuasiveness. The influencing effects of advertisement likability, an individual's mood and the cognitive constructs of perceived risk and efficacy were also discussed. This review is of particular importance as these topics, together, form an overture to the central areas under investigation in the present study.

Chapter 3: Applied focus of the research

3.1 Introduction

Chapter three provides an outline of the applied focus of the current research: road safety and anti-speeding poster advertisements.

3.2 Background and global context

3.2.1 Road safety

Road traffic collisions are a serious problem across the world (Sibley & Harré, 2009). Recent road safety statistics have revealed an annual 4% increase in road fatalities and a 2% increase in those killed or seriously injured (KSI) in Great Britain, with 1,750 people killed and over 24,000 KSI casualties between 2013 and the year ending March 2014 (Department of transport, 2014). Moreover, annually across Europe, it is estimated that more than 40,000 people are killed in road traffic collisions (Delhomme et al., 2009), and globally, approximately 1.24 million road fatalities and 20 to 50 million additional injuries are documented (WHO, 2013).

The World Health Organisation has positioned traffic collisions as the eighth most important world health problem and proposes that by the year 2030 road traffic collisions will be ranked fifth place in the leading causes of death unless action is taken. Besides the pain and suffering caused by road traffic collisions, there are also huge social and financial costs (WHO, 2013). Whilst a variety of factors are believed to contribute to road traffic collisions (Petridou & Moustaki, 2000), according to the World Health Organisation (2013), speeding, which influences both crash risk and crash consequence, is at the core of the problem.

3.2.2 Speeding and Accident Analysis

Speeding is commonly recognised in literature as the single most significant causal factor of road traffic collisions worldwide (Campbell & Stradling, 2003; Hatfield, Fernandes, Faunce, & Job, 2008; Plant, Reza, & Irwin, 2011; Quimby et al., 2005). Identified as driving over the posted maximum speed limit or driving at excessive speeds, speeding is both associated with high indices of road collisions (Abdel-Aty & Radwan, 2000; Afukaar, 2003; Vernon, Cook, Peterson, & Dean, 2004) and positively correlated with injury severity and fatality (Pei, Wong, & Sze, 2012; Vorko-Jović, Kern, & Biloglav, 2006). In developing countries alone, speeding behaviour is believed to account for 25-30% of all road traffic collision fatalities (cited in Kaye, White, & Lewis, 2013). In a review using road traffic collision data from the United Kingdom (UK), Clarke, Ward, Bartle, & Truman, (2010) found that over 60% involved vehicles driving at excessive speeds.

Empirical evidence showing a positive relationship between vehicle speed and collision and fatality is also evident from road safety literature. For example, Finch, Kompfner, Lockwood and Maycock (1994) found that a change of just 0.62 miles per hour (mph) led to a 3% change in the number of collisions on the road (Finch, Kompfner, Lockwood, & Maycock, 1994). Similarly, Taylor Dean and Podd (2002) discovered that when contributing factors such as road type and traffic density were included a 1mph increase in speed was associated with a 5% increase in road traffic collisions. Moreover, in another research study travelling at speeds of 70mph or more has been linked with a 164% increase in fatality probability compared with travelling at less than 35mph (Bedard, Guyatt, Stones, & Hirdes, 2002).

From January to October 2014, 2,346,367 UK driving licence holders received penalty points for speeding offences (DVLA, 2014). Furthermore, each year in the UK official statistics reveal that around two million speeding penalties are given

to drivers (Fiti & Murray, 2006). Nonetheless, the relationship between speeding and vehicle collisions is well known. In a survey conducted by Quimby, House and Ride (2005) the findings showed that 90% of the UK drivers who took part widely recognised excessive speed as key factor in road traffic collisions. Moreover, research conducted on vehicle users' attitudes towards speeding has revealed that speeding, when compared to other illegal behaviours, is much less likely to be viewed as a criminal offence. If an individual is caught speeding, it is typically viewed as "unlucky' as opposed to "reckless" or "unlawful" (Elliott, 1992). Consequently, there remains a great need for the development of effective anti-speeding advertisements that reach and persuade vehicle users to adhere to legal speed limits and reduce excessive speeding behaviour (Plant et al., 2011).

3. 3 Road safety and anti-speeding advertisements

The ultimate goal of anti-speeding advertisements is to challenge the issue of excessive vehicle speed by increasing a vehicle user's motivation to comply with legal speed limits (Elliot & Armatige, 2006). In road safety, this is achieved through convincing a vehicle user to initiate change and alter their behaviours. The communication task for advertisers can be rooted in reduction terms by lowering road traffic collision involvement through persuading vehicle users to initiate positive behaviours (Storey, 2008). Alternatively, through de-motivation, when the goal is to decrease a vehicle user's existing behaviour (Hoad, 2008 cited in Elliott, 2011). Nonetheless, the first task of any anti-speeding advertisement is to be noticed and gain the vehicle users attention and the second task is to make sure it is committed to memory. As the literature discussed in chapter one and two suggests, a way of achieving this is to generate some form of emotional response, whether it be positive or negative (Elliot, 2011).

Indeed in the road safety domain, Lewis, Watson and White (2008) have found that messages that induce emotions have the potential to increase the persuasiveness of the advertisement. This is especially so when trying to alter a males' speeding behaviour (Lennon & Rentfro, 2010; Lewis, Watson, Tay, et al., 2007). Moreover, while vehicle users may at times require information specifying how to be safer on the roads, a meta-analytical review of over 80 road safety advertisement campaigns revealed that campaigns with deliberately persuasive or emotion aspects were found to be preferable over campaigns that used an educational approach (Elliot, 1993 cited in Delhomme et al., 2009).

Accordingly, positive gain-framed message strategies that focus on the advantages of adopting safe behaviours (for example, "slower speeds = happy people") or negative loss-framed messages (for example, "slow down before your life comes to an abrupt stop") that focus on the negative consequences of the behaviour are frequently utilised in road safety advertisement campaigns. The most frequently used are negative loss-framed messages (Hoekstra & Wegman, 2011; Kaye et al., 2013), which are more often than not accompanied with fear or negative valence images illustrating road traffic collisions, fatalities, injuries, or the pain and sorrow of the casualty, friends or relatives.

3.3.1 Anti-speeding posters and static roadside advertisements

Current countermeasures against speeding behaviours are vast and varied, and many different media communication tools are drawn on to promote safe driving practices from television and radio to printed and outdoor media. Indeed, outdoor media, such as billboard posters and other static roadside advertisements are extensively utilised to combat road traffic collision involvement issues given their 'on the spot presence', high exposure rates, long life spans and low costs (Delhomme et al., 2009). Yet, despite their prolificacy, to date, too few evaluative studies have been conducted on their relative

effectiveness insofar as anti-speeding advertisements are concerned (Donovan, Jalleh, & Henley, 1999; Philips & Torquato, 2009).

However, in a meta-analysis, investigating the effects of 67 road safety campaigns on road traffic collisions across 12 countries over 32 years, a positive correlation between reducing road traffic collisions and the use of roadside media was established (Phillips, Ulleberg, & Vaa, 2011). Furthermore, two empirical studies where anti-speeding advertisements have been evaluated, a significant reduction in speed-related collisions has been identified (Tay, 2004, 2005). It is also insinuated that this mode of communication has the potential to capture a driver's attention for relatively long periods of time (Crundall, Van Loon, & Underwood, 2006; Lee, McElheny, & Gibbons, 2007) and be widely remembered by the target audience (Etter & Laszlo, 2005; Wundersitz et al., 2010).

It has been suggested, however, that the methods used to evaluate anti-speeding advertisement can at times be found lacking. Explicitly, Plant et al., (2011), the authors of a contemporary 'systematic review of how anti-speeding advertisements are evaluated' have postulated that at times the methodological limitations of the evaluations have affected the reliability and validity of the reported findings. Of the 28 anti-speeding studies reviewed, three prominent limitations of interest were emphasised by the authors. One, a sampling bias was noted, with half the experimental evaluations recruiting only undergraduate students as participants. Two, while half the experimental evaluations measured participants perceptions of the advertisement, including recall and awareness, only one study measured direct measures of speeding behaviour using a driving simulator. Three, conversely while almost all the experimental studies (94%) evaluated negative appeals, far less explored the outcomes of positive appeals (25%) or neutral advertisements (19%).

3.4 Conclusion

Chapter three provided an outline of the applied focus of the research: road safety and anti-speeding poster advertisements. First, a background on the global impact of road traffic accidents, and speeding as a chief factor in the road traffic accident involvement process, was presented. Second, the application of emotion and message framing in road safety and anti-speeding advertisements was deliberated. Third, the effects of anti-speeding posters and static roadside advertisements were reviewed. This chapter is of particular importance as the current study uses mixed methods to explore the differential effects of negative loss, positive gain and neutral message frames paired with congruent images in anti-speeding poster effectiveness. Advertisement effectiveness in the study will be defined by how much the advertisement content gains the drivers' attention is remembered and persuades the participants to adhere to the legal speed limit.

Chapter 4: Research rationale, aims and hypotheses

4.1 Research rationale

The ultimate goal of anti-speeding advertisements is to challenge the issue of excessive vehicle speed by increasing a vehicle user's motivation to comply with the legal speed limit (Elliot & Armatige, 2006). Therefore, for an anti-speeding advertisement to be deemed effective, it must either promote positive driving behaviours, such as driving at the legal speed, or eliminating negative behaviours by persuading drivers not to speed (Storey, 2008). However, before this can be achieved, the advertisement must first gain the driver's attention and remain in their memory (Elliott, 2011).

Thus far, there is limited literature evaluating the effectiveness of anti-speeding advertisements insofar as persuasion and direct measures of behaviour are concerned (Plant et al., 2011). Nonetheless, stimuli that evoke emotions have been found to aid visual attention (Elliott, 2011; Sheikh & Titone, 2013), improve memorability (Bakalash & Riemer, 2013; Citron et al, 2014; Sharot & Phelps, 2004), and influence cognitive and behavioural responses (Dillard & Anderson, 2004; Dillard & Peck, 2000), particularly words (Elliot, 2011) and images (Geise & Baden, 2014; Most, Chun, Widders & Zald, 2005; Sheth & Pham, 2008) with high emotional valence. With negative loss-framed messages containing congruent images found to be most effective at attaining visual attention, associated recall and action intentions in number of advertising studies (Chang & Lee, 2009; Peterson, Thomsen, Lindsay, & John, 2010; Strasser, Tang, Romer, Jepson, & Cappella, 2012). Accordingly, researchers from various disciplines, including marketing, public health and road safety today acknowledge the significance of emotional content when developing persuasive advertisement campaigns aimed at influencing decision-making and behaviour (Kemp, Bui, & Chapa, 2012; Lennon

& Renfo, 2010; Lewis et al., 2008; Malhotra, 2005; Peters, Lipkus, & Diefenbach, 2006) .

Yet, whilst the role of emotion in advertising has received copious consideration, the extent to which drivers attend to, remember and are persuaded by the emotional content of negative loss and positive gain message frames paired with congruent images in anti-speeding poster advertisements is to date inconclusive. With far less is known about the outcomes of neutral anti-speeding advertisements (Plant et al., 2011). Indeed, it is difficult to deduce which framing strategy is most effective in the road safety domain as framing effects appear to differ depending on multiple factors (Delhomme et al., 2009). Factors, to include: likeability (Elliott, 2011), an individual's mood (Yan, Dillard, & Shen, 2010), emotional arousal and the graphic content of an advertisement (Witte & Allen, 2000; Lennon & Renfro, 2010); the cognitive constructs of perceived risk (Rothman et al., 2006) and perceived efficacy (Cauberghe et al., 2009; Lewis et al., 2007) and the participants' level of involvement (Millar & Millar, 2000). All of which have been attested to impact the effectiveness of an advertisement.

The objective of the current research study was to extend on current literature. This was accomplished by revisiting several key concepts with an endeavour to ascertain which type of anti-speeding advertisement strategy (negative, positive or neutral) is the most effective and influential persuader in the road safety domain. A combination of experimental and self-report methods was used. With the influence of message framing and image valence explored using both direct measures of advertisement effectiveness (including visual attention, recall and average driving speed using a driving simulator) and indirect measures of advertisement effectiveness explored via perceptions of persuasiveness

4.2 Research Aims

The present study had five aims:

(1) To evaluate the effectiveness of negative, positive and neutral anti-speeding advertisement strategies in gaining participants' attention and regulating speeding behaviour via direct measures of visual attention and simulated driving speed.

(2) To evaluate the effectiveness of anti-speeding advertisement strategies (negative, positive and neutral) on participants' message and image memorability via a series of direct measures of recall.

(3) To evaluate indirect measures of effectiveness the between the three anti-speeding advertisements (negative, positive and neutral) via participants' self-reported perceptions of advertisement persuasiveness, (the perceived effectiveness of the advertisements in convincing the vehicle user and other drivers to adhere to the legal speed limit).

(4) To explore the influence of participants' subjective affective state (mood) and the emotional arousal produced by negative, positive and neutral message framing and image strategies in predicting self-reported advertisement effectiveness, measured via participant's perceptions of advertisement persuasiveness.

(5) To explore the influencing effects of advertisement likability, emotional and graphic content, the cognitive constructs of perceived risk and efficacy, and participants' level of involvement in predicting self-reported advertisement effectiveness via indirect measures of perceptions of persuasiveness.

4.3 Research Hypotheses

The research hypotheses are:

Hypothesis 1: During the simulated driving experiment, the negative anti-speeding poster advertisement will facilitate significantly more visual attention, recall and anti- speeding behaviours than positive or neutral anti-speeding advertisements.

Hypothesis 2: There will be a significant difference in participants' self-reported perceptions of persuasiveness between the three different types of anti-speeding advertisement poster.

Hypothesis 3: The mood and emotional arousal produced by the message framing and image strategies will be predictors of self-reported perceptions of persuasiveness with regards to the perceived effectiveness of the advertisement in convincing the vehicle user to adhere to the legal speed for the negative and positive anti-speeding advertisements.

Hypothesis 4: Graphic content, high perceived risk, high response-efficacy and low self-efficacy beliefs will be predictors of participants' self-reported perceptions of advertisement persuasiveness with regards to the perceived effectiveness of the advertisement in convincing the vehicle user to adhere to the legal speed for the negative anti-speeding advertisement.

Chapter 5: Research methodology and pre-test

5.1 Introduction

This chapter begins by introducing the rationale for the research design and sampling considerations for the current research study. Justifications for the primary research tools are then provided. This is followed by the anti-speeding advertisement developmental process; selection of anti-speeding advertisements; the message framing and image valence pre-test; and anti-speeding advertisement composition and design. Finally, it concludes with a description of the experimental pilot study.

5.2 Rationale for research design

A repeated-measures experimental mixed methods design was employed. There were two reasons for using a repeated-measures design: First, as long as order effects were controlled for by counterbalancing (Field, 2009) this type of design would permit a reduced sample size (Howitt & Cramer, 2007). Second, this style of design was best suited to the research approach given that there is less variation in individual differences in a repeated measures design with regards to; the anti-speeding advertisements framing and image effects (Levin, Gaeth, Schreiber, & Lauriola, 2002); visual working memory (Luck & Vogel, 2013); and driving behaviour (Schwebel, Severson, Ball, & Rizzo, 2006). The implementation of an experimental mixed methods design using both direct (behavioural) and indirect (self-reports and perceptions) measures of advertisement effectiveness enabled the effects of the negative, positive and neutral anti-speeding advertisements to be evaluated from a number of investigative perspectives.

5.3 Sampling considerations

A systematic review of how anti-speeding advertisements are evaluated highlighted issues of sampling bias with half the experimental evaluations recruiting only undergraduate students (Plant et al., 2011). Purposeful and snowball sampling was employed during the participant recruitment stage to maximise sample variability in gender, age, ethnicity, driving experience and prior levels of speeding involvement. Eighty percent of the participants who took part in the experimental study were recruited came from a non-student population.

5.4 Research tools: experimental and self-report measures

The research study used a variety of measurements to collect data. Justifications for the main research tools are detailed below:

5.4.1 The driving simulator

Participants' direct measures of average driving speed between the three anti-speeding advertisements (positive, negative and neutral) were explored using a driving simulator. This enabled advertisement effectiveness to be evaluated via participant's anti- speeding behaviours and speed regulation. The benefits of using a driving simulator over indirect measures of behaviour such as self-report intentions or likelihood to speed, or as an alternative to using vehicles, for experimental road safety research is well documented in the literature (Crundall et al., 2012; Jamson, Lai, & Jamson, 2010; Plant et al., 2011). In the present study, the use of a driving simulator also enabled experimental control and the manipulation of virtual traffic, pedestrians and the positioning of three static roadside anti-speeding advertisements in the driving scenario. Measurements of driving speed between the anti-speeding advertisements and experimental trials could also be assessed accurately and efficiently devoid of any potential safety risks (de Winter, van Leuween, & Happee, 2012). Besides virtual scenario

adaptability, ease of data collection and safety benefits, Rudin-Brown, Williamson and Lenné (2009) have also advocated driving simulation trials as an initial step when evaluating the effectiveness of new road safety campaigns.

5.4.2 The eye-tracking glasses

The use of eye-tracking technology to measure various aspects of an individual's visual attention has grown in popularity in the last 30 years. With emergent technological progress, eye-tracking equipment presents a novel, yet reliable, opportunity to investigate where and for how long an individual's visual attention is allocated (Duchowski, 2002; Mele & Federici, 2012). In addition to exploring visual allocation to emotional words and/or pictures in print advertisements (Higgins, Leinenger, & Rayner, 2014; Rayner, Rotello, Stewart, Keir, & Duffy, 2001; Sheikh & Titone, 2013) eye-tracking has been used to provide insights about the memorability (via a masked recall measure) of advertisement warnings (Strasser, Tang, Romer, Jepson, & Cappella, 2012). In the present study SensoMotoric Instruments (SMI) eye-tracking glasses, a portable non-intrusive eye-tracking device, was employed to enable the effectiveness of the advertisements in terms of gaining the drivers attention via visual allocation to the areas of interest (the static roadside anti-speeding advertisements in the virtual driving environment) to be assessed while participants were using the driving simulator.

5.4.3 The online survey

Qualtrics (an online survey software and insight platform) was used to collect direct measures of advertisement effectiveness with regards to message and image memorability via a series of masked recall tests. Indirect measures were used to measure participants' subjective thoughts, beliefs and feelings and self-reported perceptions of advertisement persuasiveness shortly after participation in the simulated driving experiment. Qualtrics was chosen over a traditional

hardcopy survey method as it allowed easy collection and storage of data and, where applicable, randomisation of the measurements.

5.4.4 Self-report measures of mood and emotional arousal: Message framing and image valence

Due to their advantage of being quick and user friendly, self-report measures of diverse emotional responses are extensively utilised in research (Poels & Dewitte, 2006). One self-report measure that appears to adequately encompass both an individual's mood and emotional arousal is the UWIST Mood Adjective Checklist (UMACL; Matthews, Jones & Chamberlain, 1990). In addition to measuring the overall pleasantness of a participant's mood, (measured by hedonic tone), the UMACL also provides a measure of both energetic and tense arousal. For this reason, the UMACL was chosen in the present study to explore the influence of the participants' affective state (mood) and emotional arousal produced by both the message framing techniques, and image types, in predicting the perceived effectiveness of the advertisement in convincing the vehicle user adhere to the legal speed limit.

5.5 The anti-speeding advertisement development process

Three anti-speeding advertisements with matched congruent message frames and images (negative, neutral and positive) were developed for this study. There were three stages involved in the anti-speeding advertisement development process: first, the selection of anti-speeding advertisements; second, the pre-testing of anti-speeding messages and images; and third, the anti-speeding advertisement composition and design.

5.6 Selection of anti-speeding advertisements

A total of 75 road safety posters were sourced online. A purposeful method of reviewing was undertaken to ensure that there was a variety of neutral, negative and positive anti-speeding messages and images. Of the 75 road safety posters, ten anti-speeding messages and 25 images were selected to be evaluated the by participants for message framing and image valence properties.

5.7 Message framing and image valence pre-test

5.7.1 Design

The message framing and image valence pre-test employed a quasi-experimental repeated measures design conducted online.

5.7.2 Participants

The pre-test was completed by 32 participants who did not take part in the main study. Due to missing data on a number of variables eight participants were later excluded. The analysis was, therefore, based on data from 24 participants (12 males and 12 females). The ages of the 24 participants ranged from 19 to 78-years-old (*M*=32.96, *SD*=12.39). All participants were native English speakers though ethnicities varied; 13 (54%) were White UK/Irish, four (17%) were Mixed White and Caribbean, two (8%) were White European, one (4%) was Black African, one (4%) was Black Caribbean, one (4%) was Asian-Indian, one (4%) was Mixed Other and one (4%) was Black Other. Sixteen of the 24 participants were vehicle users at the time of the survey. The remaining eight participants were a combination of passengers and/or pedestrians.

5.7.3 Materials

The ten anti-speeding messages chosen to be used in the pre-test varied in framing strategies and ranged from two to 11 words. The font style and size of all

message text was changed to Lucida Sans Unicode 10-point to strengthen consistency. The 25 images selected varied in valence and were desaturated to ensure that colour did not impact on participant ratings (Bottomley & Doyle, 2006).

A series of 7-point semantic-differential scales were utilised to assess message framing and image valence properties. The 7-point semantic-differential scales were derived from past research (Chang & Lee, 2009). To assess message framing participants were asked to specify their perception of each of the ten anti-speeding messages in terms of whether they believed the message focused on the negative consequences of not adopting a safe behaviour (negative loss-framing) or the message focused on the advantages of adopting a safe behaviour (positive gain-framing) from (1) 'Mostly Negative' to (7) 'Mostly Positive'. To evaluate image valence participants were asked to indicate what type of emotional response was evoked by each of the 25 images presented from (1) "Negative" to (7) "Positive". Written instructions were provided where deemed necessary. A copy of the instructions and materials and can be found in the Appendix A.

5.7.4 Procedure

Participants were instructed that their participation would involve filing out a series of questions. They were asked to answer each question openly and truthfully and informed that the study should take no longer than 15 minutes to complete. Participation in the pre-test was anonymous and voluntary. Participants could withdraw at any time and were also provided with the researcher's contact details should they require any additional information.

5.7.6 Results

The data from the pre-test was analysed using IMP SPSS version 19. Participants' scoring of the 7-point semantic-differential scales was averaged. The average

scores for the ten anti-speeding messages and 25 images were categorised as either; negative, neutral or positive. To ensure that the messages in each category were significantly different from each other an anti-speeding message and an image from each of these three categories were tested using repeated measures analysis of variances (ANOVAs). Bonferroni a priori tests were conducted to examine these differences in more detail.

5.7.6.1 Anti-speeding messages

Each message was grouped into one of three categories depending on the overall mean score values; negative (M < 3.5), neutral (M 3.5 - 4.5) and positive (M > 4.5). These groupings are consistent with typical categorisations for negative, neutral and positive stimuli (Chang & Lee, 2009). The means and standard deviations for the 10 anti-speeding messages are presented in Table 1.

Table 1

Participants' Anti-speeding Message Scores (N=24)

	Negative		Neutral		Positive	
Ratings	***M***	***SD***	***M***	***SD***	***M***	***SD***
Message 1	1.71**	1.30				
Message 2					5.37**	1.74
Message 3			3.83**	2.26		
Message 4	3.29	1.78				
Message 5	2.29	1.52				
Message 6			4.38	1.64		
Message 7	2.42	1.28				
Message 8					5.16	1.46
Message 9					5.33	1.61
Message 10	3.13	1.51				

*Note. Messages chosen for further analysis. ** Significant at the p<.01 level. Non-asterisked values are non-significant.*

Given the differences in the mean categorisation values, message 1 (*M*=1.71), message 2 (*M*=5.37) and message 3 (*M*=3.83) were analysed using a repeated measures ANOVA. Mauchly's test indicated that the assumption of sphericity had not been violated, $X^2(2) = 5.90$, $p = .052$, therefore the Sphericity Assumed results are reported. The results showed a significant effect of; $F(2, 46) = 27.38$, $p<.001$. A Bonferroni a priori test of multiple comparisons was undertaken to explore differences between these three messages. The Bonferroni Priori test showed a significant difference between all three message types. The pairwise comparisons attained were as follows; a significant difference of $p<.001$ was obtained between message 1 and message 2 (mean difference, -3.67) and message 2 and message 3 (mean difference, 1.54), while a significant difference of $p=.005$ was obtained between message 1 and message 3 (mean difference, -2.12).

5.7.6.2 Anti-speeding images

Each image was grouped into one of three categories depending on the overall mean score values; negative (*M* < 3.5), neutral (*M* 3.5 - 4.5) and positive (*M* >

4.5) (see Chang & Lee, 2009). The means and standard deviations for the 25 anti-speeding images are presented in Table 2.

Table 2

Participants' Anti-speeding Image Scores (N=24)

	Negative		Neutral		Positive	
Ratings	***M***	***SD***	***M***	***SD***	***M***	***SD***
Image 1	3.09	1.71				
Image 2	2.66	2.15				
Image 3					4.63	1.95
Image 4	3.22	1.54				
Image 5	3.38	1.89				
Image 6	2.81	2.15				
Image 7	3.13	2.22				
Image 8	3.28	1.67				
Image 9					5.22*	2.01
Image 10	3.00	1.98				
Image 11	3.28	1.76				
Image 12			4.28	1.65		
Image 13	2.91*	1.67				
Image 14					4.53	1.85
Image 15			4.03	1.71		
Image 16			4.16*	1.69		
Image 17	3.81	1.53				
Image 18	3.44	1.46				
Image 19	3.16	1.50				
Image 20			4.09	1.71		
Image 21	2.91	2.04				
Image 22			4.34	1.38		
Image 23	2.53	1.68				
Image 24			4.41	1.50		
Image 25	2.63	1.74				

*Note. Images chosen for further analyses. * Significant at the p<.05 level. Non-asterisked values are non-significant.*

Given the differences in the mean categorisation values, images 9 (*M*=5.22), 13 (*M*=2.91) and 16 (*M*=4.16) were analysed using a repeated measures ANOVA. Mauchly's test indicated that the assumption of sphericity had this time been violated, $X^2(2) = 8.55$, $p = .014$, therefore Greenhouse-Geisser corrected tests are reported. The results showed a significant main effect of; $F(1.51, 34.79) = 14.36$, $p<.001$. The Bonferroni a priori test of multiple comparisons was undertaken to

explore differences showed a significant difference between all three message types. A significant difference of *p*=.001 obtained between image 9 and image 13 (mean difference, 2.71), a significant difference of *p*=.01 obtained between image 9 and image 16 (mean difference, -1.08) and a significant difference of *p*=.02 obtained between image 13 and image 16 (mean difference, -1.62).

5.8 Composition and design of the anti-speeding advertisements

Based on the results of the pre-test, message 1 (negative) message 2 (positive) and message 3 (neutral) was paired with matched congruent anti-speeding images, image 13 (negative), image 9 (positive) and image 16 (neutral), respectively. The negative loss-framed and positive gain-framed messages consisted of six words each, whereas, the neutral message was slightly longer in length with a total of eight words. Text was changed to White Raoul Transport Britannique Medium font size 24-point. Raoul Transport Britannique Medium is a sans serif font usually applied when using white letters on dark backgrounds owing to its easy readability. It is used on roads signs and various UK government websites, with contemporary text recognition research identifying heightened reading comprehension on computer screens for san serif fonts compared to serif fonts (Moret-Tatay & Perea, 2011). Images were rescaled to the same dimensions, grey-scaled (see Bottomley & Doyle, 2006) and superimposed on a black background containing a thin white border using Adobe Photoshop. For study purposes, both portrait and landscape anti-speeding advertisements were produced.

5.9 Experimental pilot study

A pilot study was conducted to test the study procedure and examine the feasibility of using an ADInstruments' Plethysmographi (FP) Ear Clip to measure differences in the emotional arousal elicited by each of the anti-speeding advertisements via changes in participants' heart rate variability. This was used

in conjunction with the SMI eye tracking glasses while using the driving simulator (Arain, Campbell, Cooper & Lancaster, 2010). Five participants were recruited based on Barkers (1994) recommendation that a pilot study should aim to recruit 10 to 20% of the sample to be used in the main study. All participants were fitted with the Plethysmographi Ear Clip and asked to put on the eye tracking glasses. However, due to difficulties linking the Plethysmographi Ear Clip to the LabChart Software during the simulated experimental drive, the decision was made to omit Plethysmographi Ear Clip from the main study. Instead self-reported mood and emotional arousal was measured post driving simulation using the UWIST Mood Adjective Checklist (see section 5.4.4). No additional problems were identified during the pilot study so no further revisions were made to the main study.

Chapter 6: The current research study: Method

6.1 Design

A repeated measures experimental mixed-method design was employed in the current research study:

During the experimental drive, the effects of the all advertisement stimuli were counterbalanced and explored using a repeated measures experimental design. The control and anti-speeding advertisements were the independent variables (IV's) with four levels: control, negative, positive and neutral. The dependent variables (DV's) were the advertisement effectiveness measures of visual allocation, including total number of fixations (DV1) and total dwell time (DV2); and speeding behaviour measured by participants' average driving speed on the driving simulator (DV3).

Following the experimental drive, the advertisement effectiveness measure of memorability for the anti-speeding advertisements was explored using a repeated measures experimental design. This time only the anti-speeding advertisements were the independent variables (IV's) with three levels: negative, positive and neutral. Masked recall of the messages (DV1) and masked recall of images (DV2) were the two dependent variables.

A repeated measures experimental design was also used to explore self-reported differences between the anti-speeding advertisements. The anti-speeding advertisements were the independent variable with three levels: negative, positive and neutral. The dependent variables were two measures of perceived advertisement effectiveness; participants' perceived effectiveness of the anti-speeding advertisements in terms of convincing them to remain within the legal speed (DV1); and participants' perceived effectiveness of the anti-speeding

advertisements at convincing other vehicle users to remain within the legal speed (DV2).

A correlational design was used to explore the influence of the following predictor (independent) variables: advertisement likeability; the mood and emotional arousal evoked by the three message frames and images independently; the graphic content of the anti-speeding advertisement; perceived susceptibility, severity, self-efficacy, response-efficacy; and the participants' level of involvement. The self-reported effectiveness of anti-speeding advertisements to persuade the vehicle user to adhere to the legal speed limit was the outcome (criterion or dependent) variable.

6.2 Participants

Purposeful and snowball sampling was employed to recruit participants for the study. A total of 40 participants took part. Eight students took part as a result of recruitment advertisements being posted at University of Bedfordshire Park Square Campus and 32 non-students were recruited via word-of-mouth. Fifteen participants were male (37.5%) and 25 were female (62.5%). Ages ranged from 18 to 70 years (*M*=40.45, *SD*=15.43). All participants were native English speakers from varying ethnic backgrounds; Twenty-six participants (65%) were White UK/Irish and four (10%) were White European. Four participants were Black African (10%), three were Asian-Bangladeshi (7.5%), two were Black Caribbean (5%) and one participant was Mixed White and Caribbean (2.5%) All 40 participants were vehicle users with full UK driving licences. The length of time participants had held their licences for ranged from 5 months to 50 years (M=17.99, SD=15.11); with a mode average of 11 years since gaining a licence (N= 25 (65%) had held their licenses for 11 years or more and N=15 (37.5%) had held their licences for less than 11 years). At the time of the experiment all participants had driven within the last eight months.

6.3 Ethical considerations

The study adhered to the ethical guidelines of the Research Graduate School throughout. Ethical approved was gained from Research Centre for Applied Psychology at the University of Bedfordshire.

In line with the requirements of the British Psychological Society (BPS) Code of Ethics and Conduct (2006): Participants were provided with an overview of the purpose and procedure of the study. Written consent was attained from all participants, all of whom were aged 18 years or over. Participation was voluntary and participants were free to withdraw at any time during the data collection process without penalty or ramifications. All data collected was kept anonymous and confidential. Participants were debriefed at the end of the study (see Appendix C for the consent form and Appendix E for the debriefing form).

In accordance to the simulation sickness prevention using the Person-Environment-Occupation-Performance (PEOP) framework, participants were excluded from the study if they suffered from motion sickness, were taking any forms of medication, or had physical conditions that interfered with their ability to drive the simulator. This included epilepsy, seizures, gross fatigue, recurring migraines, inner ear ailments, visual impairments, hearing impairments and nerve or muscle disease (see Stern, Barth, Durfee, Rosen, Rosenthal, Schold-Davis, Schaffer, Wachtel, Watson, & Zola, 2006). Symptoms of simulation sickness were also monitored throughout the experimental drive.

6.4 Materials

6.4.1 Advertisement stimuli

Anti-speeding advertisements: The three anti-speeding advertisements developed in the pre-test had matched congruent message frames and images,

and were all related in context, but differed in content (negative, neutral or positive message framing and emotional valence). Example anti-speeding advertisements are shown below.

Figure 2: Negative Advertisement

Figure 3: Positive Advertisement

Figure 4: Neutral Advertisement

Control advertisement: Portrait and landscape versions of the control advertisement were created to be compared to the anti-speeding advertisements during the experimental drive. The control advertisement was desaturated and rescaled to match the same dimensions as the anti-speeding advertisements (see Figure 5).

Figure 5: Control Advertisement

6.4.2 Personal Comfort Questionnaire

The Personal Comfort Questionnaire is a shortened adaptation of the Motion Sickness Assessment Questionnaire (MSAQ) (Gianaros et al., 2001) developed to gauge simulator sickness during driving simulation studies. The questionnaire contains a six item checklist measuring symptoms of headache, eyestrain, blurred vision, dizziness and sickness on a series of 10-point semantic-differential

scales from (0) 'no symptom at all' to (10) 'unbearable level of symptom'. During the study participants who scored between 4 to 6 on any of the semantic-differential scales before or after the practice drive were allowed to continue using the driving simulator if they wished to do so but were monitored for signs of simulation sickness throughout (for example, sweating and/or looking away from screen). Participants scored a 7 or above at any stage were withdrawn from the study (see Appendix B).

6.4.3 Experimental Measures

6.4.3.1 STISIM Drive® Simulator

The experiment was performed on a STISIM Drive® Simulator at the University of Bedfordshire. Driving scenes were presented from a 180 degree driver field-of-view across three 20 inch computer monitors. A speedometer was displayed on a virtual dashboard in the bottom left hand corner of the central monitor. A rear view mirror was positioned at the top of the central monitor. The left and right wing-mirrors were displayed on the left and right monitors, respectively. Participants were required to drive the STISIM using a steering wheel, manual gear stick and accelerator, brake and clutch pedals. Average driving speed data in miles per hour (mph) was collected, where applicable, from the brake and accelerator pedals at a rate of 30Hz.

Figure 6: STISIM Driving Simulator

Practice Drive: All participants took part in a practice drive on the STISIM driving simulator. The practice drive lasted approximately 2 minutes 30 seconds depending on the participants driving speed. In the practice drive the STISIM pre-programmed steering scenario was utilised. This scenario comprised of a large skid pad that contained a simple steering manoeuvre using roadway cones. The only modification made to the scenario was the insertion of a secondary driver reaction task where two large stop signs instantaneously appeared in the central monitor at approximately 500 feet (ft) and 1000ft. The sole purpose of the insertion was to ensure that the participants were comfortable using the brake in conjunction with all other driving controls. No data was collected during the entirety of the practice drive.

Experimental Drive: The experimental drive scenario was made up of a total of four scenes containing four different static roadside poster advertisements positioned on a column, billboard, bus-stop and a banner on a wall at 1800ft intervals. The first scene was set in a residential area. In this scene, participants saw a European stop sign and a column poster in full view ahead on the left hard shoulder of an unmarked junction. In the second scene, participants took a short drive through a construction zone before being forced to brake approximately 20ft ahead of a billboard poster positioned on the right by a truck backing into the driver's lane. For the third scene, within close proximity to a primary school, a bus-stop was positioned on the left after an intersection and pedestrian crossing. Here pedestrian crossings were used to ensure that the driver stopped at the intersection within viewing distance of the bus-stop. The fourth scene comprised of a variety of shops, restaurants and office buildings. In this scene a large banner poster was displayed on the foreside of a building positioned on the right after a signal light changed to red. Apart from the triggered events such as truck backing into the driver's lane, all obstructing traffic in the driver's lane was removed. European 30mph speed limit signs were inserted at regular intervals to

act as reminders, and additional buildings, pedestrians and automobile traffic was inserted to make the scenario more realistic.

Figure 7: Example Experimental Drive Scenes

A total of four versions of the scenario were created so that the three anti-speeding advertisements and control advertisement could be counterbalanced between the four scenes containing one of four static roadside posters (i.e. column, billboard, bus-stop and a banner) during four trials (see Table 3). This helped to both eliminate confounding effects and to ensure uniformity between the conditions. No other alterations to the scenario were made.

Table 3

Positioning of Anti-speeding and Control Advertisements between the Four Trials

Poster Type	Column	Billboard	Bus-stop	Banner
Trial 1	Control	Neutral	Negative	Positive
Trial 2	Neutral	Negative	Positive	Control
Trial 3	Negative	Positive	Control	Neutral
Trial 4	Positive	Control	Neutral	Negative

Participants' average driving speed in miles per hour (mph) was recorded at 1800ft intervals (before, after or between the static roadside poster advertisements) to gauge the impact of the advertisements on the participants speeding behaviour. In total, the experimental drive lasted approximately 5 to 6 minutes depending on the participants driving speed.

SensoMotoric Instruments (SMI) Eye Tracking Glasses Wireless: Visual allocation to the areas of interest (AOI) (the static roadside advertisements in the virtual driving environment) was monitored via the SMI Eye Tracking Glasses during the experimental drive. The eye tracking glasses had a video-based binocular eye tracking device with a high definition scene camera. Eye position was sampled at 60 Hz, following a three-point calibration procedure. Automatic parallax compensation ensured accurate data without need for manual adjustments. Participants' total number of fixations to the AOI's and total dwell time in milliseconds (the total amount of time allocated to the AOI's) was examined using SMI BeGlaze Analysis Software.

Figure 8: SMI Eye Tracking Glasses

Memorability: Memorability of the negative, positive and neutral anti-speeding advertisements was assessed via three masked recall tests. In each of three masked recall tests participants were exposed to a different screenshot from the experimental drive containing a single masked area. The masked area in each screenshot corresponded to one of the three anti-speeding advertisements

displayed the experimental drive (see Figure 9). For the purpose of the study, participants were asked to describe in as much detail as possible (1) the message and (2) the image they recalled seeing in the masked area. The ordering of the three masked recall tests was randomised.

Figure 9: Example of Masked Recall Test

During data treatment participant responses from the masked recall tests were coded into four levels of recall ranging from (0) 'no response' to (3) 'the exact message/image': The lowest coded level, '0', corresponded to no response or answers that had no relevance. Responses coded as '1' represented answers that indicated that a warning message/image was present but provided no specific information about the content. Responses coded as a '2' represented a response that correctly identified road-safety or the alike as a central theme. Finally, a recall code of '3' was given where accurate text or image descriptions were reported.

6.4.4 Self-report measures

6.4.4.1 Self-report measures of mood and emotional arousal

The UWIST Mood Adjective Checklist (UMACL; Matthews, Jones & Chamberlain, 1990): The participants' mood and emotional arousal produced by the anti-speeding advertisement message frames (negative, positive and neutral) and images (negative, positive and neutral valence) were assessed using the UMACL.

The UMACL is a self-report measure containing a total of 24 mood adjectives measuring bipolar dimensions of energetic arousal (EA), tense arousal (TA) and hedonic tone (HT). Each sub-scale consists of a total of eight items (see Table 4). The Cronbach's alpha coefficients (α) for the three sub-scales are reported to range from .86 to .88 (Matthews et al, 1990a).

Table 4

The Adjectives used in each Dimension on the UMACL

Energetic Arousal	Tense Arousal	Hedonic Tone
Sluggish	Anxious	Depressed
Tired	Jittery	Dissatisfied
Unenterprising	Tense	Sad
Passive	Nervous	Sorry
Vigorous	Relaxed	Cheerful
Alert	Calm	Happy
Active	Restful	Contented
Energetic	Composed	Satisfied

While completing the UMACL participants were asked to indicate how each of the 24 adjectives described their current mood on a 4-point Likert scale from (1) 'definitely feel' to (4) 'definitely do not feel' when viewing each anti-speeding message and image. The stimulus was presented one at a time and randomised for each participant; this process was repeated until all three messages and images had been independently assessed. Scores for each sub-scale were calculated individually with high scores being positive for energetic arousal and hedonic tone but negative for tense arousal.

6.4.4.2 Advertisement likeability, graphic content and self-report measures of perceived risk and response-efficacy

The three anti-speeding advertisements were displayed in full one at a time. For each anti-speeding advertisement, participants' were asked to respond to a series of nine self-report items measured on a succession of 7-semantic-differential scales acquired from past research (Chang, 2009; Lennon & Rentfo, 2010). During analysis mean scores were calculated for each individual item.

Advertisement likeability: To measure advertisement likeability two items were taken from Chang and Lee's (2009) study on 'Framing Charity Advertising'. Participants were asked to indicate how informative from (1) 'Very Uninformative' to (7) 'Very Informative',(item 1) and appealing from (1) 'Not at all Appealing' to (7) 'Extremely Appealing' (item 2); they considered each of the anti-speeding advertisements to be.

Graphic content and self-report measures of perceived risk and response-efficacy: To determine the level of graphic content, perceived risk and response-efficacy five items derived from Lennon and Rentfo (2010) study on fear appeal effectiveness were utilised. Items 3 and 4 addressed the graphic content of the anti-speeding advertisements; participants were asked to rate how graphic they believed the anti-speeding advertisement was from (1) 'Not at all Graphic/Vivid' to (7) 'Very Graphic/Vivid' (item 3), as well as the level of emotion aroused from (1) 'Not at All' to (7) 'Very Much' (item 4). Item 5 measured perceived severity (beliefs about the seriousness of what was depicted in the anti-speeding advertisements) from (1) 'Not at All Severe' to (7) 'Extremely Severe'. Item 6 gauged perceived susceptibility (the participants beliefs about their chances of experiencing the threat) from (1) 'Very Unlikely' to (7) 'Very Likely' and item 7 assessed response-efficacy (the extent to which the participants believed driving at the speed limit would result in the depicted outcome) from (1) 'Very Ineffective' to (7) 'Very Effective'.

Anti-speeding advertisements effectiveness: In items eight and nine, participants' were asked to rate the perceived effectiveness of the poster at convincing others (item 8), and themselves (item 9) to stick to the speed when driving from (1) 'Very Ineffective' to (7) 'Very Effective' (Lennon & Rentfo, 2010).

6.4.4.3 Self-report measures of self-efficacy and level of involvement.

At the end the survey, devoid of any of the anti-speeding advertisements, the participants were asked four concluding questions regarding self-efficacy and levels of involvement.

Self-efficacy: To measure the participants' self-reported self-efficacy participants' were asked to rate their perceived ability to drive at the recommended speed limit in general on a final 7-semantic-differential scale from: (1) 'Very Difficult'; to (7) 'Very Easy'. The responses to this question were reversed scored to reflect the low self-efficacy when the participants rated driving at the speed limit as very difficult and the high self-efficacy when the participants rated the behaviour as very easy (Lennon & Rentfo, 2010).

Level of involvement: To measure level of involvement, first, participants were asked two questions adapted from the Driving Habits Questionnaire (DHQ; Owsley, Stalvey, Wells and Sloane, 1999). For these questions participants were asked to quantify "how many accidents they had been involved in over the past year when they were the driver" and to indicate on a 5-point Likert scale "how fast they usually drive compared to the general flow of traffic" from: (1) 'Much faster'; (2) 'Somewhat faster'; (3) 'About the same'; (4) 'Somewhat slower'; (5) 'Much slower'. During data treatment, the DHQ 5- point Likert scale was reverse scored so that higher numbers represented a greater inclination to drive faster than the general flow of traffic. Second, participants were also asked to indicate honestly "how often they disregard the speed limit when driving". This question

was adapted from the Manchester Driving Behaviour Questionnaire (DBQ; Reason, Manstead, Stradling, Baxter & Campbell, 1990), and unlike the DHQ was measured on a on a 6-point Likert scale from: (1) 'Never'; (2) 'Hardly Ever' (3) 'Occasionally'; (4) 'Quite Often'; (5) 'Frequently'; (6) 'Nearly all the Time'. For analytical purposes, all three questions were totalled with higher scores representing higher levels of accident and risky driving behaviour involvement.

6.5 Procedure

The study took place at the University of Bedfordshire in the psychology department's research cubicles. All research tools and materials were administered on the same day: Following completion of a written consent form and the Personal Comfort Questionnaire, participants were taken into a cubicle and seated at the driving simulator. Participants were fitted with the eye-tracking glasses before undertaking the supervised practice drive. Following the practice drive, participants completed a second Personal Comfort Questionnaire. The eye-tracking glasses were then calibrated and participants were told that they were going to "take part in a short hazard perception test and to drive in accordance to the UK Highway Code and follow the road straight ahead". The participants started the experimental drive when they were ready to begin using a button located at the top right of the steering wheel. During the experimental drive the static roadside advertisements appeared in the same location for each participant, however, the anti-speeding advertisements were counterbalanced between trials. Subsequent to the experimental drive, participants were permitted a short break, water and a biscuit before completing demographics, the masked recall tests and a series of self-report measures via Qualtrics in different research cubicle. Once the participants had completed the Qualtrics survey, they were provided with a debriefing form and thanked for their time. The total completion time of the study was approximately 40 minutes.

Chapter 7: The current research study: Results

7.1 Data analysis

A series of repeated measures Multivariate Analysis of Variance (MANOVA) tests were employed to explore participants' visual allocation, simulated driving speed, the memorability of the message framing and image valence strategies between negative, positive and neutral anti-speeding posters, and general anti-speeding advertisement effectiveness. Reliability analyses were also performed to investigate the internal consistency of the scales used to investigate the mood and arousal elicited by the anti-speeding messages and images. Finally, linear multiple regression analysis was utilised to explore significant predictor variables of self-reported effectiveness for each of the three anti-speeding advertisements. All results were considered statistically significant based the alpha (α) level of 0.05.

7.2 Results

The results are presented in six sections; Visual allocation checks, experimental drive analyses, masked recall analyses, analyses of self-reported anti-speeding advertisement effectiveness, UMACL reliability checks, and analyses of predictors of self-reported effectiveness.

7.2.1 Visual allocation checks

Preliminary checks were conducted to investigate participants' visual allocation to the AOI's (the control and anti-speeding advertisements) during the experimental drive. The analysis revealed that visual allocation to the AOI's was identified for 21 participants (52.5%). The participants (n=19; 47.5%) who did not attend to any AOI's were removed from the experimental drive and masked recall analysis (sections 7.2.2 and 7.2.3.)

7.2.2 Experimental drive analyses

Descriptive analyses were performed to explore participants (N=21) visual allocation (total number of fixations and total dwell time) and driving speed (mph) between the control, negative, positive and neutral advertisements. The results for each measure are presented in Table 5 below.

Table 5

Mean Values of the Dependent Variables Separated by the Independent Variable Levels (N=21)

	Control		**Negative**		**Positive**		**Neutral**	
Measure	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Fixations	.86	1.28	1.52	2.09	1.29	2.35	1.52	3.12
Dwell Time (ms)	301.81	553.75	441.28	737.24	246.37	550.49	510.96	1292.09
Driving Speed	24.26	8.97	25.88	10.52	26.07	11.91	23.65	6.14

Table 5 illustrates that the participants' fixations, the moment the participants' eyes were more or less stable taking in the AOI's, ranged from an average of 0.83 fixations when attending to the control advertisement to an average of 1.52 fixations when looking at the negative and neutral anti-speeding advertisements. While the mean number of fixations were identical for the negative and neutral anti-speeding posters, inspection of dwell time mean values, however, showed that the participants on average spent more time attending to the neutral anti-speeding advertisement (*M*=510.96, *SD*= 1292.09) than the negative anti-speeding advertisement (*M*=441.28, *SD*=737.24). The least amount of time was spent attending to the positive anti-speeding advertisement (*M*=246.37, *SD*=550.49) followed by the control (*M*=301.81, *SD*-553.75). Only minimal differences were observed for mean driving speeds between the advertisements, with participants on average driving under the 30mph speed limit whilst using the driving simulator in all four cases.

A repeated measures Multivariate Analysis of Variance (MANOVA) test was conducted to explore the main effects of the advertisements on participants' mean fixations, dwell time and speeding behaviour. The Mauchly's test indicated that the assumption of sphericity had not been violated for the main effects of fixations, $X^2(5) = 7.12$, $p = .21$ but had been violated for the main effects of dwell time, $X^2(5) = 14.40$, $p = .01$, and driving speed, $X^2(5) = 12.60$, $p = .03$. Therefore the Greenhouse-Geisser *F*-ratio results are reported for the dwell time and driving speed variables. The results showed that there was no significant main effect for participants fixations, $F(3, 60) = .38$, $p = .77$, dwell time, $F(1.99, 39.90) = .44$, $p = .65$, or driving speed, $F(2.29, 45.83) = .96$, $p = .40$. Thus, no further analyse was performed.

For investigative purposes, further exploratory analyses were undertaken on participants (N=21) fixations, dwell time and driving speed (mph) between the static roadside column, billboard, bus-stop and banner posters. The descriptive analyses for each dependent variable between these four poster types are presented in Table 6 below.

Table 6

Mean Values of the Dependent Variables Separated by the Four Roadside Static Posters (N=21)

	Column		**Billboard**		**Bus-stop**		**Banner**	
Measure	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Fixations	1.19	1.50	.71	1.31	3.24	3.40	.05	.218
Dwell Time (ms)	427.81	677.37	167.13	378.42	903.11	1334.41	2.37	10.87
Driving Speed	21.89	5.80	22.43	11.31	25.17	11.28	30.38	6.25

Table 6 shows that the participants' fixations ranged from an average of just 0.05 fixations for the banner roadside poster to an average of 3.24 fixations for the bus-stop roadside poster. This time, a similar pattern was observed for the participants dwell time. Participants spent, on average, the least amount of time allocated to the banner roadside poster and the most amount of time attending to bus-stop roadside poster; followed by the column and the billboard roadside poster. A mean difference of 8.49 mph was also found between the participants mean driving speed for the column and banner static roadside poster. Here participants drove, on average, 0.38mph over the 30mph speed limit after the banner roadside poster had been displayed during the experimental drive.

To explore the main effects of the static roadside posters a succeeding repeated measures MANOVA test was performed. The Mauchly's test indicated that the assumption of sphericity had been violated for the main effects in all cases; fixations, $X^2(5) = 26.36$, $p < .001$, dwell time, $X^2(5) = 35.63$, $p = <.001$, and driving speed, $X^2(5) = 41.44$, $p < .001$. Therefore, Greenhouse-Geisser corrected tests are reported for all variables. The results showed a significant main effect of p<.001 for fixations, $F(1.65, 33.05) = 11.07$, $p < .001$ and driving speed $F(1.42, 28.45) = 18.41$, $p < .001$. A significant main effect for dwell time, $F(1.52, 33.33) = 5.76$, $p = .01$, was also obtained.

Post-hoc testing using pairwise comparisons of the estimated marginal means with Bonferroni adjusted levels for fixations revealed a significant difference between the column and banner poster fixations, $p=.02$, the billboard and bus-stop fixations, $p=.01$, and the bus-stop and banner poster fixations , $p=.002$. The comparisons between the column and billboard fixations, $p=1.00$, the column and bus-stop fixations, $p=.09$ and the billboard and the static roadside banner poster fixations, $p = .21$, were non-significant.

Pairwise comparisons of the estimated marginal means with Bonferroni adjusted levels also revealed a significant difference for dwell time between the bus-stop and banner static roadside posters, p=.02. No significant differences for dwell time were revealed between; the column and billboard, p=.55, the column and bus-stop, p =.91, the column and banner poster, p=.06, billboard and bus-stop, p=.12, or the billboard and banner poster, p=.36.

For the participants driving speed, pairwise comparisons of the estimated marginal means with Bonferroni adjusted levels revealed a significant difference between the column, and the billboard and banner poster, p<.001, the billboard and bus-stop posters, p=.001, and the bus-stop and banner poster, p=.002. No significant differences between the column and billboard, p=1.00, or the column and bus-stop poster, p=.45 were obtained.

7.2.3 Masked Recall

Participants' recall of the messages and images (negative, positive and neutral) contained in the three anti-speeding advertisements displayed during the experimental drive were explored with an additional repeated measures MANOVA test. The Mauchly's test indicated that the assumption of sphericity had been met for both the main effects of message type, $X^2(2) = 7.58$, p = .46 and image type, $X^2(2) = 2.11$, p =.35. The MANOVA results found no significant difference between either the negative (M=.29, SD=.90), positive, (M=.00, SD=.00) and neutral anti-speeding message recall scores[M=.33, SD=.86; $F(2, 40) = 1.52$, p = .23]; or the negative (M=.29, SD=.90), positive, (M=.29, SD=.90) and neutral anti-speeding image recall scores[M=.24, SD=.77; $F(2, 40) = .02$, p = .98]. This pattern is illustrated in Figure 10 and Figure 11.

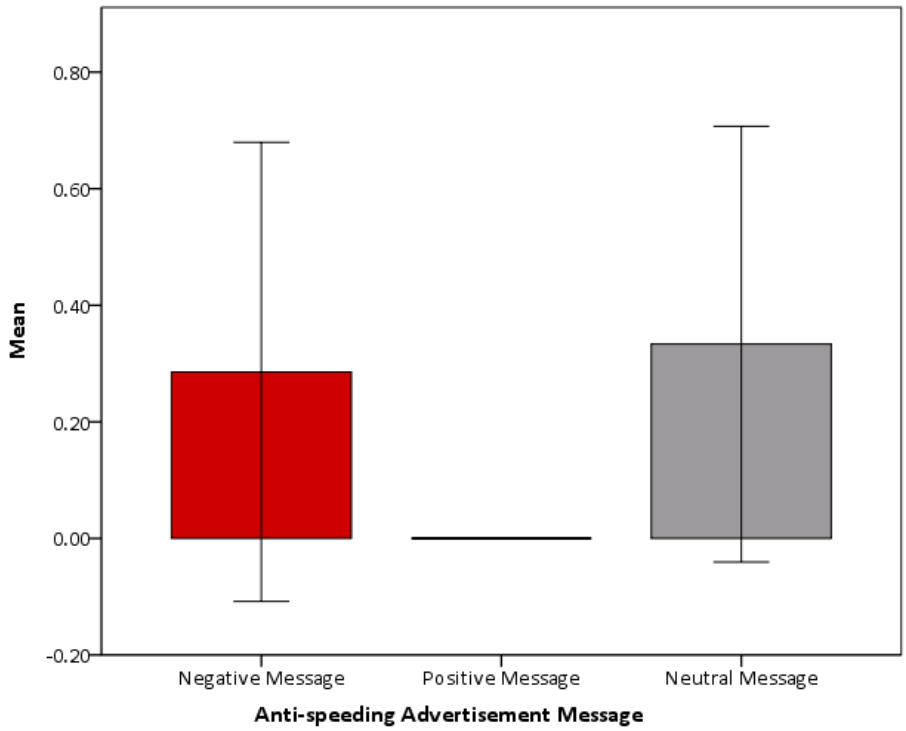

Figure 10. *Mean Number of Masked Recall Scores for each Anti-speeding Advertisement Message.*

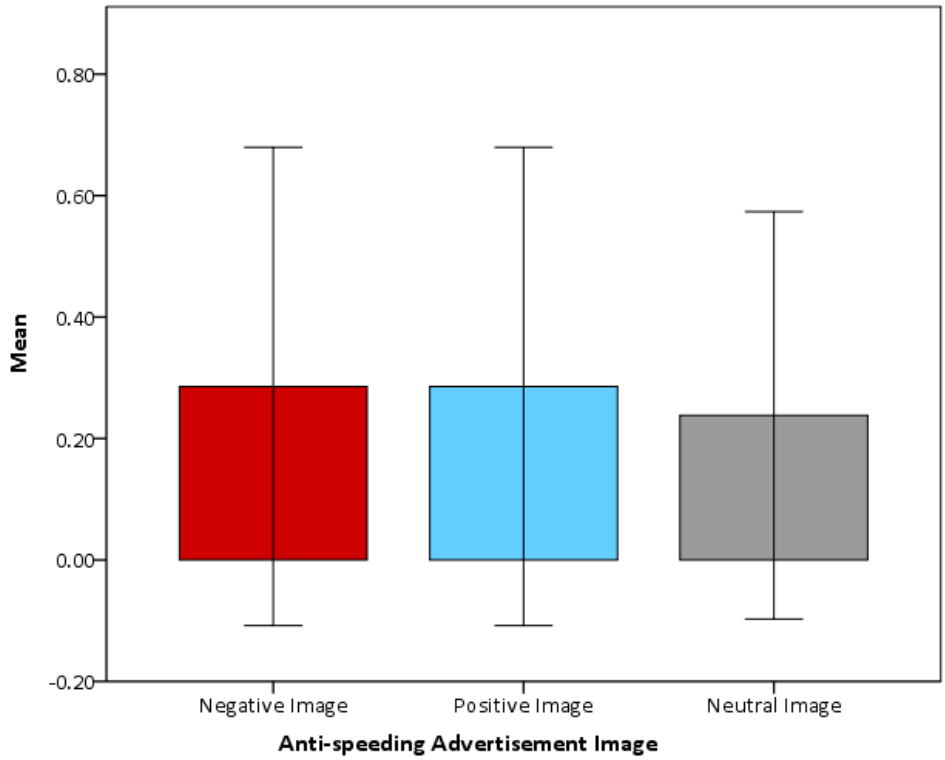

Figure 11. *Mean Number of Masked Recall Scores for each Anti-speeding Advertisement Image.*

Further inspection of the descriptive data revealed that four participants (19%) provided a response coded above a '0' for the masked message recall test and five (24%) provided a response coded above a '0' for the masked image recall test. Moreover, exploration of the written responses coded as a '0' showed that five participants (24%) from the total sample wrote that they were too busy "concentrating on their driving" or "the road ahead" to notice any of the anti-speeding advertisements. Consequently, analysis to explore the main effects of the static roadside posters was not performed.

7.2.4 Self-reported effectiveness of the anti-speeding advertisements

Descriptive analysis was performed to examine how the sample (*N*=40) viewed the effectiveness each of the anti-speeding advertisement posters in term of convincing both other vehicle users and themselves to adhere to the legal speed limit. The means and standard deviations for each measure are presented in Table 7 below.

Table 7

Mean Values of the Dependent Variables Separated by the three Independent Variable Levels (N=40)

	Negative		Positive		Neutral	
Measure	***M***	***SD***	***M***	***SD***	***M***	***SD***
Effectiveness for other vehicle users	4.88	1.75	3.05	1.65	2.50	1.60
Effectiveness for vehicle user	5.43	1.62	3.60	1.71	3.08	1.69

Observation of the mean values for each of the three anti-speeding advertisements displayed in Table 7 shows that, on average, the negative anti-speeding poster was deemed most effective in terms of convincing both other vehicle users (*M*=4.88, *SD*=1.75) and the participant to adhere to the legal speed limit (*M*=5.43, *SD*=1.62). With the negative anti-speeding advertisement

perceived as somewhat more effectual at convincing the participants as opposed to other vehicle users to adhere to the legal speed limit. The positive and then the neutral anti-speeding advertisements followed in terms of perceived effectiveness.

A repeated measures MANOVA test was conducted to explore the main effects of perceived anti-speeding advertisement effectiveness. The Mauchly's test indicated that the assumption of sphericity had been met for both effectiveness for other road users, $X^2(2) = 1.05$, $p = .59$, as well as the vehicle user, $X^2(2) = .51$, $p = .76$. The MANOVA results revealed a significant main effect for advertisement effectiveness for other vehicle users, $F(2, 78) = 27.04$, $p = <.001$, as well as the vehicle user, $F(2, 78) = 28.90$, $p < .001$. Post-hoc testing using pairwise comparisons of the estimated marginal means with Bonferroni adjusted levels revealed that the negative anti-speeding advertisement was rated as significantly more effective than both positive and neutral anti-speeding advertisement in terms of convincing both other vehicle users and the vehicle user to adhere to the legal speed limit ($p < .001$). There were no significant differences found between the positive and neutral anti-speeding advertisement for other vehicle users, $p = .32$, or the vehicle user, $p = .35$.

7.2.5 UWIST Mood Adjective Checklist (UMACL) reliability checks

Internal consistency reliability analyses was conducted on the UWIST Mood Adjective Checklist (UMACL) rating scales utilised to measure the energetic arousal, the tense arousal and the hedonic tone evoked by the messages and images used in the anti-speeding advertisements. Cronbach alphas values for these three scales are reported to range from .86 to .88 (Matthews, Jones & Chamberlain, 1990). However, because self-report scales that require in-depth psychological scrutiny and use reverse-scored items are prone to lower reliability (Barnette, 2000) an acceptable Cronbach alpha cut-off point of .60 was used (Langridge & Hagger-Johnson, 2009).

Reliability tests revealed that 'good' to 'acceptable' Cronbach alphas values were obtained for the UMACL energetic arousal scale and hedonic tone scale for the negative and positive anti-speeding images only. With regards to the UMACL energetic arousal scale, an acceptable level of internal consistency was obtained for negative anti-speeding image (α=.66) and good level of internal consistency was found for the positive anti-speeding image (α=.77). For the UMACL hedonic tone scale, however, acceptable levels of internal consistency were obtained for both the negative (α=.60) and positive anti-speeding image (α=.67). The Cronbach alphas values for all other UMACL scales were below the acceptable cut-off point of .60. Therefore, these scales had to be omitted from the multiple regression analyses.

7.2.6 Predictors of self-reported effectiveness for the vehicle user between anti-speeding advertisements

The multiple regression analyses focuses on the participants' perceived advertisement effectiveness scores, and on the likability, UMACL, graphic content, perceived risk, efficacy, and level of involvement measures. Means and standard deviations were analysed for each measure to enable of participants' average scores as well as the spread of data (the square root of the variance) between each of the outcome variables to be examined. Analyses exploring relationships between each measure and advertisement effectiveness were also conducted. The means, standard deviations and correlation coefficients are presented in Table 8.

Table 8 Descriptive Statistics: Pearson Correlation Coefficients and Mean Values and Standard Deviations for all Predictor Variables (*N*=40)

		Negative Anti-Speeding Advertisement			Positive Anti-Speeding Advertisement			Neutral Anti-Speeding Advertisement		
	Measure	***M***	***SD***	***r***	***M***	***SD***	***r***	***M***	***SD***	***r***
UMACL Scales	*Energetic Arousal: Image Only*	23.05	4.32	.23	23.15	4.49	-.06	-	-	-
	Hedonic Tone: Image Only	23.93	3.69	.19	23.10	3.26	-.05	-	-	-
Advertisement Likeability	*Informative*	4.93	1.90	.54***	3.53	1.83	.60***	3.58	1.72	.60***
	Appeal	3.50	1.95	-.03	3.65	1.79	.54***	2.60	1.37	.69***
Graphic Content	*Advertisement Content*	5.65	1.35	.55***	2.90	1.63	.55***	2.45	1.41	.31*
	Emotion Aroused	5.25	1.53	.59***	3.68	1.56	.32*	2.35	1.41	.61***
Perceived Risk	*Severity*	5.65	1.63	.56***	2.38	1.39	.56***	2.48	1.28	.58***
	Susceptibility	5.35	1.51	.48**	2.73	1.72	-.06	4.23	2.11	.41**
Perceived Efficacy	*Response-efficacy*	5.80	1.38	.71***	4.45	1.92	.54***	4.70	1.90	.46**
	Self-efficacy	4.60	1.60	-.15	4.60	1.60	-.18	4.60	1.60	-.13
	Level of Involvement	6.00	1.01	.20	6.00	1.01	.07	6.00	1.01	.02

*Note. All correlations are one-tailed. ***Significant at p<.001 level. **Significant at the p<.01 level. * Significant at the p<.05 level*

The data in Table 8 illustrates similar mean values for the energetic arousal and hedonic tone measures for both the negative and positive anti-speeding advertisement images. Neither of these measures, however, was found to be significantly correlated with self-reported advertisement effectiveness (p<.05). In contrast, considerable mean values divergences were found for the informative, graphic content and perceived risk measures between the three anti-speeding advertisements; with strong significant correlation effects obtained for moderate to high perceived graphic content (content; r=.55, p<.001; emotions aroused; r.59, p<.001), severity (r=.56, p<.001) and response-efficacy (r=.71, p<.001) with regards to negative anti-speeding advertisement effectiveness. A medium correlation effect was also found between perceived susceptibility and the self-reported effectiveness for the negative (moderate to high levels; r=.48, p=.001) and neutral (low levels; r=.41, p=.004) anti-speeding advertisements, and the self-reported effectiveness of the positive anti-speeding advertisement was significantly related to low threat severity (r=.56, p<.001). Perceived self-efficacy and levels of involvement were not found to be associated with self-reported effectiveness for any of the three anti-speeding advertisements (p<.05).

7.2.6.1 The negative anti-speeding advertisement

The main assumptions of multiple regression analyses were validated for the negative anti-speeding advertisement measures. An analysis of standard residuals was carried out, which showed that the data contained no outliers (*Std. Residual Min*=-2.39, *Max*=1.54). Tests to see if the data met the assumption of collinearity indicated that multicollinearity was not a concern for any of the variables (*Tolerance* > 0.1, *VIF* < 10). The data also meet the assumption of independent errors (*Durbin-Watson* = 1.75). The histogram and normal P-P plot indicated that the data met the assumptions of normally distributed residuals. The scatterplot of standardised predicted values also showed that the data met the assumptions of homogeneity of variance and linearity. Finally, tests of non-zero variances confirmed that all data met the assumption of non-zero variances.

A multiple linear regression was conducted using the enter method (with all predictor variables entered in one step) to examine whether the likability, UMACL, graphic content, perceived risk, efficacy, and level of involvement measures predicted participants' effectiveness scores for the negative anti-speeding advertisement. The results found that overall the model explained 71.5% of the variance in the negative anti-speeding advertisement effectiveness scores. This result was statistically significant, R^2=.715, $F(11, 28)=6.37$, $p<.001$. Inspection of individual predictors revealed that both response-efficacy, β =.62, $t(28)=4.02$, $p<.001$, and levels of involvement, β =.30, $t(28)=2.39$, $p=.02$, significantly predicted participants' effectiveness scores for the negative anti-speeding advertisement. No other significant predictors for the negative anti-speeding advertisement effectiveness were found ($p>.05$).

7.2.6.2 The positive anti-speeding advertisement

The assumptions of multiple regression analyses were also confirmed for all positive anti-speeding advertisement measures. Analysis of standard residuals showed that there were no outliers (*Std. Residual Min*=-2.01, *Max*=1.51). The assumption of collinearity for all variables was validated (*Tolerance* >0.1, *VIF* <10) and the data met the assumption of independent errors (*Durbin-Watson* = 1.75). The residuals were normally distributed as shown in the histogram and normal P-P plot and the assumptions of homogeneity of variance and linearity were confirmed via inspection of the scatterplot of standardised predicted values. Tests of non-zero variances revealed that all data was above a value of zero, thus the assumption of non-zero variances was all confirmed.

To explore if the likability, UMACL, graphic content, perceived risk, efficacy, and level of involvement measures predicted participants' effectiveness scores for the positive anti-speeding advertisement a second multiple linear regression was conducted using the enter method. Analyses showed that for the positive anti-speeding advertisement

the model explained 62.7% of the variability in self-reported advertisement effectiveness scores. Again an overall significant result was found, R^2=.627, *F*(11, 28) = 4.27, *p*=.001. For the positive anti-speeding advertisement only the low severity of the threat displayed the advertisement significantly predicted participants' effectiveness scores, β =.41, *t*(28)=3.03, *p*=.005.

7.2.6.3 The neutral anti-speeding advertisement

All neutral anti-speeding advertisement measures too met the assumptions of multiple regression analyses. Analysis of standard residuals tests found no outliers (*Std. Residual Min*=-2.05, *Max*=1.70). Tests for assumptions of collinearity indicated that multicollinearity was not found (*Tolerance* >0.1, *VIF* <10). The assumption of independent errors was met (*Durbin-Watson* = 2.16). The assumptions of normally distributed residuals were validated by the histogram and normal P-P plot. Homogeneity of variance and linearity assumptions were confirmed through scrutiny of the scatterplot of standardised predicted values. The assumption of non-zero variances was also confirmed with all measure variances found to be over zero.

Finally, a third multiple linear regression was conducted using the enter method to investigate whether the predictor variables likability, UMACL, graphic content, perceived risk, efficacy, and level of involvement measures predicted participants' effectiveness scores for the neutral anti-speeding advertisement. This time, the regression results showed that overall the model explained 66% of the variance in advertisement effectiveness scores. A result that was found to be statistically significant, R^2=.66, *F*(9, 30) = 6.47, *p*<.001. Inspection of individual predictors revealed that advertisement appeal, β =.59, *t*(30)=3.34, *p*=.002 and response-efficacy, β =.35, *t*(30)=2.03, *p*=.05, significantly predicted the neutral anti-speeding advertisements effectiveness scores. No other variables were found to be significant predictors of self-reported effectiveness (*p*>.05).

Chapter 8: The current research study: Discussion

The main purpose of this research study was to build on current literature and explore the influence of message framing and image valence on the effectiveness of anti-speeding posters. A combination of direct and indirect measures of advertisement effectiveness was used. The discussion presents a review of the findings in relation to the research aims and hypotheses outlined in Chapter 4. Contributions to road safety literature and roadside design and placement are also discussed along with limitations and future directions**.**

8.1 Review of the study results

8.1.1 The effectiveness of the anti-speeding advertisement strategies on visual attention, memorability and safe simulated driving speed.

The goal of anti-speeding advertisements is to challenge the issue of excessive vehicle speed by increasing a vehicle user's motivation to comply with the legal speed limit (Elliot & Armatige, 2006). However, to date, few studies have used direct measures to explore the effectiveness of anti-speeding advertisements (Plant et al., 2011). What is known, however, is that before an advertisement can have any cognitive or behavioural influence it must gain the driver's attention and be committed to memory (Elliott, 2011). The current study, therefore, aimed to: (1) evaluate the effectiveness of negative, positive and neutral anti-speeding advertisement strategies in gaining participants' attention and regulating speeding behaviour via direct measures of visual attention and simulated driving speed and (2) evaluate the effectiveness of anti-speeding advertisement strategies (negative, positive and neutral) on participants' message and image memorability via a series of direct measures of recall.

Previous research suggests that advertisements that contain negative messages and images are significantly more effective than positive or neutrally framed

advertisements in facilitating visual attention, memorability and influencing cognitive and behavioural responses (Chang & Lee, 2009; Peterson, Thomsen, Lindsay, & John, 2010; Strasser, Tang, Romer, Jepson, & Cappella, 2012). Therefore, it was hypothesised that:

Hypothesis 1: During the simulated driving experiment, the negative anti-speeding poster advertisement will facilitate significantly more visual attention, recall and anti-speeding behaviours than positive or neutral anti-speeding advertisements.

In the current study, the results showed no significant differences between the negative, positive and neutral anti-speeding advertisement posters or control with regard to participants' visual attention and average driving speed using the driving simulator. Furthermore, no significant differences were obtained after the experimental drive when investigating differences between the negative, positive and neutral anti-speeding advertisement posters on participants' message and image recall. Thus, Hypothesis 1 was not supported and the null hypothesis failed to be rejected,

Scrutiny of the descriptive statistics for participants' visual fixations and dwell time did, however, show that on average somewhat greater visual attention was allocated to the anti-speeding advertisement posters than the control advertisement. With the negative anti-speeding advertisement seen, on average, more times than the positive anti-speeding advertisement and the same amount of times as the neutral anti-speeding advertisement, Although, on average, greater dwell time was also allocated to the negative advertisement than the positive advertisement (a mean dwell time difference of 194.91ms), contrary to expectations, greater visual allocation time was focussed on the neutral anti-speeding advertisement than the negative anti-speeding advertisement, with a mean dwell time difference of 69.68ms obtained. While such visual allocation differences may seem only minute, Pieters and Wedel (2012) suggest

that advertisement viewers are able to gain the general essence of an advertisement message after a single exposure of just 100 milliseconds.

Pieters and Wedel (2012) proposition is also consistent with the descriptive masked recall message findings which showed that the participants remembered more neutral anti-speeding messages than negative anti-speeding messages during the masked recall test. Pieters and Wedel (2012) suggestion may also go some way to explicate why no positive anti-speeding messages were recalled. Even so, this elucidation may be contentious given that only four (19%) of the participants who visually attended the advertisements during the experimental drive were able to recall any aspects of the anti-speeding messages. It must also be noted that the findings in the current study contradicts previous research showing greater attentional processing and recall for negative and positive information than information bestowed in neutral prose (Chan & Singhal, 2013; Sharot & Phelps, 2004).

Nonetheless, consistent with the view that emotionally-laden images more effortlessly recalled than text (Ohman et al., 2001; Vuilleumier, 2005), the masked recall descriptive data did indicate that, on average, the negative and positive anti-speeding images were recalled in greater detail than the neutral advertisement. Another possible interpretation of this result has been put forward by Rayner and Castelhano (2008) who posit that when attending to advertisements people spend a greater amount of time fixated on the pictures shown in the advertisement than the text. The visual allocation to the messages and images, however, was not investigated independently in the current study.

It is also important to note here, that from the sample of 40 participants, 19 (47.5%) did not attend any visual allocation to any of the statistic roadside poster advertisements driving the experimental drive. Moreover, in the current study, five participants (24%) from the total sample wrote that they were too busy “concentrating

on their driving" or "the road ahead" to notice any of the anti-speeding advertisements. A finding, that may be explained by Wickens (2008) multiple resource and mental workload theory. According to Wickens, individuals only have a limited capacity to process information and information processing demand issues can occur if an individual is expected to perform a multitude of processing tasks, such as attending to the road ahead as well as the presence of static roadside poster advertisements (Wickens, 2008). This theory is consistent with the results found in numerous driving studies exploring vehicle user's ability to monitor multiple sources of visual information within a dynamic driving environment (Edquist, Horberry, Hosking, & Johnston, 2011; Crundall, 2009; Parkes, Luke, Burns & Lansdown, 2007; Sagberg & Bjørnskau, 2006).

Although no significant differences were identified between the control and anti-speeding advertisements with regards to participants' visual allocation or simulated driving speeds. A significant main effect was identified between the four different static roadside poster advertisements used in the driving scenario with the bus-stop advertisement facilitating a higher amount of fixations and visual allocation time than the column, billboard or banner poster. To be exact, an average difference of 2.05 fixations and 475.30ms visual allocation was obtained between the bus-stop advertisement poster and the second most frequently observed poster (the column advertisement poster). A significant main effect for simulated driving speed was also obtained, with participants found to drive significantly slower after seeing column poster in the driving scenario than the billboard and banner poster and significantly slower after viewing the bus-stop poster than the billboard and banner poster, respectively.

8.1.2 The effectiveness of the anti-speeding advertisement strategies on participants' self-reported perceptions of advertisement persuasiveness.

The influence of message framing on participants' engagement with the message content in road safety advertising has been investigated by several self-report studies (Millar & Millar, 2002; Cauberghe et al., 2009; Lewis et al, 2010). However, too often these studies produce conflicting results (Delhomme et al., 2009). The current study, therefore, sought to build on existing literature and (3) evaluate indirect measures of effectiveness the between the three anti-speeding advertisements (negative, positive and neutral) via participants' self-reported perceptions of advertisement persuasiveness, (the perceived effectiveness of the advertisements in convincing the vehicle user and other drivers to adhere to the legal speed limit). It was hypothesised that:

Hypothesis 2: There will be a significant difference in participants' self-reported perceptions of persuasiveness between the three different types of anti-speeding advertisement poster.

In the current study, the results showed a significant difference in participants' self-reported advertisement persuasiveness between the three anti-speeding advertisement strategies (negative, positive and neutral). With the negative anti-speeding advertisement containing a negative loss-framed message and image with negative valence rated as significantly more effective in its ability to convince both the vehicle user and other vehicle users to adhere to the legal speed limit than the positive and neutral anti-speeding advertisements. Therefore, Hypothesis 2 was accepted and the null hypothesis was rejected.

This result is in line with previous research that has investigated the effects of message framing on health prevention behaviours (Zhao & Penchmann, 2007), self-reported advertisement persuasiveness (Chang & Lee, 2009; 2010), and message engagement

evaluations (Pham et al., 2013). On the contrary, however, this result opposes several road safety studies where positively framed advertisements that focus on the benefits of adopting safe driving behaviours have been found to generate significantly greater perceptions of advertisement persuasiveness than negatively framed advertisements (Millar & Millar, 2000; Sibley & Harré, 2009). This result also challenges more contemporary road safety research on message framing strategies and speeding. For example, a study conducted by Delhomme et al., (2010), where the authors found no significant differences between participant ratings of negatively and positively framed messages when vehicle users' behavioural intentions to abide by the legal speed limit were evaluated.

Moreover, although no significant differences were found between the positive or neutral framed anti-speeding advertisements in the current study, the descriptive statistics did indicate that, on average, the positive advertisement was rated as somewhat more persuasive than the neutral advertisement by the participants. A finding consistent with the view that road safety messages that induce vehicle users' emotions have the potential to increase the overall persuasiveness of an advertisement. With advertisements that use negative or positive advertising strategies found to have the advantage over advertisements that are bestowed in a neutral form in the road safety domain (Lewis et al., 2008; 2010).

8.1.3 The influence of the vehicle user's mood and emotional arousal in predicting self-reported advertisement effectiveness.

It has been suggested that both the mood and the emotions elicited while viewing an advertisement can influence an individual's thoughts and behaviour. Nonetheless, there is an on-going debate about the influencing effect of negative or positive moods on the persuasiveness of differential message framing strategies (e.g. Yan et al., 2010 vs. Chang, 2007). Moreover, despite the widespread use of fear evoking strategies in

road safety advertising, and a reliable correlation between fear and persuasion found in several studies (Witte & Allen, 2000; Lennon & Rentfro, 2010), the persuasive effectiveness of advertisements that use extreme versions of negative loss-framing remains contentious (Lewis, Watson, White, & Tay, 2007). Consequently, the current study sought to: (4) explore the influence of participants' subjective affective state (mood) and the emotional arousal produced by negative, positive and neutral message framing and image strategies in predicting self-reported advertisement effectiveness, measured via participant's perceptions of advertisement persuasiveness.. The following hypothesis was proposed:

Hypothesis 3: The mood and emotional arousal produced by the message framing and image strategies will be predictors of self-reported perceptions of persuasiveness with regards to the perceived effectiveness of the advertisement in convincing the vehicle user to adhere to the legal speed for the negative and positive anti-speeding advertisements.

In the current study, when exploring the influence of the participants' mood state and the emotional arousal produced by the message framing and image strategies in predicting self-reported perceptions of advertisement persuasiveness, neither mood, or emotional arousal were found to be significant predictors. Therefore Hypothesis 3 was not supported and the null hypothesis failed to be rejected.

A possible explanation for this finding, concerns the issues encountered with the reliability of the UWIST Mood Adjective Checklist (UMACL) scales used to measure the participants mood state and the emotional arousal during analysis. With the reliability values for all UMACL scales used to measure message framing techniques, the neutral anti-speeding advertisement and tense arousal found to be below an acceptable internal consistency cut-off point. These scales, therefore, had to be omitted from the study. Nonetheless, when assessing participant's mood, and the emotional arousal,

produced by the negative and positive anti-speeding images, contrary to expectations, neither the hedonic tone nor the energetic arousal measures were found to be associated with self-reported advertisement effectiveness. A result that is in stark contrast to Wegener and Petty (1994) contingency framework and prior studies that have shown that the effectiveness of an advertisement is dependent on the mood (Chang, 2007; Keller, Lipkus & Rimer, 2003; Yan et al., 2010) or emotional state of the individual when viewing an advertisement (Witte & Allen, 2000; Lennon & Rentfro, 2010). It is acknowledged, however, that much work in this area has centred on either message framing techniques or on advertisements as a whole rather than the influence of image valence alone.

8.1.4 The influencing effects of advertisement likability, emotional and graphic content, perceived risk and efficacy and level of involvement in predicting self-reported advertisement effectiveness.

The role of emotion in advertising has received copious attention. Yet, it is difficult to deduce which framing strategy is most effective in the road safety domain since framing effects appear to fluctuate depending on multiple factors. These factors have too, been found to influence participants' self-reported perceptions of advertisement persuasiveness (Delhomme et al., 2009). Therefore, the final aim of the current study was to (5) explore the influencing effects of advertisement likability, emotional and graphic content, the cognitive constructs of perceived risk and efficacy, and participants' level of involvement in predicting self-reported advertisement effectiveness via indirect measures of perceptions of persuasiveness. It was hypothesised that:

Hypothesis 4: Graphic content, high perceived risk, high response-efficacy and low self-efficacy beliefs will be predictors of participants' self-reported perceptions of advertisement persuasiveness with regards to the perceived effectiveness of the

advertisement in convincing the vehicle user to adhere to the legal speed for the negative anti-speeding advertisement.

Hypothesis 4 was partially accepted, with the cognitive construct of response-efficacy found to be a significant predictor of perceived advertisement effectiveness for the negative anti-speeding advertisement. Explicitly, in the current study higher ratings of response-efficacy were found to significantly predict higher self-reported perceptions of advertisement persuasiveness. A finding consistent with existing road safety (Floyd et al., 2000; Lewis et al., 2003) and anti-speeding advertisement evaluation research (Lewis et al., 2010; Tay & Watson, 2002). Moreover, although initial analysis revealed that the participants' level of involvement with road traffic collisions or speeding behaviours was not associated, or significantly predicted, with participants' higher effectiveness ratings; collectively response-efficacy and levels of involvement explained 71.5% of the variance in the negative anti-speeding advertisement effectiveness scores. Suggestive that for the participants who believed that driving at the legal speed limit was effective at reducing child fatalities on the road, and had been involved in road traffic collisions or had a tendency to drive over the speed limit, negative anti-speeding advertisements fostered greater perceptions of persuasiveness. This finding supports the work of Wansink and Pope (2015), however, contradicts earlier research by Millar and Millar (2000) who investigated the influence of levels of involvement on positive and negative message framing strategies. Nonetheless, the dissimilarity in findings is likely to be explained by the differential measures used to assess participant's levels of involvement in the current study. For instance, whereas Millar and Millar (2000) used self-reported measures of road traffic collision involvement susceptibility, in the current study participants' self-reported collision involvement and prior speeding behaviours were used.

Moreover, inspection of the descriptive statistics for the negative anti-speeding advertisement also revealed a fair relationship between participants' self-reported

effectiveness ratings and moderate to high perceived levels of susceptibility (a high likelihood of killing a child if the participant disregarded the legal speed limit). A strong significant relationship was also found between participants' self-reported effectiveness ratings, and moderate to high perceived graphic content (including both graphic advertisement content and emotions aroused by the advertisement), and severity of the threat (seriousness of the killing a child through speeding). Overall, these associations are consistent with the findings from previous research (Lennon & Renfro, 2010; Tay & Watson, 2002; Witte & Allen, 2000) and notably, for the most part, in line with Witte's (1992; 1994) Extended Parallel Process Model (EPPM). For example, as aforementioned, according to the EPPM for an anti-speeding advertisement to effective in reducing risky driving behaviours, the viewer must perceived a threat, adequate levels of fear must be produced and high levels of perceived efficacy should be roused, However, it should not go without remark, that perceived self-efficacy was not found to be associated with self-report perceptions of effectiveness for the negative or any of the three anti-speeding advertisements in the current study.

With regards to the positive anti-speeding advertisement, contrasting severity findings between the negative and positive anti-speeding advertisement were established. Although only an intermediate relationship was revealed, the low severity of the threat displayed in the positive anti-speeding advertisement was too found to be both associated with and significantly predict participant's self-reported effectiveness scores. For the neutral anti-speeding advertisement, however, similar findings to the negative advertisement were obtained. Unexpectedly, an association between perceived susceptibility and perceptions of advertisement persuasiveness were found. With response-efficacy, along with advertisement appeal, revealed to significant predictors of participants' self-reported effectiveness scores.

8.2 Contributions to road safety literature

The results obtained in the current study converge with existing literature suggesting that the type of message framing and image valence used in an advertisement can impact on perceived effectiveness (Alk et al., 2011; Lewis, Watson & White, 2010). With advertisements containing negative loss-framed messages and images with negative valence found to have the advantage over neutral advertisements and advertisements that use positive images and gained-framed messages when it comes to participants' self-reported perceptions of persuasiveness. A result akin to several other evaluation studies (Chang & Lee, 2009; Krishnamurthy, Carter & Blair, 2001; Peterson et al., 2010; Zhao & Pechmann, 2007). In line with previous research (Lennon & Renfro, 2010; Tay & Watson, 2002; Witte & Allen, 2000) and theory (Rodgers, 1975; Witte, 1992; 1994), the results of the current study would also suggest that negative emotional advertisement content associated with high perceived graphic content, severity and response-efficacy can help facilitate participants' perceptions of advertisement persuasiveness. There is also some evidence to support for the notion that the perceived effectiveness of advertisement framing and image strategies varies depending on several distinct or dispositional factors. Factors to include the vehicle users level of involvement with road traffic collisions and prior speeding behaviour (Covey, 2014; Wansink & Pope, 2015) and advertisement likeability (Smit, Van Meurs & Neijens, 2006).

8.2.1 Roadside poster design and placement

Unexpectedly, in the current study a significant difference between the four static roadside poster advertisements used in the driving scenario and participants' visual allocation and driving speed was identified. Thus, it is likely that the roadside poster design, as well as the positioning and the location of the static poster, may influence a vehicle user's visual allocation and affect driving speed. It would, therefore, be beneficial to examine these factors in greater detail in future research. Also notably, if

vehicle users were to attend to the roadside posters for relatively long periods of time, this may be at the expense of information processing that is important for safe driving behaviour (Wickens, 2008; Chan & Singhal, 2003).Indeed, it is likely that the presence of roadside poster advertisements will distract drivers from the driving task in hand. This is evidenced in a simulated driving study exploring participants' visual attention and self-reported ratings of mental workload by Young et al., (2009). In the study, the authors found that the presence of static roadside posters in the dynamic roadside environment both increased subjective ratings of mental workload and caused the vehicle users' to take their eyes off the road ahead for relatively long periods of time, resulting in impaired driver attention and lateral control of the vehicle. Moreover, Bendak and Al-Saleh (2010) evaluated the effects of roadside advertising signs on driving performance using a driving simulator. In their study two driving paths were created. These paths were identical apart from one slight difference, one contained a roadside advertising sign and the other did not. In the driving path containing the roadside advertising sign, the authors found impaired driving performance, with significantly greater indices of lane drifting and reckless driving across dangerous intersections observed. These findings correspond with various contemporary simulated driving research studies investigating the differential effects of roadside distractions (Chan & Singhal, 2012) and hazardous driving situations (Crundall et al., 2012; Megias et al., 2011).

8.2.2 Limitations and future directions

One limitation pertaining to the current study relates to the small sample size used to explore significant predictors of advertisement effectiveness during the regression analysis. Although the main assumptions of multiple regression analyses were met, due to a lack of cases per predictor variable, interpretation of the regression results must be taken with caution. Future research, therefore, would benefit from a larger sample size when exploring the influencing effects of factors such as response-efficacy, levels of involvement and advertisement likability on participants' perceptions of

advertising effectiveness. A sample size of more than 55 is recommended to obtain a medium effect (Field, 2013).

Issues with the internal consistency of the UMACL scales used to explore the influence of mood and emotional arousal on the message framing strategies and neutral image were also encountered in the current study. Consequently, several UMACL scales were omitted from further analysis. Although a possible explanation for these findings could be attributed to the high repetition of the UMACL scales, which in turn, may have affected participants' compliance and motivation to provide valid responses (Wilhelm & Schoebi, 2007), the use of reverse scoring in measurements such as the UMACL has also been found to be problematic (Barnette, 2000). However, an alternative explanation as to why no mood effects were found concerns the design of the current study. It has been said that an individual's mood is liable to change depending on several factors, to include exposure to pleasant and negative stimuli (Megias et al., 2014). There is also evidence that emotional messages presented on a small screen can influence in an individuals' responses to the message (Ravaja et al., 2006). Far less, however, is known about the impact of anti-speeding message text or images on mood manipulation. Nonetheless, it can be assumed that if such stimuli were to bring about a change in a participants' mood, this manipulation is only likely to be weak. Moreover, typically in research the UMACL is used to evaluate mood changes before and after exposure to the stimuli (Dorn & Matthews, 1995; Biernacki & Dziuda, 2014). Yet, in this study when completing the UMACL participants' were only asked describe their mood when viewing the stimuli. Thus, a range of extraneous and confounding variables, to include participants preceding affective state, were not adequately controlled. Unambiguously, the measurement method utilised to manipulate mood in the current study must be addressed. It is, therefore, suggested that in future studies pre-and-post measurements are utilised so that baseline scores of mood are obtained. If not, there is no point of reference and it is difficult to know if the stimuli itself has influenced the participants mood.

Self-reports measurement methods in general can also suffer from several other specific disadvantages. Not only can participants vary in their understanding or interpretation of the questions but participants' responses can also be exaggerated. There is also evidence to suggest that people tend to agree with positive rather than negative statements (Barnette, 2000). Surveys, containing multiple questionnaires that measure similar attributes are also prone to common-method variance. Common-method variance is a variance attributed to the measurement method rather than the construct under investigation and can either inflate or deflate associations between variables or create associations that do not exist. Social desirability and consistency effects are just two potential sources of bias in the current study that may have attributed to common-method variance in the self-report measurement methods used to gauge participants' prior collision involvement and speeding behaviours, and the influence of mood and emotional arousal, respectively (Podsakoff, MacKensie & Podsakoff, 2003: Wahlberg, Dorn & Kline, 2010). Furthermore, although self-report measurement methods are frequently employed in message framing and road safety research they can sometimes be unreliable predictors of true behaviour. For example, in a meta-analysis investigating the link between participants' intentions and behaviour change, Webb and Sheeran (2009) revealed that moderate-to-high changes in behavioural intentions leads only to a weak-to-moderate change in tangible behaviours.

It must also be noted that procedural instructions provided to the participants prior to taking part in simulated drive may have also presented several drawbacks. During the experimental procedure participants were verbally instructed that they were going to "take part in a short hazard perception test and to drive in accordance to the UK Highway Code and follow the road straight ahead". Therefore, participants' attention was likely to be focussed towards identifying potential hazards in the virtual driving simulator environment and their driving performance in response to these hazards,

thus, producing both an increase in mental workload and reduction in saccade amplitude and spread of search (Crundall et al., 2010; Wickens 2008). This is likely to explain why only 52.5% of the participant sample visually attended to the areas of interest (anti-speeding advertisements) during the simulated drive. Consequently, in future research it is recommended that the words 'hazard perception test' are not uttered and that instead participants are simply instructed to "drive as they would normally drive".

Correspondingly, participants' visual allocation, recall ability and driving performance may also have been affected by several factors in the design of the driving scenario, such as scene complexity and the fact that the participants were exposed to a number of different stimuli in a short space of time. The virtual driving simulator environment in the current study consisted of four diverse roadway scenes, dynamic objects as well as pedestrians, traffic, hazards and various triggered events. The anti-speeding advertising stimuli were also presented just 1800ft apart in four different roadside posters. However, individuals only have a limited capacity to process multiple sources of visual information. Thus, the simultaneous bombardment of visual stimuli in this study was only likely to add to the participants' mental workload and impact the on processing and attentional capacities that are vital for safe driving performance (Crundall, 2009; Edquist et al., 2011; Wickens, 2008). Moreover, in the driving scenario triggered events were employed within close proximity to each anti-speeding advertisement stimuli. Therefore, it is also plausible that participants were not provided with enough time to efficiently adapt their speed between the anti-speeding advertisement stimuli following their response to each triggered event. In future studies the scene complexity needs to be managed more efficiently. Thus, it is suggested that a less complex scene such as a quiet roadway environment, devoid of both pedestrians and hazards, containing a single static roadside poster is used in future research studies. It is also recommended that a greater distance is applied between each anti-speeding advertisement.

Participants' visual attention and recall was also likely to be affected by the nature of the anti-speeding advertisements used in the driving scenario. For example, Higgins, Leinenger and Rayner (2014) have suggested that individuals are more likely to fixate on colour than black and white print advertisements, and visually attend to them sooner and for a greater amount of time. There is also an on-going debate about the optimum level of advertisement exposure necessary to facilitate advertisement effectiveness. While Weitz and Wensley (2002) report that an advertisement can influence an individuals' behaviour after just one exposure. In contrast, Delhomme et al. (2009) suggest that a minimum of three exposures is optimum. Moreover, the anti-speeding advertisements used in the driving scenario were patently much smaller than they would appear in a real driving situation. This too, may have had an effect on true manifestations of visual allocation and behaviour. Therefore, size may really matter, given that prior research has found that individuals are more likely to attend to larger advertisements than smaller advertisements (Peters & Itti, 2007).

Finally, despite the advantages of measuring speed adaptation using direct measures of simulated driving speed over indirect measurements, it should also be noted, that an inherent limitation of driving simulation studies is that participants inevitably know that the driving scenario is not a real-life driving situation. Driving simulators provide participants with a risk free experience where they are devoid of any physical threat, safety concerns or consequences. This can give rise to a false sense of responsibility and competence (Plant et al., 2011; Yadav & Singh, 2014). Thus, simulated driving research may produce differential results to that that would occur if a participant was not undertaking driving research confined to a laboratory setting. Consequently, the use of more naturalistic driving measures such as instrumental smart cars may be more suited this type of research and could help facilitate ecological validity (Boyce & Geller, 2002).

To conclude, the results of this research provide some interesting insights into the influence of message framing and image valence in road safety advertising. Contrary to expectations, no significant differences were found between the negative, positive and neutral anti-speeding advertisements during the simulated drive. Thus, the ability of emotional advertisement content in aiding visual attention, memory and regulating speeding behaviour was inconclusive. In line with existing literature, however, the results suggest that negative message framing and image valence can impact on the perceived effectiveness of an advertisement (Akl et al., 2011; Lewis et al., 2010; Pham et al., 2013). Nonetheless, since perceptions do not always translate to behaviour (Webb & Sheeran, 2009), it is unknown whether roadside advertisements that employ negative strategies will in reality promote safe driving behaviours. In fact, there are growing concerns over the potential risks of roadside advertisements to safe driving practices (Young et al., 2009), as well as evidence to suggest that alone the beneficial effects of road safety advertisements are small (Elvik et al., 2009; Hoekstra & Wegman, 2011). These mixed results suggest that there is still much to learn. Therefore, further research in this area is required to evaluate the best anti-speeding countermeasures to take in order to effectively reduce speed related collisions and make Britain's roads a safer environment for vehicle users, cyclists and pedestrians.

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Appendix

Appendix A: Pre-Test: Online Survey

Informed Consent Form

Purpose: This is a short on-line survey aimed at exploring your views of anti-speeding messages and images used to raise awareness of road safety.

Procedure: Your participation will involve filing out a series of questions. Please answer each question openly and truthfully. I have designed the questionnaire so that you have to give an answer on each page. If you wish to go back to a previous screen you can click on the back arrow at the bottom of the page.

It is estimated that this questionnaire will take no longer than15 minutes to complete.

Voluntary Nature of the Study/Confidentiality: Your participation is voluntary and the anonymous nature of this study means that no name is necessary.

Contacts and Questions: Should you wish to withdraw your data or require any additional information concerning this study before or after its completion, please contact: laila.horan@beds.ac.uk

Consent: Completion of the survey indicates your approval to participate in the study and that you are over 18 years of age.

Thank you in advance for taking the time to complete this survey.

Demographics

Q1 Are you male or female?
- ❍ Male (1)
- ❍ Female (2)

Q2 How old are you?_____

Q3 What is your ethnicity?
- ❍ White - UK / Irish (1)
- ❍ White - European (2)
- ❍ White - Other (please specify) (3) _____
- ❍ Mixed - White and Black Caribbean (4)
- ❍ Mixed - White and Black African (5)
- ❍ Mixed - White and Asian (6)
- ❍ Mixed - Other (please specify) (7) _____
- ❍ Asian - Indian (8)
- ❍ Asian - Pakistani (9)
- ❍ Asian - Bangladeshi (10)
- ❍ Asian - Other (please specify) (11) _____
- ❍ Black - Caribbean (12)
- ❍ Black - African (13)
- ❍ Black - Other (please specify) (14) _____
- ❍ Oriental - Chinese (15)
- ❍ Oriental - Malaysian (16)
- ❍ Other ethnic group (please specify) (17) _____

Q4 What type of road user are you? (Please select all that apply)
- ☐ Passenger (1)
- ☐ Pedestrian (2)
- ☐ Vehicle Driver (3)
- ☐ Motorcyclist (4)
- ☐ Pedal Cyclist (5)
- ☐ Other (please specify) (6) _____

Message Framing

You are about to be presented with 10 anti-speeding messages taken from road safety posters (one per page). The message may focus on the advantages of adopting a safe behaviour (positive, gain framing) or the negative consequences of not adopting a safe behaviour (negative, loss framing).

Please provide your view of each of the messages by responding on a 7-point rating scale, with 1 being “Mostly Negative” and 7 being “Mostly Positive”.

There are no wrong or right answers and no trick questions.

Please work quickly and do not think too long about each rating.

Q5 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Kill your speed. Not a child"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q6 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' response whereas if you consider it as a gain a 'Positive' response will be necessary.

"Slow down for a happy town"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q7 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Keep your speed Suitable, Appropriate, Fitting, Economical"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q8 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Even a child knows that speed = Danger"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q9 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Slow down before your life comes to an abrupt stop"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q10 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Don't speed"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q11 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Dying to get home? Speeding. What's your excuse"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q12 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Have a heart behind the wheel. Stick to the speed limit"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q13 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"Slower speeds = Happy people"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Q14 Please provide your view of the below message. If you consider the message as a loss then it will require a 'Negative' rating whereas if you consider it as a gain a 'Positive' rating will be necessary.

"No Excuses. Too Fast? Slow Down"

❍ 1 Mostly Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Mostly Positive

Image Valence

Now... you are about to be presented with a series of road safety images.
If a negative emotion is invoked please provide a 'Negative' rating. Similarly, if a positive emotion is invoked please provide a 'Positive' rating. A neutral rating should only be provided when no change in emotion is experienced.

Once again, there are no wrong or right answers and no trick questions.

Please work quickly and do not think too long about each rating.

Q15

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q16

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q17

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q18

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q19

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q20

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q21

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q22

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q23

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

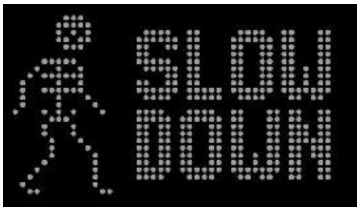
Q24

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q25

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q26

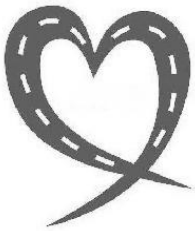


❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q27

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q28



❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q29

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q30

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q31

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q32

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q33

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q34

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q35

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q36

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q37

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q38

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q39

❍ 1 Negative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Positive

Q24 Thank you for participating in the survey

Appendix B: Personal Comfort Questionnaire

Identification Number: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Date: ☐ ☐ ☐ ☐ ☐ ☐

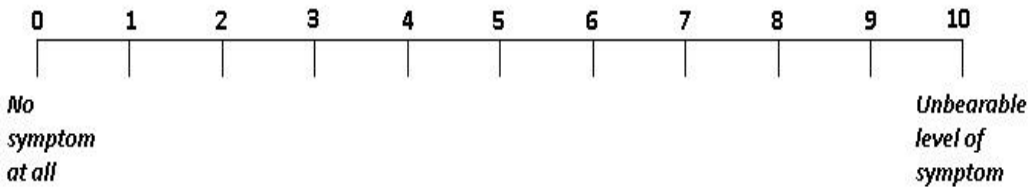
Do you have any physical conditions that might interfere with your ability to drive the STISIM simulator (recurring migraines, inner ear ailments, visual impairment, hearing impairment, epilepsy, seizures, nerve or muscle disease, or other conditions?)

No **Yes** (please specify)……

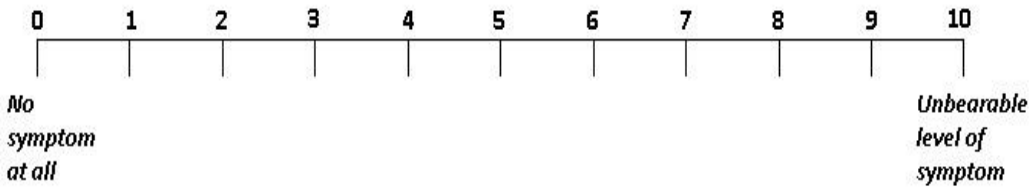
Personal Comfort Questionnaire A

Please read the following list of symptoms carefully
Using a cross anywhere along the scale, please rate your current feelings of each symptom.

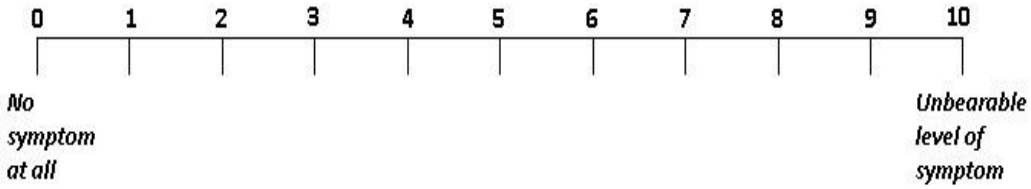
- **Headache:**



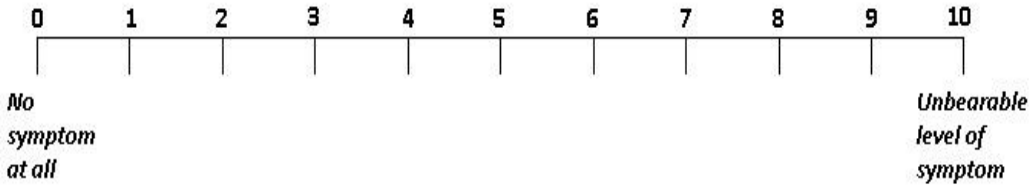
- **Eyestrain:**



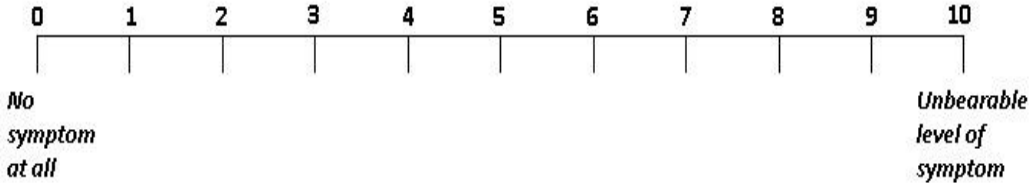
- **Blurred Vision:**



- **Dizziness:**



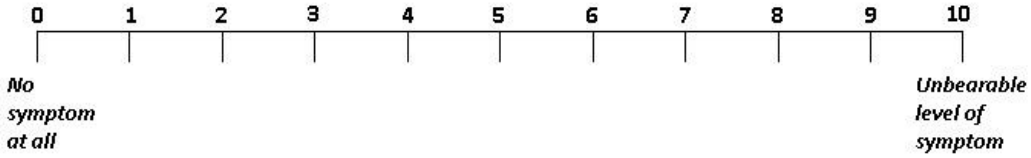
- **Sickness:**



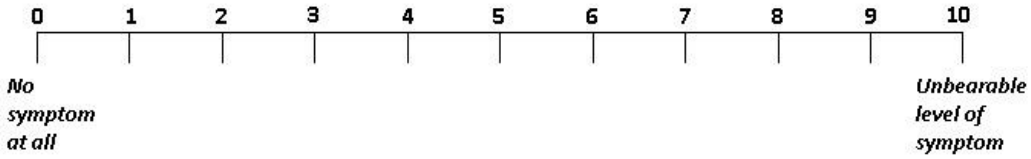
Personal Comfort Questionnaire B

Once again please read the following list of symptoms carefully. Using a cross anywhere along the scale, rate your current feelings of each symptom.

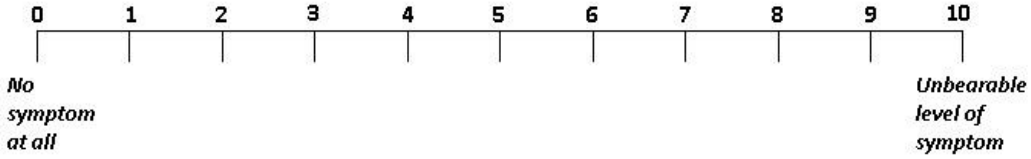
- **Headache:**



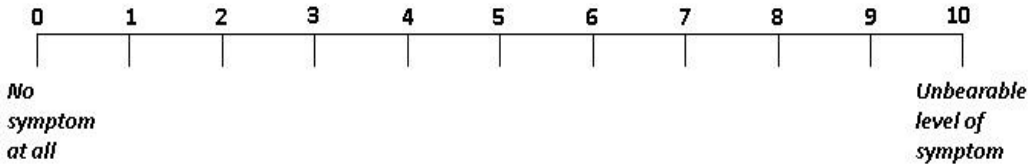
- **Eyestrain:**



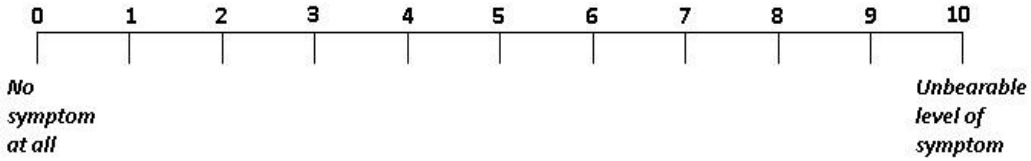
- **Blurred Vision:**



- **Dizziness:**



- **Sickness:**



Appendix C: Information/Consent Form:

Dear Participant,

You are invited to participate in an MRes project designed by Laila Horan. This study will be approved and supervised by Dr. Patricia Roberts and Isabella McMurray.

The aim of this research project is to explore various aspects of driver attention and driving behaviour using the STISIM driving simulator and a variety of cognitive and physiological measures. Following the experiment you will also be asked to take part in a short masked recall test and complete a Mood Adjective Checklist. These tests are designed to measure your awareness and current mood and should be taken consecutively with no break in between.

Your participation in this study will be completely voluntary and you are able to leave and withdraw your input at any time during your data collection without penalty. All information will be kept anonymous and in the strictest of confidence. Please note that due to the anonymous nature of the study, it will prove impossible to withdraw your information at a later date.

Participation should take no longer than 35-40 minutes. Completion of the experiment indicates your approval to participate in the research project. Please note participants should be aged 18 or over.

I would like to thank you for in advance for your interest in my MRes project.

Miss Laila Horan

……
…….

Statement of Consent:

I have read all the information. Any questions I had regarding the experimental procedure have been answered to my satisfaction by the researcher. I give my consent to participate in this study.

I am aware my participation is entirely voluntary and I am free to withdraw at any time during data collection without penalty.

Signature: _____

Appendix D: Post Simulated Drive Qualtrics Survey

Identification Number: _____

Demographics

Please enter your demographics and indices of driving behaviour below:

Q1 Are you male or female?

- ❍ Male (1)
- ❍ Female (2)

Q2 How old are you? _____

Q3 What is your ethnicity?

- ❍ White - UK / Irish (1)
- ❍ White - European (2)
- ❍ White - Other (please specify) (3) _____
- ❍ Mixed - White and Black Caribbean (4)
- ❍ Mixed - White and Black African (5)
- ❍ Mixed - White and Asian (6)
- ❍ Mixed - Other (please specify) (7) _____
- ❍ Asian - Indian (8)
- ❍ Asian - Pakistani (9)
- ❍ Asian - Bangladeshi (10)
- ❍ Asian - Other (please specify) (11) _____
- ❍ Black - Caribbean (12)
- ❍ Black - African (13)
- ❍ Black - Other (please specify) (14) _____
- ❍ Oriental - Chinese (15)
- ❍ Oriental - Malaysian (16)
- ❍ Other ethnic group (please specify) (17) _____

Q4 When (what month and year) did you obtain your driving license? *If you cannot remember the month and year please write how old you were when you passed your test. _____

Q5 When is the last time you drove? (Month/Year) _____

Memorability: Masked Recall Test

During the simulated driving task you were exposed to four posters (a billboard poster, a bus shelter poster, a column poster and a large banner poster positioned on the side of a building).

Picture A

The masked area in red in 'Picture A' corresponds to the location of the billboard poster that you would have seen during the simulated driving task.

Q6 In as much detail as possible: 1) Please describe the message you recall seeing in the billboard poster:

_____

Q7 2) Please describe the image you recall seeing in the billboard poster:

_____

During the simulated driving task you were exposed to four posters (a billboard poster, a bus shelter poster, a column poster and a large banner poster positioned on the side of a building).

Picture B

The masked area in red in 'Picture B' corresponds to the location of the banner poster that you would have seen on the side of the building during the simulated driving task.

Q8 In as much detail as possible: 1) Please describe the message you recall seeing in the banner poster:

_____

Q9 2) Please describe the image you recall seeing in the banner poster:

_____

During the simulated driving task you were exposed to four posters (a billboard poster, a bus shelter poster, a column poster and a large banner poster positioned on the side of a building).

Picture C

The masked area in red in 'Picture C' corresponds to the location of the column poster that you have seen during the simulated driving task.

Q10 In as much detail as possible: 1) Please describe the message you recall seeing in the column poster:

_____

Q11 2) Please describe the image you recall seeing in the column poster:

_____

UWIST Mood Adjective Checklist (UMACL)

INSTRUCTIONS: You about to see three images followed by three road safety messages. Just below each item is a list of words that describe the moods or feelings that people have. Please indicate how well each adjective or phrase describes your mood by choosing one of the four possible options. Work quickly and don't spend too much time thinking about your answer. The first answer you think of is the best one. Answer every word, even if you find it difficult. Answer as honestly as you can, and what is true to you. Please do not choose an answer because it seems like the right thing to say. Your answers will be kept entirely anonymous.

Image 1

Q12 On the scale below please indicate how well each adjective or phrase describes your mood when viewing image 1. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

Message 1

"Kill your speed. Not a child."

Q13 On the scale below please indicate how well each adjective or phrase describes your mood when reading message 1. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

Image 2

Q14 On the scale below please indicate how well each adjective or phrase describes your mood when viewing image 2. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

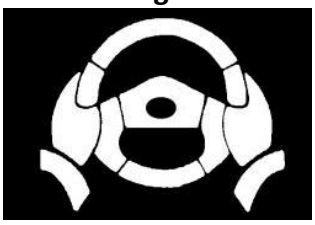
Message 2

"Slow down for a happy town"

Q15 On the scale below please indicate how well each adjective or phrase describes your mood when reading message 2. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

Image 3



Q16 On the scale below please indicate how well each adjective or phrase describes your mood when viewing image 3. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

Message 3

"Keep your speed Suitable, Appropriate, Fitting and Economical"

Q17 On the scale below please indicate how well each adjective or phrase describes your mood when reading message 3. Work quickly and don't spend too much time thinking about your answer.

	Definitely feel (1)	Slightly feel (2)	Slightly do not feel (3)	Definitely do not feel (4)
Sluggish (i.e. lacking alertness and energy) (1)	❍	❍	❍	❍
Tired (2)	❍	❍	❍	❍
Unenterprising (i.e. not bold or willing to take risks) (3)	❍	❍	❍	❍
Passive (4)	❍	❍	❍	❍
Vigorous (5)	❍	❍	❍	❍
Alert (6)	❍	❍	❍	❍
Active (7)	❍	❍	❍	❍
Energetic (8)	❍	❍	❍	❍
Anxious (9)	❍	❍	❍	❍
Jittery (10)	❍	❍	❍	❍
Tense (11)	❍	❍	❍	❍
Nervous (12)	❍	❍	❍	❍
Relaxed (13)	❍	❍	❍	❍
Calm (14)	❍	❍	❍	❍
Restful (15)	❍	❍	❍	❍
Composed (16)	❍	❍	❍	❍
Depressed (17)	❍	❍	❍	❍
Dissatisfied (23)	❍	❍	❍	❍
Sad (24)	❍	❍	❍	❍
Sorry (25)	❍	❍	❍	❍
Cheerful (26)	❍	❍	❍	❍
Happy (27)	❍	❍	❍	❍
Contented (28)	❍	❍	❍	❍
Satisfied (29)	❍	❍	❍	❍

Additional Self-report Measures

Poster 1

Please answer each question by selecting the number that applies on the 7-point scales below. There is no right or wrong answer and no trick questions. Work quickly and do not think too long about each rating.

Q18 How informative would you rate the poster 1?

❍ 1 Very uninformative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very informative

Q19 How appealing would you rate poster 1?

❍ 1 Not at all appealing ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Extremely appealing

Q20 How would you rate the content of Poster 1?

❍ 1 Not at all graphic ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very graphic

Q21 To what extent do your emotions change when you look at poster 1?

❍ 1 Not at all ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very much

Q22 How would you rate the severity of the message in the poster 1 (i.e. seriousness of the threat)?

❍ 1 Not at all severe (Positive) ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very severe (Negative)

Q23 How would you rate the likelihood of killing a child if you disregarded the legal speed limit?

❍ 1 Very unlikely ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very likely

Q24 Please rate how effective you think poster 1 is at convincing other road users to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q25 Please rate how effective poster 1 is at convincing YOU to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q26 How effective do you think driving at the speed limit is in terms of reducing child fatalities on the road?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Poster 2

Please answer each question by selecting the number that applies on the 7-point scales below. There is no right or wrong answer and no trick questions. Work quickly and do not think too long about each rating.

Q27 How informative would you rate the poster 2?

❍ 1 Very uninformative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very informative

Q28 How appealing would you rate poster 2?

❍ 1 Not at all appealing ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Extremely appealing

Q29 How would you rate the content of Poster 2?

❍ 1 Not at all graphic ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very graphic

Q30 To what extent do your emotions change when you look at poster 2?

❍ 1 Not at all ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very much

Q31 How would you rate the severity of the message in the poster 2 (i.e. seriousness of the threat)?

❍ 1 Not at all severe (Positive) ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very severe (Negative)

Q32 How would you rate the likelihood of 'having a happy town' if you disregarded the legal speed limit?

❍ 1 Very unlikely ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very likely

Q33 Please rate how effective you think poster 2 is at convincing other road users to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q34 Please rate how effective poster 2 is at convincing YOU to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q35 How effective do you think driving at the speed limit is in terms of creating a happy town?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Poster 3

Please answer each question by selecting the number that applies on the 7-point scales below. There is no right or wrong answer and no trick questions. Work quickly and do not think too long about each rating.

Q36 How informative would you rate the poster 3?

❍ 1 Very uninformative ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very informative

Q37 How appealing would you rate poster 3?

❍ 1 Not at all appealing ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Extremely appealing

Q38 How would you rate the content of Poster 3?

❍ 1 Not at all graphic ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very graphic

Q39 To what extent do your emotions change when you look at poster 3?

❍ 1 Not at all ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very much

Q40 How would you rate the severity of the message in the poster 3 (i.e. seriousness of the threat)?

❍ 1 Not at all severe (Positive) ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very severe (Negative)

Q41 How would you rate the likelihood of being Suitable Appropriate Fitting and Economical if you drove at the legal speed limit?

❍ 1 Very unlikely ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very likely

Q42 Please rate how effective you think poster 3 is at convincing other road users to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q43 Please rate how effective poster 3 is at convincing YOU to stick to the legal speed limit when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Q44 How effective do you think driving at the speed limit is in terms of being suitable, appropriate, fitting and economical when driving?

❍ 1 Very ineffective ❍ 2 ❍ 3 ❍ 4 ❍ 5 ❍ 6 ❍ 7 Very effective

Self-efficacy and Level of Involvement

Q45 Please indicate how difficult do you believe it is for you to drive at the legal speed limit?

- ❍ Very difficult 1 (1)
- ❍ 2 (2)
- ❍ 3 (3)
- ❍ 4 (4)
- ❍ 5 (5)
- ❍ 6 (6)
- ❍ Very easy 7 (7)

Q46 How fast do you usually drive compared to the general flow of traffic? Would you say:

- ❍ Much faster (1)
- ❍ Somewhat faster (2)
- ❍ About the same (3)
- ❍ Somewhat slower (4)
- ❍ Much slower (5)

Q47 Please indicate how often you disregard the speed limit when driving.

- ❍ Never (12)
- ❍ Hardly Ever (13)
- ❍ Occasionally (14)
- ❍ Quite Often (15)
- ❍ Frequently (16)
- ❍ Nearly All The Time (17)

Q48 How many accidents have you been involved in over the past year when you were the driver? Please tell me the number of all accidents, whether or not you were at fault. _____

Thank you for taking the time out to complete my experiment

Appendix E: Debriefing Form

Debriefing Form:

Thank you for taking the time to participate in my research.

As outlined in the Information Sheet, you took part in a study exploring various aspects of driver attention and driving behaviour using the STISIM driving simulator and a variety of cognitive physiological measures. The main aim of this research however, was to determine whether negatively framed road safety advertisements facilitate higher levels of attention and recall when compared with a positively framed or neutral event using a simulated driving environment.

The results found by the experiment will be available after all data has been collected and analysed. Due to the anonymous nature of the data collection, individual results will not be accessible, however, for a brief overview of the findings please contacts me via email (laila.horan@beds.ac.uk).

Once again, I would like to thank you for your participation.