

# Special issue: Communications, media and road safety messages

## Peer-reviewed papers

### Beyond reviews of road safety mass media campaigns: Looking elsewhere for new insights

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#### Abstract

Road safety practitioners are well served by a well-researched body of publications designed to inform the development and assessment of more effective mass media campaigns. But how does road safety advertising actually influence road user behaviours and how often do road users need to be exposed to a particular message? Campaign developers need to look beyond the traditional body of knowledge found in the road safety mass media campaign literature. Insights can be gained from other disciplines including research into public sector advertising, commercial advertising effectiveness, neuroscience and social psychology.

#### Keywords

Advertising, Campaign evaluation, Effective frequency, Mass media, Neuroscience, Persuasion, Road safety advertising, Social marketing

#### Introduction

Road safety campaign planners have a large number of well documented and researched publications indicating the principles associated with evaluated road safety advertising campaigns. There is considerable consensus across the various publications. Nonetheless, there needs to be more debate on whether or not road crashes ought to be used as the basis of success or failure. The issue concerning how road safety advertising seemingly influences behaviour also needs to be addressed as does the issue of how frequently road users need to be exposed to a particular road safety communication for it to have an effect.

#### Road safety campaign analyses and reviews

Road safety practitioners have a wide range of available publications summarising what we know about designing and evaluating road safety advertising campaigns, but little has been written about implementing them other than the three Handbooks: Taylor and Elliott [1], Delhomme et al. [2], Elliott [3].

Since the publication of the author's *Effective Road Safety Campaigns: a Practical Handbook* [3], a number of publications have appeared synthesising what has been learnt specifically from road safety media campaigns: Wundersitz and Hutchinson [4], Wundersitz, Hutchinson and Woolley [5], Vaa and Phillips [6], Phillips and Torquato [7], Lewis, Watson and White [8], Delaney et al. [9], Rodriguez Anderson-Wilk [10], Woolley [11] and Donovan et al. [12]. Beyond these reviews, a small number of meta-analyses have been available: Elliott [13], Delhomme [14] and Phillips et al. [15]. In addition, road safety practitioners have turned to health in their search for principles including Noar [16] and Strecher et al. [17].

In addition to the more general reviews, there have been a number of reviews relating to the use of threat appeals given that, in Australia, campaigns often focus on negative outcomes: Lewis, Watson and White [18], Lewis, Watson, White and Taylor [19], Elliott [20, 21].

#### Assessing Campaign Performance

Virtually all reviewers highlight the finding that any form of scientific evaluation is highly desirable, but usually absent. In this writer's opinion, the status quo arises because of the difficulties and cost of scientific evaluation and the mistaken belief that crashes are the only legitimate outcome measure. The cost of

scientific evaluation can equal or exceed the cost of developing and implementing the campaign. Equivocal findings are also likely, as occurred in Boughton and South's [22] expensive large-scale switch over experimental design with control.

For any mass media campaign to meet its planners' objectives it must have an influence on behaviour; to have an effect, even if that effect was not the intended one; e.g. a campaign about drink-drive enforcement aimed at drink drivers may inadvertently encourage greater levels of random breath testing (RBT) to be carried out because the police now see RBT enforcement as accepted by the community and in turn influencing drivers to moderate their drink driving. Whether or not there is a reduction in alcohol-related crashes should not be the criteria of campaign success. The campaign was designed to influence drink-driving behaviour either directly or indirectly.

Hutchinson and Wundersitz [23] urge the focus in assessment should be on **behaviours which are proxies for safety** rather than crashes because the random variability in crash numbers is too great; this accounts for the lack of success of the few documented evaluated campaigns. What ought to matter is: Did the campaign overall have the desired effects on the advocated behaviours even if the change can't be detected in the crash database? Elliott [24] argued that the same principles apply to assessing the effects of road safety education programs.

Beyond knowing the campaign had a measurable effect (on behaviour), it would be invaluable to determine 'how' or 'why' it has had the intended effect. A suite of **intermediate measures** can provide the clues needed. An outstanding review of how to measure success can be found in Morgan and Poorta's [25] review of successful public service media campaigns in the UK.

Traditionally, designing and pre-testing messages have taken the form of diagnostic small-scale qualitative research. Recently, Hoekstra and Wegman [26] present a strong case for campaigns to undergo **experimental pre-testing** of parts of the campaign in a controlled environment.

## Some new knowledge frontiers to embrace when considering road safety campaigns

The following frontiers have been chosen because of their possible relevance to road safety campaign planners.

### Insights from social marketing or public sector advertising campaigns

Some reviewers mention the use of commercial marketing practices in road safety campaigns (termed 'social marketing'). Elliott [27] painstakingly documented the failure of social marketing over three decades concluding that whilst marketing had some useful tools to offer (a marketing analysis), its theory of persuasion 'Make what the customer wants and will buy' is fundamentally different to the persuasion task faced by road safety practitioners, where the task is about getting people to

*start or stop* specific behaviours. Product marketing communication is about getting people to choose 'our' offering (brand/product/service) rather than a competitor's or choosing none. For marketers to succeed their offering must meet the underlying needs and wants of their potential customers and in so doing they are taking customers as they are with a predisposition to purchase. It is essentially a zero sum game [Storey 28] where existing behaviour is being modified slightly [Elliott 27].

In road safety, health and other public sectors, the communication task is to challenge people where they are and advocate that they change by *stopping or starting* because it is good for them, even though they might prefer not to adopt new behaviours. The persuasion task is to advocate fundamental behaviour change versus the task of brand, product or services marketing where the persuasion task is merely requesting a modification of an existing behaviour: 'choose ours not theirs'. Storey [28] argues that the task is usually couched in *reduction* terms – lowering accidents and this is achieved by initiating positive behaviours. Hoad [29] suggests that the task is one of *demotivating* people rather than motivating them because often the message is to stop and to start doing something else. It is significant that one of the identified principles for effective road safety advertising, that of basing the strategy on a theory of behaviour change, is rarely advocated in commercial marketing campaigns.

Many insights can be gained by analysing non-profit public service advertising campaigns. An outstanding compendium of UK award-winning campaigns is available. Edited by Lannon [30], it includes campaigns on exercise, taxation, domestic violence, stroke, burglary, unwanted pregnancy, unbelted rear passengers, car theft, household fire, child literacy, drink drivers killing pedestrians, cancer, binge drinking, mobile phones whilst driving, organ donation, blood donation, antisocial noise, pedal cycle accidents, smoking, illegal mini cabs, drink driving, chip pan fires, TV licences. This volume provides many practical strategies and insights that planners of road safety campaigns will find stimulating, given that reviewers listed earlier complain that new insights have not been forthcoming.

Whilst road safety advertising involves a different persuasion model to that of commercial marketing, it still has to perform the same functions. The first task of road safety advertising is to be noticed, that is, to gain some degree of attention and the best way of achieving this is to generate an emotional response. The second task of road safety advertising is to ensure it is remembered and this is intimately tied in with how often it is seen. The third and most difficult task for road safety advertising is to influence road user behaviour, either directly (choose to adopt the advocated safe behaviour) or indirectly (be more open to change if the situation encourages change e.g., enforcement).

## Insights from neuroscience

The advertising industry has in recent years become interested in understanding how our brains respond to advertising (see du Plessis [31, 32]) and this should be of interest to road safety advertising campaign planners. Advertisers intuitively know that emotion is critical to persuasion. Research in neuroscience suggests emotion often precedes and directs rational (better termed reasoned) thought and that much of so-called rational thought is essentially a post hoc justification for our decisions and behaviours. Beattie [33] suggests that when advertisers target thought they may well be targeting a store of rationalisations. So why not change and deliberately target the justification process explicitly?

Thanks to behavioural neurologist and neuroscientist Antonio Damasio [34, 35], we know that emotion focuses attention, has a major effect on what we remember and is more closely linked to behaviour than our cognitions. This confirms the importance of heuristics and biases and automated behaviour (social psychology - see later). People make up their minds quickly and the arguments presented to them play only a little role in their judgement except in the subsequent justification of their behaviour to themselves or others. Successful advertisers target non-conscious biases head-on and, according to Beattie [33 p.224],

Numerous studies have identified that emotional stimuli make far more effective prompts than purely rational arguments when it comes to changing opinions and provoking a response. The way the brain is hard-wired suggests this might well be the most appropriate strategy. These non-conscious biases affect behaviour long before we understand the significance of the thing that we are acting towards.

Given the primacy of emotion, researchers and campaign planners could think creatively about this justification process and reconsider our preoccupation with rational arguments for behaviour change. Beattie [33] suggests asking some interesting questions: Do some kinds of post hoc justifications work better than others? Could we develop a taxonomy of justifications and analyse their relative effectiveness? Can we help the audience already primed to change their behaviour (because of their emotional response) justify their actions with less effort by providing right, readily available language to construct their justification and excuses?

Road safety media campaigns sometimes attempt to influence perceptions of risk by suggesting unsafe behaviours are more risky than the road user perceives. Estimations of risk are usually poor and based on what social psychologists refer to as the 'availability heuristic' whereby decisions about risk are based on judgements about likelihood or frequency. They rely on how easy it is to imagine or recall an event. Accordingly, mass communication efforts need to make negative behaviours as memorable as possible by stimulating the limbic system using surprise and the reticular formation using consequentiality. Because people are likely to believe that the unsafe behaviours they employ are not risky or 'negative consequences won't

happen to them', Damasio's research indicates we need to focus on the emotional as it reacts first. Instead of fighting the availability heuristic, campaign planners could consider ways of creating what Beattie refers to as 'flashbulb' memories which are hard-wired memories designed for human survival and shaped by evolution. Being in a near fatal situation usually creates such memories. But flashbulb memories don't have to be negative or threatening; they can be about some of the wonderful things in life or about what happened to some significant other. Campaign planners ought to consider how to generate flashbulb memories which are not necessarily shocking but meaningful, personally relevant and consequential.

### **The importance of emotion: How will I feel if I do what you ask?**

Humans are bombarded constantly with stimuli, monitoring their environment constantly and automatically. It is an unconscious process and relies on memories. It is the emotional properties of those memories that determine whether or not we pay attention at the time and how much attention we pay.

Le Doux [36], a neurologist, explained how our emotion influences attention. If the associated memories are intensely emotionally charged we will pay more attention. If the charge is positive we will feel attracted, if negative then repelled; this helps explain why ads that are liked are more noticed, more remembered and more likely to influence decisions.

According to Damasio [34], when faced with a decision, human beings use one criterion 'How will I feel if I do that?' Since we can't know about the future, we rely on our memory of similar past experiences to 'guesstimate' what our feelings might be. Damasio demonstrates, irrespective of how objective we think we are being, the emotional context set by our limbic reaction colours the decision we make and our rational thought processes do no more than rationalise and justify that emotional choice. Damasio [35] points out that this does not mean that emotions are a substitute for reason or that emotions decide for us. He argues that emotion assists reasoning, especially when it comes to social matters involving risk and conflict.

### **The somatic marker hypothesis**

Damasio's first book was *Descartes' Error* [34], referring to the separation of the emotional from the rational. Damasio proposes the somatic marker hypothesis ('somatic' referring to how the body feels). When we have experiences we lay down memories not only of the event but how we felt when we experienced the event. So when we interpret events we recall not only memories but also how we felt. This is the somatic marker. When deciding on an action, we consider if it will make us feel bad and if so we will avoid it, or if it will make us feel good we will be motivated by it. According to Damasio [35], somatic markers probably increase the accuracy and efficiency of the decision process.

Emotion not only shapes our unconscious reactions; it also feeds into, shapes and colours our conscious thought. When

watching television we usually want to be entertained and we monitor the stimuli and, if positive, we pay more attention. This has implications for road safety mass media campaigns. Effective advertising for an issue (e.g., drink driving) or product or brand establishes feelings, associations and memories in relation to the issue/product/brand etc. These associations will only influence our behaviour if they come to mind when we think about the issue/product/brand.

Emotion helps to stimulate and guide our attention and reinforce associations. All of this goes on below the level of consciousness; the learning is incidental and occurs via repetition of exposure to the advertising. The role of road safety communication campaigns can be to establish new associations for the behaviour in question (e.g., drink and drive = lose your job). A positive emotional response and repetition will increase the likelihood the new association will become part of memory about drink driving and if these come to mind they are more likely to influence behaviour. Alternatively, road safety advertising can reinforce existing associations thereby ensuring the needed associations are more likely to come to mind and so influence behaviour.

#### **Emotion governs all our behaviour**

Emotions not only drive our unconscious reactions, they also determine what becomes conscious by feeding into, shaping and controlling conscious thought. What we pay attention to we remember and so it influences the content of our brain: what we attended to and remembered in the past influences what we will pay attention to in the future. Attention and memory create a feedback system. Ads must first gain our attention if they are to be remembered. Since emotion plays a big role in directing our attention, effective ads must evoke emotion in us, either positive or negative.

Humans are programmed to seek out the positive and avoid the negative. Accordingly, we need to like the ad. We should note that most ads are not noticed and remembered because as TV viewers we can be exposed to up to 8-10 ads in any one ad break. At best, we absorb something of some ads without conscious thought. We might remember something but not necessarily all the detail. The role of road safety advertising is to be noticed and to create memorable associations of the advocated behaviour which potentially can influence action. Emotion not only shapes our unconscious reaction to advertising, it also feeds into, shapes and controls our conscious thought about the behaviours being advocated in the advertising.

What we pay attention to we remember and it has a permanent impact on the content of our brains. What we have paid attention to and remembered in the past enhances what we are more likely to pay attention to in the future, creating a feedback mechanism. Fisher et al's [37] recent meta-analytic review of risk-glorifying media exposure on cognitions, emotions and behaviours found a strong positive connection between exposures to risk-glorifying media and increase in risk-taking

inclinations. This is in keeping with how people react to stimuli. If they like the stimuli it will more likely affect memory and possibly subsequent behaviour. According to Oatley and Jenkins [38], emotions are there to modify perception, to direct attention, to give preferential access to certain memories, and to bias our thinking.

#### **The Empathy Circuit in the Brain**

Frith [39], a neuro-psychologist, in demonstrating which areas of the brain light up when a person experiences pain also found that when we observe somebody else experiencing pain the same areas light up in our own brain. The areas that light up are not related to physical pain but to our mental experience of pain. So what we share, he says, is the mental experience of pain, not its physical aspect. These findings suggest that, in developing road safety communication, we need to maximise the likelihood of viewers empathising with the situation and the characters so as to encourage them to share the emotional experience of the communication.

#### **Insights from commercial advertising tracking studies**

Tracking studies around the world (mostly of 'commercial' TV advertisements) consistently reveal that advertising that creates a positive emotional response performs better than ads that do not.

#### **Liking an ad enhances its effectiveness**

People watch ads they like, and ads that are liked are remembered the most. Further, the most memorable advertising is based on emotion as measured by advertising likeability. This fact is confirmed by the Millward Brown tracking database involving 30,000 commercials (du Plessis [31]) and the US Advertising Research Foundation Copy Research Validation Project (Haley and Baldinger [40]).

To be effective, a road safety TV commercial first has to be noticed; next it has to be remembered, not necessarily as an ad, but as associations with the road safety behaviour being advocated. Advertisements that work are advertisements that are liked, i.e., they are noticed more, remembered more and these memories are available to influence action.

Thorson [41] presented data from academic studies, covering ten years, indicating the efficacy of likeability as a measure of advertising effectiveness. Haley and Baldinger [40] in the ARF Copy Research Evaluation Project found ad-liking to be the best predictor of an advertisement's success. The Netherlands SPOT 1998 study [cited in 31] tracked 23 commercials and assessed impact on in-market awareness and purchase intent and concluded that more than 40% of the variation in effectiveness was explained simply by ad-liking scores. Ewing, Napoli and Du Plessis [42] analysed food advertising in the Australia Adtrack database concluding 58% of the variance in people's memory of food advertising could be explained by ad-liking. Ad-liking impacts on an ad's ability to gain attention and lodge itself into viewers' memories and on persuasion (intention to act).

### What is meant by liking the advertising?

The purpose (intent) of advertising is to inform or, more likely, to persuade and not merely to entertain. Ads that are not entertaining can still be liked. In identifying what makes an ad likeable, it is first necessary to establish how viewers respond to advertising (TV in particular). A number of studies are available using large samples and a large number of TV commercials. One of the earliest and most widely used models has been the Viewer Response Profile (VRP) – Schlinger [43]. Biel and Bridgewater [44] compared the available models in identifying attributes of likeable commercials.

Olsen [45] using the VRP advertising for new products found that high ad-liking led to a high level of trial for new products and could be defined by two dimensions:

**entertainment/stimulation** and **relevant news/information**.

Du Plessis [31] took seven ads for which he knew the liking scores and asked 400 respondents to rate them using 32 statements. He called his model the COMMAP model and it can be summarised by seven factors:

**High Liking:** entertainment, empathy, relevant news (NB this includes persuasion/intention to act), source reliability (brand dependability)

**Low Liking:** familiarity, alienation, confusion.

Faulkner and Kennedy [46] applied COMMAP to testing direct mail advertising approaches. Hermie et al. [47], on a database of 3000 print ads, measured recognition (seen the ad), attribution (seen and correct branding) and effective score (sum of the above). Ad-liking accounted for 80% of the variation.

### Beyond liking

If a TV commercial is enjoyable to watch, and is involving, it will be liked and remembered. But this is insufficient in road safety or brand advertising unless what is remembered is the essential message (or in the case of brands the brand). All too often what is remembered are specific creative devices used in the TV ad. So long as these devices (which are remembered) are linked to the advocated behaviour or message, the TV ad is more likely to have an influence on future actions. Using creative devices can assist in attracting attention and evoking a liking response but it needs to go further and be linked in memory to the advocated behaviour.

So if our TV ad is noticed, and elements stored in memory in relation to the advocated behaviour, then action will depend on an emotional response ‘How will I feel if I do what you want me to do?’ In developing campaign messages, research should attempt to answer this question. If the feelings are all negative then the campaign will need some environmental supports. Hopefully some positive feelings will also be available.

It is likely that what is stored in memory is tagged with an emotion related to how we answer the question. Since the behaviour being advocated invariably has some memory and feelings associated with it (knowledge or experience), the role

of any TV commercial is to generate a positive feeling (‘soma’) around adopting and continuing the advocated behaviour.

The human brain is wired for survival by monitoring the environment and the body and reacting to changes in both. The output to this process is choosing between alternatives. Du Plessis [32] suggests ‘The brain considers some alternatives in terms of how they would change the body’s homeostasis or the mind’s mood now or in the future and then chooses the one that will make the person feel best.’

### Gender differences

CARRS-Q researchers’ [Lewis et al. 18, 19, 48] studies of the ‘third-person effect’ (‘It doesn’t have any effect on me, but it will on others’) consistently establish the effect to be common in males’ reactions to certain road safety messages but not in females’ reactions. Neurological studies using functional Magnetic Resonance Imaging (fMRI) indicate that when men anticipate rewards, they mainly activate a region involved in motivation for obtaining the rewards, the ventral striatum, whereas in women, it is a region dealing with emotions, the amygdala-hippocampal region, which is most highly activated.

When it comes to stressful situations (often depicted in road safety TV ads), fMRI indicates there is increased blood flow to the left orbitofrontal cortex suggesting activation of the fight or flight response. In women, however, stress activates the limbic system which is associated with emotional responses. Readers interested in gender differences can learn more from neuro-psychologist Louann Brizendine’s *The Female Brain* [49] and *The Male Brain* [50].

### Effective frequency

How often do viewers need to see a road safety message for it to have an impact? The campaign consists of the TV commercials and their placement with around 80% of the budget on media placement and 20% on creative development and production. The impact of the road safety campaign depends both on the creative/message content (TV ad) and the scheduling of the TV ads which includes the media budget, the reach (proportion of the target audience exposed to the TV ad) and frequency (the number of times viewers are exposed to the ads).

Historically, the advertising industry used a rule of thumb (based on Krugman’s [51] data) that people need to see an ad three times for it to have an effect: **first exposure: curiosity** ‘What is it?’, **second exposure: consideration** ‘What does it say?’, **third exposure: recognition** ‘I’ve already seen it and disengagement begins’. Naples [52] promoted the three exposure theory and Leckenby and Kim [53] found this rule was in widespread use.

Jones’ [54, 55] data challenged conventional wisdom. He was able to show that in the case of 60% of the brands studied, there was more than a 12% increase in share of sales generated in the seven days after the ad was seen, *even when it was only seen once*. Ephron [56, 57] suggested an alternative as a result of

Jones' data. It was called 'continuity planning' and the aim is to schedule the advertisement so that as many people as possible receive only one exposure to it. It is very simple and involves starting with the available budget, dividing it by the number of weeks the campaign is to run, then trying to optimise the reach of the schedule and minimise its frequency. Advertising scheduling should minimise wastage.

Given that road users are road users daily, then it seems reasonable that maximising reach is very relevant. One of the consequences in attempting to reach road users with a minimum of three exposures is that heavy TV viewers are exposed many times and this is wasteful. Conversely, by aiming for reach it is likely many will get two exposures and some three but very few a lot more exposures, as would occur with a strategy of minimum of three exposures. Thus road safety campaigns are more likely to have a greater effect by aiming to reach as many road users as affordable for as long as affordable. If greater frequency is deemed desirable or necessary then it should be relatively high at the start (say a new law or enhanced enforcement) but then reduced exponentially so that it becomes one exposure in accordance with modern learning theory and cognitive science (du Plessis [31]).

Can an ad have an effect without it being given attention? The answer is 'No' unless it has been cognized (formed a memory) and 'Yes' if it is being *re-cognised*. Heath [58, 59] argued that ads can have an effect without any attention or very low attention processing. What happens is attention is occurring at a minimal level just as occurs when we are talking whilst driving. We switch our attention the moment the road environment signals a need to do so. Before we switched attention we made decisions not to attend and the neural cloud dissipated. We were attending, whilst talking and driving, but at a low level.

### Insights from social psychology

Following on from the insight that all behaviour involves emotion, an insight to emerge from social psychology is that a great deal of behaviour occurs without any thought. In many situations people are on automatic pilot as they do whilst driving sometimes. Bargh [60, 61] and Bargh and Morsella [62] have written extensively on the automaticity of much of our behaviour so that it occurs below the level of consciousness. This insight is important. In many road safety issues, road users are fully aware as to what they ought to do; they just choose to do otherwise, often without thought.

Social psychologists such as Cialdini [63], Fennis and Stroebe [64] have demonstrated that people have a tendency to rely on **heuristics** in making everyday decisions and especially when in unfamiliar circumstances. Cialdini argues convincingly that commercial marketers and professional sales people understand and use these heuristics as weapons of influence which include social proof, authority, liking, commitment and consistency, reciprocity, and scarcity. These heuristics replace or minimise considered thought and speed up decision-making. In addition

to these heuristics, many other heuristics have been documented that affect judgement and or decision-making. In sum, they suggest that choices are made intuitively. One of the best established heuristic is **choosing by liking** (Frederick [65]), where affective evaluation is used as a quick screen for alternatives and cognitive evaluation is reserved for those alternatives that surpass some affective threshold. The **availability** heuristic was mentioned earlier. There are many other heuristics people use to minimise cognitive effort (Gilovich, Griffin and Kahneman [66]).

All this suggests that in planning and developing campaigns it is important to recognise that the feelings attached to messages and images will be as important as any cognitive assessment of the information provided.

Most recently, Hoekstra and Wegman [26] suggested campaign planners might consider the use of **priming** so as to prime road users' attitudes or feelings toward the advocated behaviour to make them more likely to consider the behaviour when making a choice. They also suggest that campaigns pre-test the **framing** of messages in terms of potential gains or potential losses based on Prospect theory (Tversky and Kahneman [67]), rather than assuming that only potential losses is the correct strategy.

### Conclusion

Road safety mass media campaign planners, in theory, have access to a broadly agreed set of principles demonstrated to enhance the likelihood of the success of a campaign. Evaluation, or lack of, is still a major concern and remains an area in need of greater consensus and application. The area remains relatively devoid on new insights which go beyond the existing established principles. Gaining a better understanding as to how road safety advertising potentially influences actions needs to go beyond the road safety literature. This paper suggested some exploratory pathways via other disciplines such as advertising research in general, public sector advertising, neuroscience and social psychology. Road safety practitioners will need to take the initiative in seeking out these insights. All too often, decisions regarding campaign strategies, messages and media are in the hands of marketing and advertising personnel in road safety authorities and advertising agencies, most of whom will not be aware of, nor attempt to access, the insights available from the suggested disciplines.

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# A systematic review of how anti-speeding advertisements are evaluated

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## Abstract

A systematic review of the methodologies used to empirically evaluate anti-speeding advertisements was conducted, and the advantages and limitations of these methods consolidated. Of the 28 studies that met the inclusion criteria, approximately equal proportions employed experimental (57%) and observational (43%) evaluation approaches. While the majority of observational evaluations of anti-speeding advertisements (N = 8, 29% of total evaluations) examined changes to direct measures of speeding (e.g., crash statistics, speeding infringements or on-road driving speeds), the majority of experimental evaluations (N = 12, 43% of total evaluations) relied on indirect measures of speeding behaviour (e.g., self-reported anti-speeding attitudes, intentions, and behaviour). The current review presents the strengths and limitations of previous evaluation approaches, with a particular focus on study design, outcome measures, and advertisement manipulations.

## Keywords

Anti-speeding, Campaign, Design, Evaluation, Review, Road safety, Road safety advertising, Speeding

## Introduction

Travelling at speeds over the posted maximum speed limit has been shown to be associated with increases in the rate (for a review, see [1]) and severity of crashes [2, 3]). Although the

number of speed-related crashes has reduced considerably over the past decade, speeding remains the most significant contributor to road crashes. Consequently, there is still a great need to continue to develop effective countermeasures to reduce drivers' speeding behaviour.

Current countermeasures against speeding include a range of legislative and educational approaches, including mass media campaigns. Televised road safety advertisements constitute a large proportion of expenditure for road safety initiatives (for example [4]). For Australia's most populous state (New South Wales), the state government spent approximately \$A15.5 million on Roads and Traffic Authority media campaign advertising from 2008-2009, with speed-related media campaign expenditure reported at approximately \$A5.3 million [5].

Given that the cost of executing mass media interventions could instead be used to implement other road-safety initiatives, it is necessary to justify their use. This is particularly important for anti-speeding advertisements, given that speeding remains socially acceptable (see [6]). That is, it is essential to continue to develop and evaluate speeding countermeasures to ensure their effectiveness.

Despite the large number of mass media campaigns – and the associated costs of funding these interventions – evidence suggests that relatively few anti-speeding advertisements are evaluated [7]. Similarly, often the research methods employed to evaluate anti-speeding advertisements have methodological limitations that may significantly impact the reliability or