Vol 22 No 4, 2011

Special issue
Communications, media and road safety messages

Journal of the Australasian College of Road Safety

Formerly RoadWise — Australia's First Road Safety Journal

Special issue -
Communications, media and road safety messages

Peer-reviewed papers

- Beyond reviews of road safety mass media campaigns: Looking elsewhere for new insights
- A systematic review of how anti-speeding advertisements are evaluated
- Road safety advertising and social marketing
- What can we learn from recent evaluations of road safety mass media campaigns?
- The impact of threat appeal messages on risky driving intentions: A Terror Management Theory perspective
- Dangerous safety: Extreme articulations in car advertising and implications for safety campaigns
- Considering a new framework for designing public safety 'filler' messages on highway variable-message signs: Applying the behaviour change wheel

Contributed articles

- Regulation of motor vehicle advertising: Toward a framework for compliance research
- Drivers' perception of two seatbelt wearing advertisements with different emotional appeals and cultural settings
- How important is community support to the success of the National Road Safety Strategy?
- It sounds counterintuitive, but can mobile phones be used to reduce driver distraction?
- The importance of fear reduction in fear-based road safety advertising appeals

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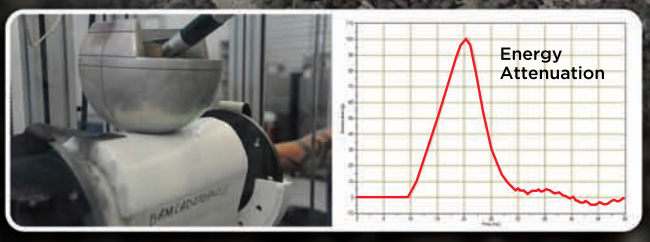

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This year's theme is "A Safe System: Expanding the Reach". While substantial reductions in road trauma have been achieved in recent decades, not all road users have benefited equally. The organisers are looking for papers including theme presentations on safety for the following road user groups and needs:-

> Rural; low socioeconomic status; Aboriginal and Torres Strait Islander; Special needs; International and new resident; motorcyclists, bicyclists, pedestrians; heavy vehicle drivers; crashes in off-road environments; crash response and post-crash care; passengers – children and adults.

Abstracts may fall within one or more of the categories that characterise the Safe System: safe roads and roadsides, safe speeds, safe vehicles and safe road use.

Closing Date for Abstracts - 30 January 2012

For more information on abstract guidelines, please Download the Abstract Guidelines at http://vaultcms.net/clients/acrs/srcfiles/Abstract-Guidelines-FINAL.pdf.

Diary dates:

Abstracts due	30 January 2012
Notification of acceptance by	27 February 2012
Manuscripts must be submitted by	26 March 2012
Reviewers' comments to authors	23 April 2012
Final papers must be submitted by	21 May 2012

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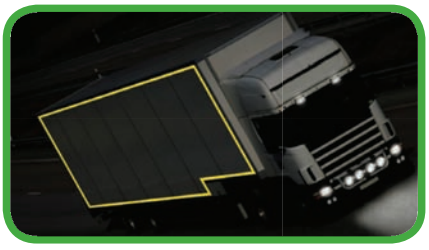

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Contents

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Road safety IS the message: Promoting the message across the mediums. Cover image courtesy of Ioni Lewis, Clare Murray and CARRS-Q.

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The aim of the *Journal of the Australasian College of Road Safety* is to provide a medium for expression of views and debate on all facets of the study of road safety. Articles are accepted from a variety of disciplines, such as health and medicine, road and automotive engineering, education, law, behavioural sciences, communication, history, management, and urban and traffic planning. Interdisciplinary approaches are particularly welcome.

The College encourages interested persons and organisations to submit articles, photographs or letters for publication. Published letters would normally show the name of the writer and the state or territory of residence. The journal provides the opportunity for researchers to have their work submitted for peer review, in order to improve the quality of their research papers. However, peer review cannot guarantee the validity of research nor assure scientific quality. The publisher reserves the right to reject submissions or, with approval of the author, to edit articles. No payment is offered for articles published.

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Messages may be left on voicemail when the office is unattended.

From the President

Dear ACRS Members,

Our recent Melbourne Conference was, from all accounts, a great success and a tribute to the Melbourne Chapter, our National Office team and of course all the participants and sponsors. Thank you.

The conference provided considerable opportunity for learning, networking and discussion and we were pleased to make a range of awards for the quality of papers and presentations.

We were delighted to make the inaugural 3M-ACRS Diamond Award to the Ravenshoe North Queensland group RAPTAR (Reduce Accidents, Prevent Trauma, Activate Resources). I had the opportunity to travel to Ravenshoe with Andrew King from 3M to present trophies to all the RAPTAR team. We saw the results of their innovative system approach at first hand and could see how easily their approach could be translated to other communities. (My address outlining the Awards is on our website www.acrs.org.au/srcfiles/3M-ACRS-Diamond-Award-Summary-Result---Presidents-SPEECH.pdf)

We were disappointed to hear from Minister Shorten that he would not recommend a Productivity Commission inquiry into the full economy costs and benefits of road trauma. The Parliamentary Secretary for Road Safety, the Hon Catherine King has suggested that more analysis may come from the national action plan of the National Road Safety Strategy to be considered by COAG Transport and Infrastructure Ministers in November.

We are pleased to have joined an NGO consortium of road safety interests in a campaign, 33900 (the annual number of deaths and serious injuries in Australia from road crashes) to work together to help save 100,000 lives and serious injuries from road crashes over the next decade.

Our new Executive Officer, Claire Howe, has launched for ACRS members a regular e-alert from the College. I know she would appreciate news items and feedback, as we would also for the journal. Please make an effort to keep Claire, and our journal editor, Deborah Banks, up to date with your activities so we can enhance our professional network.

This November journal, the last for 2011, is another special issue - this time focusing on 'Communications, media and road safety messages'. I would like to thank Dr Ioni Lewis from the Centre for Accident Research and Road Safety in Queensland for guest editing this special issue. Ioni has collated a wide range of research on diverse aspects of this important topic and, in particular, the many uses of technology and the media to inform, influence and persuade. This issue provides valuable insights into the critical role played by technology and the media in the context of road safety.

Lauchlan McIntosh AM FACRS
President

Guest editorial – Dr Ioni Lewis

Dr Ioni Lewis is the guest editor for this special issue on 'Communications, media and road safety messages'. Ioni has undertaken a decade of research into the role and effectiveness of road safety advertising messages, based within social psychological frameworks of health behaviour change and persuasion. Currently, she is based at the Centre for Accident Research and Road Safety – Queensland (CARRS-Q) at Queensland University of Technology (QUT) where she is a Postdoctoral Fellow on an Australian Research Council (ARC) project working with the Transport Accident Commission of Victoria. This project seeks to design a range of anti-speeding messages and devise improved methods for evaluating their effectiveness. As well as this ARC project, Ioni is currently involved onvarious other projects relating to message design and evaluation including messages which address other health issues and which are being delivered via different mediums (e.g., on-road Variable Message Signs, social media).

The overarching theme of this special issue was guided by two key questions: 'What do we currently know about the role and effectiveness of advertising messages and campaigns? and 'Where do we go from here?'The papers within this special issue have most certainly captured the essence of this theme and in doing so have offered insight into issues regarding advertising and media effects as well as how we evaluate such effects (including, importantly, how we evaluate the evaluations!). Some key directions and implications for future advertising research and practice, as well as policy in regard to regulatory frameworks for motor vehicle advertising standards, have been provided.

On a daily basis, individuals are exposed to a myriad of messages with each one potentially exerting some influence on attitudes and behaviours. As has been aptly reflected by papers in this issue, not only may different types of road safety messages vary in their relative influence but messages emanatingfrom the broader advertising and media context may also be associated with varying types and extents of influence - akin to the notion of receiving 'mixed messages'.Given that road safety messages must compete for attention with an array of

messages being delivered by an ever-increasing number of potential message mediums, it is crucial that continued efforts are undertaken to ensure that road safety messages are achieving their persuasive objectives.

It has been suggested by others that there is need to move beyond the debate of whether or not road safety advertising is effective to focusing more on what type of advertising approach is the most effective. I agree with this sentiment and suggest that, with the age of social media well and truly upon us, not only is it important to determine for whom particular messages are the most persuasive, but also to determine the medium by which to deliver the message to the intended audience. There is much to be explored regarding the role and effectiveness of social media for the delivery of road safety messages including identifying areliable and valid means of evaluating the persuasive effects of social media-based messages/campaigns.

Some suggestions for advancing research and practice in this area, as have been highlighted in this issue, include

(i) the value of adopting theoretical frameworks to aid message development and evaluation
(ii) the need to evaluate the persuasive effects of advertising - such evaluations need to be based within methodologically sound frameworks and guided by evidence and insight from other disciplines such as neuroscience, commercial marketing and social psychology
(iii) the need to be innovative in both message design and delivery in order to increase the likelihood that messages are attended to.

I very much look forward to seeing where the next decade or two takes us in this important and ever-changing field!

Finally, I would like to convey my thanks to everyone who prepared papers and who graciously gave of their time to review papers for this special issue. Such efforts have contributed to what I believe has shaped up to be an exciting issue!

Dr Ioni Lewis

RRSP Profile – Neil Guest

In each issue of the journal, we profile an ACRS member who is on the ACRS Register of Road Safety Professionals. To be on the register, applicants must satisfy stringent criteria (they must have relevant academic qualifications, a minimum of five years at a senior level in their particular field, and they must be acknowledged as experts by their peers). All members are encouraged to seek registration. As more members register, the more professional the College becomes. More information at www.acrs.org.au/professionalregister.

Neil Guest is a civil engineer who studied and gained his qualifications in New Zealand, and who has over 40 years' experience in civil road engineering in Australia and overseas. In the last ten years whilst employed with Lambert and Rehbein in Brisbane, Neil has been extensively involved as project manager and design manager on high profile road infrastructure projects in the South East Queensland region both for local and state governments.

As an accredited Senior Road Safety Auditor, Neil has undertaken numerous road safety audits including the pre-opening audit for the Clem7 Tunnel in Brisbane and Ipswich Motorway upgrade project.

Neil is an engineering associate member of the Institution of Professional Engineers New Zealand (IPENZ), a member of the IPWEA Panel of Road Safety Auditors and a Registered Senior Road Safety Auditor (TMR Queensland). Neil has been a member of the Australasian College of Road Safety since 2009.

Neil was asked the following questions:

What do you value most about your ACRS membership?

Knowing that there is a national register of road safety professionals available for sharing of knowledge. I enjoy reading the journal. The content is very interesting and informative.

What is your particular expertise in road safety?

As a Transport and Main Roads (Queensland) accredited Senior Road Safety Auditor, I have undertaken numerous road safety audits including existing road, preliminary and detailed design, and post-construction phase audits. I was engaged as the independent Road Safety Auditor for the Clem7 Tunnel project in Brisbane City which involved the auditing of temporary traffic control installations, the auditing of the finished external road construction works and the final road safety audit of the tunnel prior to opening.

Currently I am engaged as the independent Road Safety Auditor for the Ipswich Motorway upgrade which includes the auditing of the temporary traffic control installations and the upgrade of the existing road network adjacent to the motorway.

What is a typical day for you?

My day starts at about 5.00am. On the train to Brisbane from the Gold Coast at 6.00am. At the office 7.15am.

I address all outstanding emails, and then attend to current project business. This generally includes a project team meeting to update the team on the project progress and upcoming deadlines and targets. As part of my project duties I am responsible for the overall management of the project including client liaison, co-ordination of disciplines and sub-consultants,

liaison with service authorities, co-ordination and checking of geometric design, stormwater design, pavement design, hydraulic assessment, street lighting design, intersection layout design, traffic signal installation, and undertaking risk analysis, estimating, tender document preparation and reporting.

Interspersed with the project work are the road safety audit duties as an independent auditor on numerous projects for state government and private clients.

Back on the train at 5.15pm – home at about 6.30pm.

What current road safety issues concern you most?

Road controlling authorities are becoming more aware of their responsibilities with regard to road safety and safety in design. However, there is a general lack of safe cycle facilities throughout the road network. Although more cycle lanes are being retro-fitted onto existing road networks, there is still a long way to go. Of concern is the interface between a new construction which has incorporated cycle lane facilities and the existing road, e.g. the cycle lane ceases at the end of the new construction without thought for the safety of the cyclist continuing along the route. At the end of newly constructed works, cyclists are often left to 'fend' for themselves with no thought given to alternative cycle routes or the safe continuation of the cycle lane. I believe designers and road controlling authorities should give more thought to the interface between new works and the existing road network.

College News

2011 Fellowship awarded to David Healy

Each year the College acknowledges and honours an exemplary member who has made an outstanding contribution to the work of the organisation and to the cause of road safety. ACRS Co-vice President and Victorian Chapter Representative, Mr David Healy, was awarded this year's ACRS Fellowship, recognising his commitment and outstanding achievements. Congratulations to David who will join a list of worthy recipients who have been elected Fellows of the College since 1992. The award was presented to David at the ACRS conference dinner in Melbourne on September 1.

Chapter reports

New South Wales

The Sydney Chapter has been a very active Chapter recently, submitting a response to a NSW Parliament Inquiry, organising three more events for 2011, and, of course, gearing things up for the 2012 National Conference in Sydney.

The Parliament of NSW Joint Standing Committee on Road Safety (Staysafe) recently commenced an Inquiry into School Zone Safety. Several members provided reports and comments to contribute to a Chapter submission and/or submitted their own responses. The focus was on whether current measures are effective and what else can be done to optimise safety, not only for commuting students, but also motorists and other road users. The Chapter was subsequently invited to present at the Staysafe hearing on November 21.

On October 19, the Chapter partnered with the Royal Rehabilitation Centre to hold a full day seminar, *Health and Disability Assessments in Driving: Assessments for Drivers After a Health Event*. This was a wonderful event to hear from experts in assessment, including from driver trainer, occupational therapist, researcher and road administration perspectives, as well as personal testimonies from those who had completed or were going through the assessment process. PME (Problem Management Engineering) also provided sponsorship for the event and demonstrated some of the innovative technologies they had developed to adapt vehicles and driving controls for those with ongoing physical challenges.

On October 28, the Chapter supported the Standards Australia Committee ME088 in holding the *ISO 39001 Road Traffic Safety Management Systems National Workshop* at the Roads and Traffic Authority of NSW offices in North Sydney.Attendees were from a wide range of backgrounds and the day proved very informative of the principles and processes in this Standard, due for publication in 2012.

In addition, upcoming at the time of writing, on November 1, in conjunction with The George Institute for Global Health, the seminar *Older Drivers – Balancing Mobility, Independence and Safety* will bring together research and industry specialists from transport, insurance and policy making to foster increased understanding of safe mobility issues for older drivers. As our final seminar for the year, this will be followed by our end of year break up.

I thank all involved members and partners, and the national office for their support in this work, and look forward to receiving a rush of abstracts for the 2012 National Conference very soon!

A/Prof Teresa Senserrick, NSW (Sydney) Chapter Chair and Representative on the National ACRS Executive Committee

Victoria

The Victorian Chapter, with the able assistance of the national office, staged the 2011 ACRS Conference on 1-2 September in Melbourne with the theme 'The Safe System - making it happen!'

The conference was very well attended with approximately 250 delegates with so many committing their time and energy to help ensuring that the conference was successful. I am very grateful to the tireless work of the staff at our national office, the advice and support of the national Executive, my special helpers in Melbourne on the Organising Committee, our workshop facilitators, session chairs, presenters, reviewers and sponsors who all made such valuable contributions.

Importantly, issues so relevant to accelerating the introduction of the Safe System approach were raised and debated and a large number of delegates signed up to the College Affirmation.

A final thank you to all those delegates who took the time to attend and participate so actively in the conference.

David Healy, ACRS Co-Vice President and Victorian Chapter Representative on the ACRS Executive Committee

3M-ACRS Diamond Road Safety Award 2011

The winners of the inaugural 3M-ACRS Diamond Road Safety Award were announced at the ACRS conference dinner in Melbourne on September 1. Entries for the award had been sought from individuals or groups who could demonstrate that

their innovative initiatives or programs delivered significant improvements in road safety. The response exceeded expectations; applications were diverse and of a very high standard.

The winner was a community group in Ravenshoe, North Queensland, whose outstanding RAPTAR project (Reduce Accidents, Prevent Tragedy, Activate Resources) successfully brought together members of the Ravenshoe police force, Queensland Fire and Rescue service, government officials, community groups and businesses, owners of licensed premises, road specialists and other stakeholders to design and implement a range of initiatives to improve road safety, and specifically to reduce injuries and fatalities in the locality. Measures to address the problem included research into driver behaviour, reducing the hours of sale of alcohol, police enforcement, road and infrastructure maintenance, and hazard reduction. The RAPTAR group reported a significant decrease in serious traffic incidents and trauma, and better community awareness of, and engagement in, local road safety issues. The award was accepted on behalf of the RAPTAR group by Sergeant Michael Musumeci of the Ravenshoe Police.

Two other entries were highly commended by the judging committee. John Quee, from Nyngan in NSW, attended the dinner to accept his commendation for his invention to potentially reduce the risk of a vehicle's fuel catching fire in the event of a crash. Sandra Cook and Kerry Sunderland were also commended for their excellent online social network 'Journey Beyond Road Trauma' which they set up to support crash victims and others affected by road trauma.

Other News

ACRS Road Safety Conference 2012

The next ACRS national conference will be held next year in Sydney on 9 and 10 August. The theme is *A Safe System: Expanding the reach*. The closing date for abstracts is 30 January 2012.

New Zealand campaign targets young male drink drivers

The New Zealand Transport Agency (NZTA) launched a new advertising campaign in October, aimed at young male drink drivers. Over 40% of drink-driving-related crashes in NZ involve drivers aged under 24 years. 82% of those young drink drivers are male.

The principle behind the NZTA's campaign is that drink drivers are not bad people but people who make 'bad choices'. The campaign message 'Stop a mate from driving drunk' aims to persuade young men to speak up to prevent a drinking mate from getting behind the wheel. The ad - which is being widely distributed on TV, radio and print media in pubs and drinking venues - acknowledges the reluctance and awkwardness young men might feel about intervening - particularly the fear of 'looking dumb' in front of friends in social situations - and seeks to break down this barrier.

The 'Legend' campaign features a young man at a party who is grappling with this dilemma. The ad uses humour to show the young man imagining the potential fatal consequences of allowing his mate to drive home when drunk, and then having the courage to speak up in order to prevent a tragedy. Source: NZTA website, where the ad can be viewed at www.nzta.govt.nz.

Change at RTA

On November 1, the NSW government announced the introduction of the new **Roads and Maritime Services** agency, subsuming the former Roads and Traffic Authority (RTA) and the NSW Maritime Authority. In making the announcement, NSW Roads and Ports Minister Duncan Gay said that this would mean true integration across all modes of transport in NSW, with the new agency focusing on service delivery, building and maintaining road infrastructure, day-to-day compliance and the safety of NSW roads and waterways. For more information, visit www.rms.nsw.gov.au.

NRMA-ACT Road Safety Trust reports

The following reports supported by the Trust have been or will be published on the Trust website at http://www.roadsafetytrust.org.au/c/rtt?a=da&did=1004593.

A study conducted by CARRS-Q at Queensland University of Technology found that the *Skills for Preventing Injury (SPIY)* program continues to show promising results in regard to prevention of students' transport-related risk-taking behaviour and injuries.

Another study undertaken by CARRS-Q, *Optimism bias in young novice driver behaviour*, aimed to directly compare the effectiveness of two brief, low cost, and easily implemented interventions for reducing drivers' optimism bias with a focus on young novice drivers who continue to be a high risk group for crashes. The project aimed to examine the relative effectiveness of each intervention both immediately (acute effect) and, more importantly, in the medium-term (three months follow-up) to test for sustained effectiveness.

Improving the Identification of Fatigue-Related Crashes in the Australian Capital Territory. This CARRS-Q project surveyed a large, representative sample of residents of both NSW and ACT about their experience of fatigue and their involvement in fatigue-related crashes and incidents. The study assessed the prevalence of incidents of fatigue-related driving for residents of NSW and ACT, and the characteristics surrounding the incidents.

Development of messages to address young drivers' perceptions of risk-taking behaviour-Stage 2. The second stage of a two-stage project conducted by ARRB further developed a small number of

messages with an advertising agency, tested draft advertising concepts concerning speeding and mobile phone use with young drivers in the ACT, and used the results of this testing to further refine the concepts. More information about this project follows.

ARRB study: Development and refinement of advertisements to address risk taking by young drivers

ARRB Group (ARRB) was commissioned by the NRMA-ACT Road Safety Trust to undertake a two-stage project over two years to develop and refine advertisements to address risk taking by young drivers. Research has shown that risk taking by young drivers contributes to their crash risk. If young drivers can be convinced risky driving behaviours are in fact risky, they could be expected to engage in such behaviours less often, leading to a decrease in their crashes.

In Stage One of the research, factors that influence risk taking by young drivers were investigated, including situational, emotional, peer group, confidence and other factors, as well as risk-taking models and relevant behaviour change theories. From this research, a set of message content and development principles was developed. These principles were used to develop prototype road safety messages to counteract the perception that speeding and mobile phone use are safe.

In Stage Two of the research, ARRB guided an advertising agency to develop four sets of advertisements consisting of television, radio and print media mock-ups to address speeding and mobile phone risk-taking behaviours, based on the message content and development principles. The mock-ups developed were assessed by ARRB against eleven important components of the message content and development principles, including identifying and highlighting the costs of the risky behaviour, identifying the safer alternative behaviour, and acknowledging the benefits of the risky behaviour but showing they are outweighed by the costs. ARRB and the advertising agency further refined the advertisements before focus group testing, based on this assessment.

The sets of advertisements were focus group tested with 40 young ACT drivers aged 17 to 25 (21 females, 19 males) in Canberra. Participants were asked about the advertising concepts in terms of their understanding, realism, components liked and disliked, improvements/changes, whether the advertisement would make participants consider changing or actually change behaviour and overall favourite advertisements. The advertisements were then further improved based on these results.

Based on responses received from focus group participants, one speeding advertisement for radio and one mobile phone advertisement for television showed promise for final development and release. Although components of the advertising messages were guided by the set of content and development principles, they were not always agreeable to young drivers. Two conference research papers were produced from this project and are available from the proceedings of the Australasian College of Road Safety Conference September 2011 and the proceedings of the Australasian Road Safety Research, Policing and Education Conference November 2011.

Kelly Imberger, VicRoads, Ph: 03 9854 2702, Fax: 03 9854 2668, kelly.imberger@roads.vic.gov.au

Diary

12-16 February 2012, Tampa, Florida.American Traffic Safety Services Association 42nd Annual Convention and Traffic Expo. www.atssa.com/cs/roadway-traffic-safety-calendar.

9-10 August 2012, Sydney. ACRS National Conference. www.acrs.org.au/activitiesandevents/.

29-31 August 2012, Groningen, Netherlands. 5thInternational Conference on Traffic and Transport Psychology. www.icttp2012.com.

1-4 October 2012, Wellington, New Zealand. World Health Organization Safety Conference. www.conference.co.nz/worldsafety2012.

Special issue: Communications, media and road safety messages

Peer-reviewed papers

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

by Barry Elliott, Consultant Psychologist (Mob. 0419-738873)

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 Tay [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), fRMI 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, repricocity, 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

validity of the findings. This has important implications for road safety and behaviour change interventions because it makes it difficult to determine which strategies are the most effective, and what particular aspects of them ensure and enhance advertisement effectiveness.

While reviews of road safety advertisements have previously been conducted, many of them tend to focus on the content, or the nature of emotional appeals, utilised in road safety advertisements (for example [7]); however, some such reviews have included discussions about methodological issues with previous empirical evaluation methods (for example [8]). Similarly, while many peer-reviewed evaluations of road safety advertisements discuss the limitations of the methodologies employed in their studies, to the authors' knowledge this information has not been consolidated in the form of a systematic review.

The aim of the current paper is to review those studies that have provided an empirical evaluation of Australian and international anti-speeding advertisements, and to bring together a summary of the methodological limitations of these approaches and suggest ways to resolve these problems. Given these aims, it should be noted that the current review does not attempt to assess the extent to which anti-speeding advertisements are effective in reducing speeding (i.e., the *results* of the included studies are not reviewed). Attempting to evaluate the overall effectiveness of anti-speeding advertisements would result in restricting papers included in the review; this would be at the expense of the breadth of information gathered, especially for those studies deemed less suitable for assessing effectiveness (see [9]). The current systematic review of the methodologies used in previous evaluations of anti-speeding advertisements will allow researchers to consider each of the approaches discussed, and to make informed decisions about which evaluative method would be most suitable for their research.

Method

This systematic review intends to confirm standard methodologies used to evaluate anti-speeding advertisements. In order to identify key research designs, measures of campaign effectiveness, and advertisement manipulations, the review attempts to select a representative sample of the methods used to evaluate anti-speeding advertisements.

Inclusion criteria

Studies that evaluated anti-speeding advertisements, or aspects of such advertisements (for example, exposure to a road trauma segment), were eligible for inclusion in the current review, providing that speed-related measures were employed post-exposure. A range of campaign delivery modes was accepted, including: televised, audio or print advertisements, which could be real-world anti-speeding campaigns or designed specifically for the study. A comprehensive search was conducted for peer-reviewed journal articles and conference papers, as well as technical reports published between 1991 and 2011. To be included in this review, the study had to be primary research published in English, and if multiple publications of the same data were identified, the most recent version was selected. Due to this review's focus on outcome evaluations, studies that used non-comparative research designs (e.g., focus groups) to examine anti-speeding advertisements were not included in the current review; a comparison of outcome measures had to be made between exposed and unexposed groups or between different advertisements. There were no restrictions based on the country or language of the anti-speeding campaign's origin.

While no restrictions were made based on study quality, the suitability of each of the studies' designs to evaluate anti-speeding advertisements was assessed. The studies' designs were first classified using a standard algorithm (for example, see [9]) before they were categorised in terms of suitability for assessing the effectiveness of their anti-speeding advertisements (using the criteria in Table 1, adapted from [9]). While the attributes, or each of the levels of suitability, were based on the guidelines outlined in [9], some adaptations were made, as greater emphasis was placed on designs that reduced threats to internal validity. The analyses and discussions of research methods were conducted under these design quality judgement categories (i.e., strengths and limitations of these designs/approaches and their outcome measures). It should be noted that these categorisations refer to the studies' choice of design only; that is, for the purposes of this review, randomised trial designs were categorised as having the greatest suitability for assessing effectiveness, regardless of the execution of these studies.

Table 1. Suitability of study design for assessing effectiveness (adapted from [9])

Suitability	Attributes
Greatest	Concurrent comparison groups *and* assigned exposure with prospective measurement of outcome
	i.e., randomised trial; group randomised trial designs
Moderate	Single or multiple pre and post-measurements with concurrent comparison group *or* prospective measurement of outcome (within a cohort) but no assigned exposure
	i.e., time series or before-after with concurrent comparison group(s); prospective cohort designs
Least	Single or multiple pre and post-measurements without concurrent comparison group *or* exposure and outcome measured in a single group at the same point in time
	i.e., time series or before-after without concurrent comparison group(s)

Literature search strategy

Electronic literature searches were performed using ScienceDirect, PSYCinfo (via OvidSP), EBSCOhost, ProQuest and Google Scholar. The titles and abstracts of articles were searched using the following key terms: 'driving' AND 'advertisement;' 'road' AND 'safety' AND 'advertisement;' 'speeding' AND 'advertisement.' In addition, these searches were repeated by replacing the term 'advertisement' with 'campaign,' 'message' and 'appeal.' The abstracts of appropriate articles were manually reviewed to determine whether the study met the inclusion criteria. Seventeen eligible studies were identified this way. To widen the literature search, electronic literature searches were also conducted using the terms 'speeding' OR 'road safety' AND 'review,' and 'speeding' OR 'road safety' and 'meta-analysis.' Reference lists of appropriate reviews and meta-analyses were manually searched for additional primary research studies, and the abstracts of such studies were reviewed to determine whether they met the inclusion criteria. Eleven appropriate studies were identified this way. The final list of 28 studies included in this review was derived from 21 peer-reviewed publications (articles or conference proceedings papers) and five technical reports.

Results: summary of evaluation methods

Summary of study designs

Of the 28 studies identified in this review (summarised in Tables 2–4 in Appendix; [10-34]), almost half (43%, $N = 12$) measured the relationship between the presence/absence of real-world anti-speeding campaigns and changes in the outcome measure of interest; that is, observational approaches were utilised. Of these observational approaches, just under half utilised designs which were categorised as *moderate* to assess effectiveness (42%, $N = 5$), while the remainder employed designs which were categorised as *least* suitable ($N = 7$; see Figure 1). Conversely, in just over half of the studies included in this review (57%, $N = 16$), respondents were exposed to campaigns in a controlled environment (randomised trials and group randomised trials, see Figure 1). Accordingly, separate analyses of the research methodologies were conducted for observational and experimental approaches. Due to the similarities in measures of effectiveness for the study designs categorised as *moderate* and *least* suitable to assess effectiveness, these designs have been combined for the purposes of the current analyses.

Summary of outcome measures

For the reviewed studies that employed experimental approaches ($N = 16$), the vast majority utilised indirect measures of anti-speeding behaviour (75%, $N = 12$, see Figure 2), including measures of: self-reported attitudes, intentions, and awareness about speeding; results on a video speed test[1]; and self-reported behaviour (see Table 2 in Appendix). In over half of the experimental evaluations (63%, $N = 10$), respondents' perceptions of the message were assessed, which included recall and awareness of the campaign, perceived campaign effectiveness, and emotions experienced. The least common measures for experimental evaluations were direct measures of behaviour, with only one study measuring speeding behaviour, using a driving simulator [20]; this was also the only paper to include both direct and indirect measures of anti-speeding behaviour (although the same participants were not assessed on the different outcome measures). For all of the experimental studies, the outcome variables were measured immediately following participants' exposure to the campaign, with one quarter of these studies ($N = 4$) including follow-up measures (ranging from 1–4 weeks).

For the observational studies reviewed ($N = 12$; including five designs with *moderate* suitability to assess effectiveness), various direct and indirect outcome measures were used to evaluate real-world anti-speeding campaigns. The most common dependent variables used were direct measures of speeding ($N = 8$, see Figure 2), including crash statistics, speeding infringements, or on-road driving speeds (see Tables 3 and 4 in Appendix). Indirect measures were also common in observational designs ($N = 6$, see Figure 2), and for two of the observational studies both indirect and direct measures of behaviour were obtained (albeit from different samples). Respondents' perceptions of the message were also common measures in observational designs ($N = 7$, see Figure 2); however these were often used to determine exposure rates (cf. advertisement effectiveness).

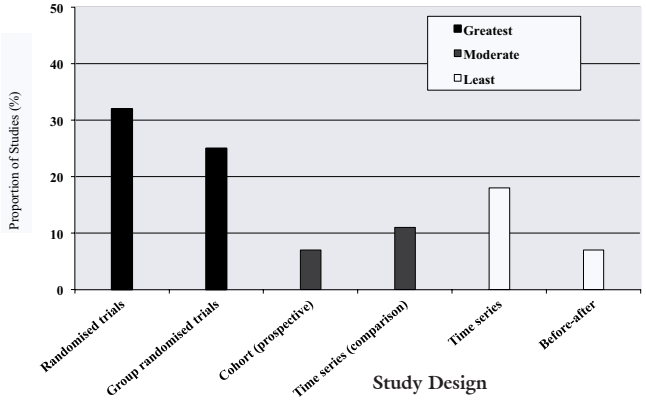

Figure 1. Proportion of studies that used each design type to evaluate anti-speeding advertisements ($N = 28$), categorised according to design suitability to assess effectiveness

When comparing approaches, observational evaluations most often relied on direct outcome measures (although the proportions are quite similar across the observational studies), while experimental evaluations most often used indirect measures. Overall, the most commonly used evaluative method was a randomised trial design (individual or group) with indirect measures of speeding behaviour ($N = 12$, 43% of all reviewed studies). Conversely, the methods least often employed to evaluate anti-speeding advertisements were randomised trial designs using direct measures of speeding behaviour (i.e., using

a driving simulator); only one study did this, and it did not evaluate a true anti-speeding campaign (see [20]).

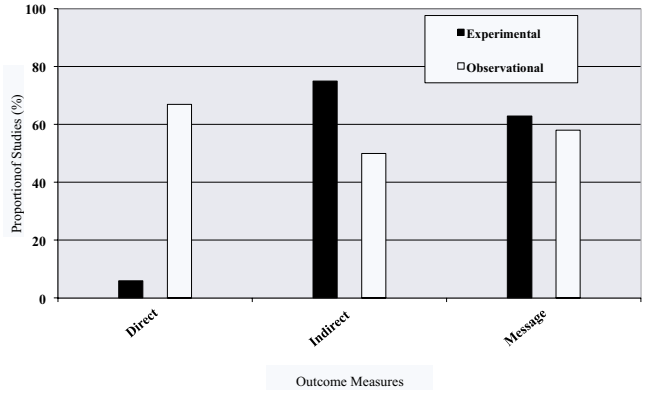

Figure 2. Proportion of experimental (*N* = 16) and observational (N = 12) studies that used each type of outcome measure to evaluate anti-speeding advertisements

(Note: Outcome measure categories are not mutually exclusive)

Summary of advertisement manipulations

Of the 16 studies which utilised an experimental design, just over half employed newly designed advertisements (56%, *N* = 9), while approximately one third utilised advertisements that had been aired in a different state to that in which the study was conducted (31%, *N* = 5). Thus, for the majority of experimental evaluations, previous exposure to the anti-speeding advertisement did not occur (88%, *N* = 14); for the remainder, at least some participants had prior exposure to the advertisement or campaign of interest. Respondents in almost all of the experimental studies were instructed to concentrate on the advertisement or campaign (88%, *N* = 14). Furthermore, one quarter of the experimental studies (*N* = 4) assessed the effects of repeated exposure on outcome measures.

A between-subjects design was utilised in many of the experimental studies (38%, *N* = 6), whereby participants were randomly allocated to view a single advertisement. Similarly, a large proportion of the experimental studies utilised mixed designs (44%, *N* = 7); for the majority of these cases (*N* = 5) participants each only viewed one advertisement. Finally, approximately one fifth of the reviewed studies employed a within-subjects design (19%, *N* = 3), whereby all participants were exposed to multiple advertisement conditions.

With respect to the emotional appeals of the advertisements employed for the experimental evaluations, almost all studies evaluated a campaign with a negative emotional appeal (94%, *N* = 15), such as a fear- or shock-inducing advertisement. Conversely, relatively few studies evaluated campaigns with a positive emotional appeal, such as those incorporating humour (25%, *N* = 4), and few evaluated advertisements or campaigns that evoked neutral emotions (19%, *N* = 3). Importantly, in approximately half of the evaluations reviewed (56%, *N* = 9), a manipulation check was conducted to ensure that the intended emotion was experienced by respondents.

For all of the observational studies (*N* = 12), real-world anti-speeding campaigns were evaluated and exposure to the campaign was assumed; in over half of these studies advertisement exposure was measured or sampled (58%, N = 7). The campaigns which were most heavily evaluated using this method were the various Transport Accident Commission campaigns which featured in Victoria.

Summary of sampling methods

The most common sampling method for experimental evaluation approaches was to recruit undergraduate university students (50%, *N* = 8). Other sampling methods included directly approaching participants (13%, *N* = 2), or posting invitations to participate (19%, *N* = 3); for two studies, members of the Israeli Defence Force were recruited to participate (see [20]). Questionnaires (paper or online) were most often utilised to measure participants' reactions to the advertisements or campaigns (81%, *N* = 13). It should be noted that possible social desirability effects were only examined in two studies (Study 1 and Study 2 in [20]).

The most common sampling method used to measure the observational studies which utilised indirect measures of behaviour (*N* = 6) was telephone surveying (33%), followed by door-to-door knocking (17%), and random location sampling (17%). In the case of observational studies examining crash statistics, data were analysed across timeframes of up to 11 years.

Discussion: strengths and limitations of evaluation methods

The current research has extended previous reviews of road safety advertisement evaluation methodologies by conducting a systematic review of the research methods used to evaluate Australian and international anti-speeding advertisements. As such, in this section, the strengths and limitations of the research methods used to evaluate anti-speeding advertisements will be discussed, and some suggestions of ways to overcome the addressed limitations will be made. Finally, the implications of the current review will be presented, and directions for future research will be suggested.

Suitability of study designs to assess effectiveness

Greatest level of suitability: strengths and limitations of experimental approaches

A large proportion of the studies reviewed here have evaluated anti-speeding advertisements using designs deemed to have *greatest* suitability to assess effectiveness – these included randomised trials and group randomised trials (i.e., experimental approaches with random allocation). The main advantage to such designs over all others is that the investigator has control over exposure to the advertisement(s) – such control does not occur in observational studies. Similarly, randomised trials evaluate the effects of the advertisement(s) in

highly controlled environments, whereby extraneous variables (i.e., possible confounds) are minimised. Thus, experimental evaluation approaches have high internal validity; the observed effects on outcome measures can clearly be attributed to the anti-speeding advertisement(s).

Given that the main strengths of experimental approaches are attributable to the controlled environment in which they're conducted, the main limitation of these approaches is that they are removed from the natural driving environment; as a result, experiments are often low in ecological validity. The external validity of experimental approaches may also be impacted due to sampling issues or biases. Given that experimental evaluations often rely on samples of undergraduate university students, their findings might not truly reflect the general population of (young) drivers. Thus, the external validity of experimental approaches could be improved upon by collecting data from drivers from the general population and collecting data in the most natural settings possible.

Other limitations of experimental procedures that should be addressed are the problems of social desirability and measurement (i.e., Hawthorne) effects. It is a real possibility that any reported effects of anti-speeding advertisements, which have been evaluated in an experimental situation, could be explained by participants responding in a socially desirable manner. Despite many researchers' awareness of this issue, only two of the reviewed studies examined, and attempted to minimise, possible social desirability effects (see [20]). It is recommended that future evaluations of anti-speeding advertisements, in which participants are aware that their responses are being measured, examine possible social desirability effects (e.g., using the Marlowe-Crowne [35] social desirability scale, as utilised in [20]). In addition, future investigations could attempt to reduce possible social desirability effects by embedding the advertisement(s) within a short cartoon or television programme (using a similar procedure to [20]); this could reduce any social desirability effects by making the intervention more subtle (and naturalistic, see later).

There are additional concerns with previous experimental procedures used to evaluate anti-speeding advertisements that should be addressed. For instance, while one third of the reviewed experimental evaluations have examined the effects of the advertisements over time, the majority have only examined the immediate effects of the advertisement(s) on their dependent variable(s). Excluding delayed measures is a limitation because relatively little is known about the persuasive effects of anti-speeding advertisements over time. In order to determine the effects of advertisements on measures of speeding behaviour, it would be beneficial to include both immediate and delayed measures (also see [8]).

Moderate and least levels of suitability: strengths and limitations of observational approaches

The strength of observational studies (and their associated designs), in general, is that they employ a global approach to evaluating anti-speeding advertisements, which is advantageous for multiple reasons. First, drivers are often unaware that their behaviour or behavioural outcomes are being measured (excluding cohort studies); consequently, any possible Hawthorne and social desirability effects are avoided. Second, in the case of measures of on-road driving speeds, these evaluations are often conducted in the natural driving environment. In addition to the high ecological validity of such studies, measuring driving speeds in a natural setting will likely capture the driving behaviour of a representative sample of the driving population; this approach should enhance the external validity of the findings. A final strength of observational evaluation approaches is that these designs often provide an opportunity to examine large-scale societal effects (cf. experimental approaches).

Despite the aforementioned strengths, there are limitations to observational evaluation approaches. Perhaps the most significant of these – preventing some of these studies from being categorised as having *greatest* suitability for assessing effectiveness – is that the investigator has no control over advertisement exposure. That is, exposure to the campaign is either assumed or checked retrospectively (e.g., by sampling advertisement awareness and recall). Another significant limitation of some observational studies is their tendency to examine relationships between outcome measures and the presence/absence of anti-speeding advertisement waves (e.g., before-after and time series designs without concurrent comparison groups). Such designs provide no control over extraneous variables, which means that changes to the outcome measure of interest cannot, reliably, be attributed to the advertisement(s). One way to increase the internal validity of the findings is to include a concurrent comparison group that has not been exposed to the advertisement (i.e., use time series or before-after designs with concurrent comparison). Assuming that the concurrent comparison group was similar or matched to the exposed group, it could act as a suitable control for extraneous variables – thereby making any causal connections between the intervention and changes to outcome measures more reliable.

Suitability of outcome measures to assess effectiveness

Direct measures of speeding behaviour: strengths and limitations

Only one of the experimental evaluations presented in this review included a direct measure of speeding behaviour (simulated driving speeds, see [20]); however, it should be noted that this study did not evaluate an anti-speeding campaign (rather it was a road trauma video that did not mention, nor depict, speeding). Similarly, although not captured using the inclusion criteria of the current review, the authors are aware of previous experiments that have evaluated anti-speeding advertisements using a driving simulator (see [36–40]). Together, these studies have measured a range of

speed-related dependent variables, including completion time, speeding frequencies, average driving speeds, and speed exceedance magnitudes. The main advantage of such direct measures of speeding behaviour is that they may provide a more representative account of the effects of anti-speeding advertisements on actual driver behaviour (cf. indirect measures, see next section). In addition, any erroneous findings that may emerge as a result of heuristics that drivers hold about what constitutes an effective anti-speeding advertisement (see [41, 42]) may be averted if empirical evaluations measure speeding behaviour directly. That is, if drivers do not have accurate insight into which anti-speeding advertisements will be effective, then measuring advertisement effectiveness via direct measures of their behaviour may bypass any subconscious biases that drivers hold (cf. indirect measures, such as behavioural intentions, or measures of message characteristics, such as perceived campaign effectiveness).

Despite the potential advantages of measuring anti-speeding advertisement effectiveness using simulated driving speed measures, the reliability and validity of simulated driving behaviour to model actual on-road driving behaviour should be considered. While driving simulators provide, arguably, a more ecologically valid and reliable method of measuring driving behaviour (cf. indirect measures), simulated driving behaviour should not be treated as identical to actual driving. For instance, the driving simulator provides drivers with a risk-free driving experience, where physical threat and fear factors are absent. Thus, simulated driving speeds might not be representative of actual on-road driving speeds. Despite this apparent limitation, studies have shown driving simulators to have relative [43] and absolute validity [44] with respect to on-road driving speeds. However, the authors are not aware of any empirical evaluations of anti-speeding advertisements that have included a validation procedure to determine the driving simulator's absolute validity.

For a large proportion of the observational evaluations of anti-speeding advertisements, behavioural outcomes (e.g., crash rates and speeding violations) or on-road driving speeds were the measure of interest. The main strength of these direct measures is that they are high in ecological validity and – especially in the case of crash rate measures – it could be argued that outcome-based measures are closely related to safety.

While outcome-based measures of anti-speeding advertisement effectiveness may be high in ecological validity, it is debatable how measures of speed-related crash rates and speeding violations are linked to actual speeding behaviour. For instance, it could be argued that speeding violations are really a measure of the number of times the driver was *caught* for speeding. Similarly, there may be multiple causes of crashes – this is problematic when trying to determine whether speed was the sole, main, or one of many contributing factor(s) of a crash. Thus, while speeding violations and speed-related crash rates are, presumably, indicators of speeding behaviour, this is not the same as measuring actual speeding. There are other problems associated with using speed-related crash rates as a dependent variable, including the issue of minor crashes often going unreported (for a more detailed discussion about the limitations of using crash rates as a measure of road safety advertisement effectiveness, see [45]). Thus, when relying on behavioural outcome measures as an indicator of speeding, it can be difficult to establish whether anti-speeding advertisements have been effective because of the nature and limitations of these measures.

Indirect measures of speeding behaviour: strengths and limitations

Some of the observational evaluations and a large proportion of the experimental evaluations reported in the current review have measured anti-speeding campaign effectiveness via indirect measures of behaviour, including: reported issue awareness; attitude towards speeding; intention to speed; and self-reported speeding. The major advantage that indirect measures of behaviour have over direct behavioural measures relates to the relative ease and economic efficiency with which anti-speeding advertisements can be evaluated. For instance, in the case of experimental approaches, if anti-speeding advertisements are evaluated via indirect behavioural measures, it is possible to arrange a the procedure such that several drivers participate simultaneously; for example, participants could each view a randomly-assigned advertisement and complete the post-exposure measures at the same time (using computers).

Although the findings from such research can have important implications for anti-speeding advertisements, the ecological validity of these measures is subject to criticism. For instance, investigations into the predictive validity of attitudes have indicated that while positive attitudes towards speeding may correlate positively with self-reported frequencies of speeding, significant correlations with average driving speeds in a driving simulator may not be found for all speed zones [46]. Similarly, examinations into the validity of self-reported speeding, compared with objective speed measures using GPS technology, have revealed a tendency for drivers to over report their driving speeds when travelling at low speeds and to under report their driving speeds when travelling at high speeds [47]. Importantly, an investigation into the effects of anti-speeding advertisements on the reported intentions to reduce speeding and the simulated driving speeds of young drivers has suggested that there may be a gap between drivers' reported intentions to change and their observed changes to speeding behaviour [36, 37]. These findings highlight a potential limitation of using indirect measures of behaviour to examine the effects of anti-speeding advertisements, as drivers' post-exposure anti-speeding attitudes, intentions, or self-reported behaviours might not be representative of their subsequent driving behaviour - a suggestion which has important implications for some of the anti-speeding advertisement evaluations reviewed here.

Suitability of advertisement manipulations

Advertisement characteristics: limitations

Although the purpose of many of the evaluations reviewed here was to examine the effects and perceptions of different real-world anti-speeding advertisements, using real-world advertisements presents some limitations that should be discussed. In particular, real-world anti-speeding (and control) advertisements often include different characters, settings, and vehicles, and they may present speeding behaviour (and its consequences) differently; that is, the examined components are not manipulated in a controlled manner. For this reason, caution should be made when attempting to isolate, and make conclusions about, the components of the advertisement which contribute to any observed changes in the dependent variables of interest. Similarly, very few real-world anti-speeding advertisements include specific coping strategies or instructions for drivers [7]. As a consequence, such anti-speeding advertisements do not lend themselves to an examination of the behavioural or perceived effects of response efficacy. Thus, while studies that employ real-world anti-speeding advertisements may be higher in ecological validity, using such stimuli makes it difficult to tease out the characteristic(s) or aspect(s) of the advertisement which makes it effective (or ineffective). It is recommended that future experimental evaluations of anti-speeding advertisements employ controlled stimuli (cf. real-world advertisements) which manipulate the depictions of speeding behaviour and its consequences, response efficacy, and the emotional appeal in a systematic manner.

On a similar note, almost half of the experimental evaluations presented in the current review have made a priori assumptions about the emotions evoked by the advertisements employed. This is a limitation for two reasons. First, for studies in which the advertisements' emotional appeal is the experimental manipulation, if the evoked emotions are not established before or during the study, the manipulation has not been verified – this may mean that any observed effect, or lack thereof, has been inaccurately attributed to emotional effects. Second, without measures of the emotions evoked by the advertisement(s), it makes it difficult to compare findings across studies (for a more detailed discussion about the implications of an absence of manipulation checks, see [8]). Future investigations should rectify this limitation by independently establishing the emotions evoked by anti-speeding advertisements (and the strength of these emotions), via a pilot study or by measuring participants' evoked emotions throughout the study.

Exposure methods: strengths and limitations

A small number of the experimental evaluations reviewed employed advertisements or slogans which had been previously televised within the state in which testing was conducted. As a result, often participants of such studies have seen the advertisements prior to their participation in the research, which introduces prior exposure issues. Research into advertisement wear-out effects suggests that the effects of road safety advertisements might decline over time [25], and that people tend to habituate to the fear evoked by threatening anti-speeding advertisements with repeated exposure [21]. Accordingly, where there are high rates of prior exposure to an advertisement, reported changes to indirect or direct speeding behaviour measures could be too conservative. To better examine pre-exposure effects on persuasive outcomes, future studies should gather data on the approximate number of times participants have seen the advertisements prior to the study, which would allow pre-exposure levels to be entered into the model as a covariate. Similarly, future studies could examine the effects of repeated exposure by presenting the entire advertisement or advertisement prompts to drivers at multiple intervals.

Another limitation that has been noted as a result of the current review is that some empirical evaluation methods allow participants to view multiple anti-speeding advertisements or campaigns, via within-subjects designs. This manipulation is undesirable because there is a possibility that any reported differences between advertisements could be explained, or could have been enhanced, by interaction or contrast effects (see [48]. Information provided in previously encountered stimuli has been shown to impact upon the persuasive impact of a target message). That is, perhaps after viewing an advertisement the remaining advertisement(s) would be perceived by participants as significantly more or less influential, resulting in inflated or deflated effects. While many evaluations attempt to avoid these issues via counter-balancing the presentation of the advertisements, this would likely lead to wash-out effects; consequently, there may be a failure to detect any real differences. Accordingly, future experimental evaluations should employ between-subjects or mixed designs, such that each participant only views one anti-speeding advertisement.

Finally, most often, experimental evaluations of anti-speeding advertisements subject participants to 'forced' exposure to the advertisement, which limits the ecological validity of the research. Despite this limitation being addressed in previous reviews [8], only two of the studies reviewed in the current paper have attempted more natural exposure methods (see [20]). Although not meeting the inclusion criteria for the current review, the authors are aware of two evaluations which have employed subtle exposure methods (see [39, 40], [49]); future empirical evaluations could adopt similar strategies to enhance their ecological validity with respect to naturalistic exposure to anti-speeding advertisements.

Implications and future directions

The current review has highlighted the salient methodological limitations of previous research methods used to evaluate anti-speeding advertisements. Given that the methodological limitations outlined in this review may significantly impact the reliability or validity of the conclusions drawn from such evaluations, the findings of the current review have important implications for road safety and for behaviour change

interventions. In particular, the current findings suggest that some evaluation methods, by themselves, are unsuitable for providing reliable evidence from which to govern effective media advertisement design.

Overall, it is suggested that investigators first determine the goals of the evaluation and select the study design based on what is feasible and most suitable to meet these objectives. It is recommended that investigators with narrow research questions (e.g., what types of messages enhance effectiveness), employing experimental approaches, include direct measures of behaviour, where possible, to enhance the ecological validity of their findings. In addition, it is suggested that future research using experimental approaches considers exploring in-car technologies to measure drivers' actual on-road driving speeds to validate indirect outcome measures. For investigators who wish to examine large-scale societal effects, it is recommended that any observational studies (with direct measures) include a concurrent comparison group, where possible, to enhance the study's internal validity. While a large emphasis has been placed on the design and outcome measures in this review, considering the overall execution of the evaluation is vital. Overall, a well-executed large-scale design may be superior to a poorly-executed randomised trial (see [9]). Thus, it is recommended that researchers consider the limitations of previous approaches, as discussed in this review, and ensure that they avoid the relevant limitations where possible.

Furthermore, it is recommended that further basic research is conducted. For instance, additional research is needed in order to gain a better understanding about the effects of prior exposure and any delayed effects that advertisements have on persuasive outcomes. Similarly, more research into the persuasive effects of various emotional appeals is needed, especially given the dominance of negative emotional appeals in anti-speeding campaigns and empirical evaluations (also see [7, 8]). In addition, further research is required to establish whether the conclusions drawn about the effective characteristics of anti-speeding advertisements can be generalised to other road safety behaviours and/or target groups (see [50]); that is, if the findings are particular to the behaviour or population of interest this will influence future campaign development. Such basic research would be foundational for the future design and evaluation of anti-speeding, and other road safety, advertisements.

Acknowledgements

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Notes

[1] The video speed test involves a driving simulation test, whereby participants watch a video of someone driving in real driving situations. Participants then indicate their speed choice for the just-seen driving scenario (for example, see [21]).

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* Denotes that the publication was included in the systematic review. An Appendix to this article, containing tables which summarise the methodological details for each of the anti-speeding advertisement evaluations included in this review, can be viewed in the online version of this issue of the journal at www.acrs.org.au/publications/journalscurrent.

Appendix: Summary of the methodological details for each of the anti-speeding advertisement evaluations included in this systematic review

Table 2. Studies employing designs with greatest suitability for assessing effectiveness

First author (year)[Ref] Design Evaluation Setting Description Peer reviewed status (PR)	Participant details: Sampling (driver status) Gender Age	Intervention details: Mode (real-world status) Emotions Target audience	Intervention Checks: Manipulation Social desirability	Exposure to Intervention: Prior to study During study Nature or exposure	Evaluation Measure(s) Collection Method	Duration of data collection
Algie (2010)[10] **Randomised trial (mixed)** **Australia** **Fear-relief patterns** **PR**	First-year undergraduate university students (drivers) M and F 18–25y	TV ads (real-world) Strong negative and positive (control) emotions Targeted all drivers	Manipulation checks (fear-relief patterns)	Previous exposure Forced exposure	Continuous response measurement (CRM) of fear from *very tense* to *very relieved* CRM device	Immediate
Cauberghe (2009)[11] **Group randomised trial (between)** **Australia** **Effect of high and low threat ads and context** **PR**	Undergraduate university students M and F 18–27y	TV ads (designed for the study) Weak and strong negative emotions Targeted young drivers	Manipulation checks (threat severity and fear)	Forced exposure	Message involvement; anti-speeding attitude; anti-speeding intentions Questionnaires	Immediate
Donovan (1999)[4] **Australia** **Randomised trial (between)** **The relationship between production cost and ad effectiveness** **PR**	General public, approached directly at shopping centres and in the city centre (drivers) M and F 17–29y	TV ads (real-world) Weak and strong negative emotions Ads 1 and 2 targeted drivers 24-39y; Ads 3 and 4 targeted drivers 17-29y	Manipulation checks (various emotions and cognitions)	Repeated exposure (x2) Forced exposure	Likelihood of complying with the recommended behaviour; as a passenger, the likelihood of influencing the driver to comply with the recommended behaviour; emotions experienced, and their intensity; perception of the main messages Questionnaires	Immediate

Table 2. Continued

Elliott (2009)[12] **United Kingdom** **Randomised trial (mixed)** **Evaluating a print ad based on the TPB** **PR**	Random sampling from Transport Research Laboratory database (UK) M and F *M* = 49.2y	8-page booklet (designed for the study) Neutral emotions Targeted all drivers	Manipulation check (belief targets)	Forced exposure	Theory of Planned Behaviour (TPB) constructs; intention to comply with speed limits; self reported speeding behaviour Questionnaires	Immediate Follow-up (1 month)
Glendon (2003)[13] **Australia** **Randomised trial (within)** **Effectiveness of billboard slogans** **PR**	Undergraduate university students (drivers) M and F 17–25y	Road sign messages (designed for the study) Negative and neutral emotions Targeted all drivers	Manipulation checks (categories; target behaviours)	Forced exposure	Perceived effectiveness; perceived personal influence; agreement with message; self-reported speeding behaviour; perceived crash vulnerability Questionnaires	Immediate
Goldenbeld (2008)[14] **The Netherlands** **Group randomised trial (mixed)** **Effects of fear evoking ad and neutrally toned information leaflet** **PR**	Invitation letters (drivers) M and F *M* = 51y	Communication leaflet (designed for the study) Neutral emotions Targeted all drivers TV ad (real-world) Negative emotions Targeted all drivers	Manipulation checks (intervention clarity)	Forced exposure	Perceptions about speeding; attitudes towards introduction of 60 km/h zones; intentions to speed; self-reported speeding Questionnaires	Immediate (only; TV ad) Delayed (only; leaflet)
Lewis (2007)[15] **Australia** **Group randomised trial (within)** **Threatening ads and the third person effect** **PR**	University students and acquaintances of the researcher (drivers) M and F Drivers of all age groups	TV ad (real-world) Strong negative emotions Targeted all drivers	Manipulation checks (threat level)	Forced exposure	Attitudes towards speeding; self-reported speeding; future speeding intentions; perceived influence (self; other) Questionnaires	Immediate

Table 2. Continued

Lewis (2008)[16] **Australia** **Randomised trial (mixed)** **Comparison of positive and negative emotional ads** **PR**	Invitations mailed to students/staff at a university and a large organisation (drivers) M and F 17–59y	Audio ads (designed for the study) Positive and negative emotions Targeted all drivers	Manipulation checks (evoked emotions)	Forced exposure	Past speeding behaviour; intentions to obey the speed limit; self-reported speeding Online questionnaires	Immediate Follow-up (4 weeks)
Lewis (2010)[17] **Australia** **Randomised trial (between)** **Role of response efficacy** **PR**	Invitations mailed to students/staff at a university and a large organisation (drivers) M and F Drivers of all age groups	Audio ads (designed for the study) Positive and negative emotions Targeted all drivers	Manipulation checks (evoked emotions)	Forced exposure	Intentions to monitor and obey the speed limit; self-reported maladaptive responses to the advertisement (e.g. ignoring the ad) if it were to appear on TV; perceived response efficacy Online questionnaire	Immediate
Parker (1996)[18] **England** **Group randomised trial (between)** **Evaluation of a campaign based on the TPB** **PR**	General public approached directly in the city centre (drivers) M and F 17–40y	TV ads (designed for the study) Neutral, positive and negative emotions Targeted all drivers	No checks	Repeated exposure (x2) Forced exposure	TPB constructs; intentions to speed; self-reported driving behaviour; attitudes towards committing violations Questionnaires	Immediate
Rossiter (2004)[19] **Study 1: Group randomised trial (between); Study 2: Randomised trial**	First-year undergraduate university students M and F 18–25y	TV ads (real-world) Negative emotions Targeted all drivers	Manipulation checks (fear-relief patterns)	Forced exposure	Continuous response measurement (CRM) of fear from *very tense* to *very relieved*; post-exposure static measures of fear and relief CRM device; questionnaire	Immediate

Table 2. Continued

(mixed) **Influence of efficacy of fear appeals** **PR**	Undergraduate university students (drivers) M and F 18–25y	TV ads (real-world) Negative emotions Targeted all drivers	Manipulation checks (fear-relief patterns)	Repeated exposure (x3) Forced exposure	Continuous response measurement (CRM) of fear from *very tense* to *very relieved* CRM device (each week); Video Speed Test (VST) (after final exposure)	Weekly (3 consecutive weeks)
Taubman Ben-Ari (2000)[20] **Israel** **Randomised trials (Study 1: between; Study 2: mixed)** **Effect of a road trauma video** **PR**	Soldiers in the Israeli Defence Forces M only 18–21y	TV road trauma segment (designed for the study) Strong negative emotions Targeted young male drivers	Social desirability questionnaire	No forced exposure (segment embedded between commercials)	Self-reported intentions to drive recklessly Questionnaire	Immediate
	Soldiers in the Israeli Defence Forces M only 18–21y	TV road trauma segment (designed for the study) Strong negative emotions Targeted young male drivers	Social desirability questionnaire	No forced exposure (segment embedded between commercials)	Average driving speed (pre- and post-exposure) Driving simulator	Immediate
Thornton (2001)[21] **Australia** **Group randomised trial (mixed)** **Wear out effects** **PR**	First-year undergraduate university students (drivers) M and F Age = unknown	TV ads (real-world) Negative emotions Targeted all drivers	Manipulation checks (fear-relief patterns)	Repeated exposure (x3) Forced exposure	Attention paid to the ad; expected effect on speeding behaviour; emotions evoked Questionnaires; VST (after final exposure)	Weekly (3 consecutive weeks)
Walton (2001)[22] **New Zealand** **Group randomised trial (within)** **Perceived influence of ads** **PR**	Undergraduate university students (drivers) M and F *M* = 21y	Slogans (real-world) Negative emotions Targeted all drivers	No checks	Previous exposure (some slogans) Forced exposure	The extent to which the slogans were intended for them and others Questionnaire	Immediate

Table 3. Studies employing designs with moderate suitability for assessing effectiveness

First author (year)[Ref] Design Evaluation Setting Description Peer reviewed status (PR)	Participant details: Sampling (driver status) Gender Age	Intervention details: Mode (real-world status) Emotions Target audience	Evaluation Measure(s) Collection Method	Duration of data collection
Brown (2010)[23] **Australia** **Cohort study (prospective)** **Effectiveness of an anti-speeding campaign** **PR**	Randomly selected from an electronic telephone directory (drivers and non-drivers) M and F *M* = 42y	TV, radio and billboard ads (real-world) Negative emotions Targeted all drivers	Risk perception; self reported speeding behaviour; campaign exposure Telephone interviews	14 weeks
Cameron (2003)[24] **Australia** **Time series (with comparison – districts)** **Interaction between ads and enforcement**	Data obtained from VicRoads M and F Age = unknown	Transport Accident Commission (TAC) ads (real-world) Negative emotions Targeted all drivers	Casualty crashes; serious crashes; fatal crashes; awareness of advertising and enforcement; self-reported intention to speed Telephone interview (awareness and intentions)	5 years
Fry (1996)[25] **Australia** **Time series (with comparison – regions; low/high alcohol hours)** **Evaluation of the TAC campaigns** **PR**	Data obtained from the Australian Bureau of Statistics, Victorian Police, VicRoads M and F Age = unknown	TV, radio, billboard ads (TAC; real-world) Strong negative emotions Targeted all drivers (particularly young males)	Serious casualty crashes; number of speed camera infringement notices issued	11 years
Stead (2005)[26] **Scotland** **Cohort study (prospective)** **Evaluation of the *Foolsspeed* campaign** **PR**	Door-to-door knocking (drivers) M and F 17–54y	TV ads (real-world) Negative and neutral emotions Targeted all drivers	TPB constructs; awareness, recall, involvement and perceptions of key messages; intentions to speed; self-reported speeding behaviour Face-to-face interviews	4 years
Whittam (2006)[27] **USA** **Time series (comparison – regions)** **Evaluation of the *What's the Hurry?* Campaign** **PR**	Young driver crash statistics (State of Tennessee) M and F 16–19y	TV, radio and billboard ads (real-world) Strong negative emotions Targeted young drivers and their parents	Crash rates of at-fault drivers; awareness and recall of campaign; parental reports of changes to driving privileges or restrictions Telephone interview (awareness and self-reported changes to privileges)	6 years (monthly)

Table 4. Studies employing designs with least suitability for assessing effectiveness

First author (year)[Ref] **Design** **Evaluation Setting** **Description** **Peer reviewed status (PR)**	**Participant details:** **Sampling (driver status)** **Gender** **Age**	**Intervention details:** **Mode (real-world status)** **Emotions** **Target audience**	**Evaluation Measure(s)** **Collection Method**	**Duration of data collection**
Angle (2009)[28] **Great Britain** **Before-after (no comparison)** **Evaluation of *Live With It* campaign**	Random location sampling (drivers and non-drivers) M and F 15y+	TV, radio, poster and online ads (real-world) Strong negative emotions Targeted all drivers	Attitudes towards speeding (acceptance of speed limits, personal responsibility, risks and acceptability of speeding); recall, prompted recognition, opinions about campaign Interviews	4 months (pre- and post- attitudes) 1 week (post- recall)
Divjak (2009)[29] **Slovenia** **Before-after (no comparison)** **Effectiveness of the *Speeding is Worth Regretting!* Campaign**	Random sampling via phone directory (drivers and non-drivers) M and F *M*s = 34.2y (pre-) and 36.8y (post-)	TV, radio and billboard ads (real-world) Strong negative emotions Targeted all drivers	TPB constructs; perceived crash risk; reported intentions to speed; self-reported speeding; campaign recall Online questionnaires; telephone interviews (campaign recall)	2 weeks pre exposure – 2 weeks post exposure
Guria (2005)[30] **New Zealand** **Time series (no comparison)** **Evaluation of shock ads to supplement enforcement** **PR**	Data obtained from the Traffic Crash Report database of police-reported injury crashes (LTSA) M and F Age = unknown	TV ads (real-world) Strong negative emotions Targeted all drivers	Number of: fatal crashes; fatalities; non-motorcycle fatalities; serious casualties; serious non-motorcycle casualties	10 years
Mulholland (2005)[31] **Australia** **Time series (no comparison)** **Evaluation of the *Wipe Off 5* campaign**	Data obtained from VicRoads M and F Age = unknown	TV, radio and billboard ads (TAC; real-world) Negative (unspecified) emotions Targeted all drivers	Number of: fatalities; serious injuries; self reported speeding behaviour; on-road travelling speeds; recall of ad; attitudes toward the ad and speeding	4 years

Table 4. Continued

Tay (2005)[32] **Australia** **Time series (no comparison)** **Interaction between TAC ads and enforcement** **PR**	Data obtained from VicRoads M only Age < 25y	TV, radio and billboard ads (TAC; real-world) Negative emotions Targeted all drivers	Number of serious crashes involving at least one young male driver; number of speeding tickets issued	6.5 years (monthly)
Tay (2002)[33] **New Zealand** **Time series (no comparison)** **Effectiveness of a TV ad campaign** **PR**	Data obtained from LTSA's Accident Investigation System M and F Age = unknown	TV ad (real-world) Strong negative emotions Targeted all drivers (mainly males, 18–24y)	Number of speed-related fatal crashes	9.5 years (monthly)
Taylor (2001)[34] **Australia** **Time series (no comparison)** **Evaluation of an anti-speeding campaign**	On-road speed data collected at six locations on the Adelaide metropolitan arterial road network M and F Age = unknown	TV ads (real-world) Various negative emotions Targeted all drivers (mainly young males)	On-road free driving speeds (km/h)	3.5 years (with 6 test weeks per year)

Road safety advertising and social marketing

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Abstract

Traditional road safety advertising via media such as television, print media, radio and static roadside advertising is being overtaken by a transition to broader campaigns that include the internet, digital marketing and direct marketing. This paper discusses several examples of recent road safety advertising campaigns that have used novel approaches, including the Roads and Traffic Authority's anti-speeding public awareness campaign 'Speeding. No one thinks big of you' which featured Myspace webpages and specific internet advertising, the Roads and Traffic Authority's 'Pimp Our Ads' initiative, Land Transport NZ's 'Phone Legends' campaign using SMS messaging to deliver a road safety message to influence the decision of an individual to engage in a risky and illegal behaviour, and VicRoads 'YellowCard' campaign using video messaging to allow people to tell friends that they are disappointed with their dangerous driving. The evidence is that target populations will participate in interactive communications that are centred around safety messages.

Keywords

Advertising, Digital communication, Innovation, Internet, Messaging

Introduction

The advertising industry is in the middle of a digital revolution that is basically about the changing role of the internet. Not only is the world wide web moving from computer screens to mobile phone screens and from fixed cable connections to wireless, it is also moving from being a delivery channel to an interactive one [1]. Websites such as MySpace, YouTube and Facebook and the ever-increasing rise and use of blogs, allow immediate and sustained connection of individuals and online communities beyond defined urban, regional and national boundaries. These individuals and online communities want to be able to generate content as well as receive it, to parody content and to appropriate it. Increasingly, the acceptability of advertising content is reliant on how internet connected individuals and online communities want to receive such content, and in a form they choose and at a time when they choose [2].

In this paper, it is proposed that effective road safety advertising will need to address content though digital marketing, direct marketing, and perhaps even revisions of approaches to public relations and event management. This challenge, and the change of approach, can be seen in an increasing diversification of traditional advertising firms to include specialist communication companies, as well as the increase in revenue from digital-based advertising as a share of clients' marketing expenditure. It is expected that as access and the user experience become faster, cheaper, easier and better, target groups will respond and participate more in a truly interactive digital environment.

The Roads and Traffic Authority's 'Speeding. No one thinks big of you' anti-speeding public awareness campaign

The Roads and Traffic Authority's 'Pinkie' advertisement – part of an anti-speeding public awareness campaign 'Speeding. No one thinks big of you' – is a significant Australian-based road safety advertising campaign that succeeds in the transition from traditional advertising delivered through traditional media such as television, print media and static roadside advertising, to a broader campaign that integrates a suite of approaches including internet and digital marketing [3, 4, 5, 6, 7]. The campaign included the Pinkie advertisement on television and static advertising (such as billboards, bus shelters and busbacks), the 'Slowdown Notes' advertisement in cinemas only, and an internet advertisement, 'Hectic' [8].

Speeding is the biggest road safety problem in New South Wales and young male drivers are significantly over represented in speed related crashes [6]. The Roads and Traffic Authority sought to use a new approach to make contact with a target audience that has been traditionally difficult to reach and to deliver an anti -speeding message that would have an impact on their attitudes, beliefs and motivate behaviour change. The Pinkie campaign, 'Speeding. No one thinks big of you' launched in June 2007 has not only broken through the youth barrier but has been embraced by popular youth culture. The Pinkie campaign has introduced a new paradigm into road safety marketing, providing an integrated road safety advertising campaign presence in the digital arena as well as through traditional media such as television, cinema and static advertising [8].

The use of Myspace webpages to support the Pinkie advertising campaign provides a ready example of the use of digital media. In a campaign element developed by Fox Interactive Media (a division of News Corporation and owner of MySpace), MySpace Australia provided the Roads and Traffic Authority (RTA) with free banner ads that linked directly to a new road safety space: www.myspace.com/rtaslowdown. This site offered a forum for young people to share their concerns about

dangerous driving [9]. Within a day, more than a thousand hits were registered at the site, with more than 250 users placing comments. It appears that a benefit of the new campaign was to provide a forum for young people to discuss the issues associated with risky and dangerous driving, as opposed to traditional advertising campaigns which they 'may or may not' notice. Ferguson [9] noted comments by Rebekah Horne, General Manager, Fox Interactive Media:

> It's really provoked a lot of discussion. It comes back to this audience wanting to have a say rather than being spoken to. The thing it highlights to me is…there's a lot of people in the youth demographic concerned about social issues like this and probably a stronger way to get the message out is this peer-to-peer approach.

Some visitors to the Roads and Traffic Authority's MySpace website posted their own modifications to the advertisements (see, e.g., Figure 1)

Figure 1. Modification of the Roads and Traffic Authority's 'Speeding. No one thinks big of you' campaign, appropriating a screenshot of a driver doing a burnout at a signalised traffic intersection from the television advertisement, with the addition of the RTA logo and a caption – Fully Sik Bro!!!
See website: www.myspace.com/rtaslowdown (image taken from Redshaw et al. 2008 [8])

While the response to use of Myspace webpages to support the Pinkie advertising campaign was positive, it must also be noted that the majority of comments were from young provisionally-licensed drivers who also took the opportunity to indicate their frustration over driving restrictions within the New South Wales graduated driver licensing system (including criticism of current restrictions as well as further restrictions being considered as part of a review of the system). The RTA did not make any statement regarding these comments.

The television and outdoor advertising versions of the Pinkie advertisements of the 'Speeding. No one thinks big of you' campaign were the subject of formal complaints to the Advertising Standards Bureau, an industry self-regulatory body in Australia [10]. The television component of the Pinkie advertisement was the subject of complaints to the Advertising Standards Bureau in 2007, and the outdoor advertising component of the Pinkie advertisement was the subject of complaints to the Advertising Standards Bureau in 2008. These complaints were not upheld. The internet component (the 'Hectic' advertisement) and the cinema component (the 'Slowdown Notes' advertisement) of the 'Speeding. No one thinks big of you' campaign were not the subject of any formal complaints to the Advertising Standards Bureau or to other oversight agencies or organisations.

The Pinkie campaign has been the subject of studies relating to its effectiveness [see, e.g., 11, 12, 13, 14, 15, 16, 17], including a systematic review of how anti-speeding advertisements are evaluated [18].

The Roads and Traffic Authority's online 'Pimp our ads' competition

New digital technologies also allow new means of interactive communication. In 2007, the RTA ran the 'Pimp our ads' competition with partners Toyota, 2DAY FM radio, MMM radio and Free2Go (a partnership between NRMA Motoring and Services and Subaru providing roadside assistance for young drivers, see www.befree2go.com.au). This online competition was inspired by the MTV television show 'Pimp My Ride', and was specifically designed to appeal to young drivers, especially those drivers holding provisional licences in New South Wales [8].

A website (pimpourads.com) was established and an online competition was designed to challenge young people to create posters reflecting the road safety issues they thought were the most relevant. The competition ran through an interactive website that provided the tools for creating, submitting and online sharing of posters with a road safety theme. Entries received—there were almost 8,000 entries received over a six week period—were published in a viewable gallery. Participants received an acknowledgement email which contained a web address link to their poster that they could then forward to friends, encouraging viewers to the website and more entrants to the competition. Viewers could also register their vote for the best entry.

Participants were given several practical tips to assist the development of their creative idea, including:

- Keep it simple.
- The 10 metre test: Limit your headline to as few words as possible. Remember, the best posters should get their message across when viewed from a distance. Try taking a few steps away from your computer screen and looking at your work. Are the words big enough to be read from a distance? Do the colours look good together? Is there anything you could improve?
- Is it original?
- What is the impact?
- Is it legible?
- Is it typo-free?

- The criteria used in judging the posters were outlined: 40% Words (Are they hard-hitting and meaningful?); 30% Visual appeal (How well applied are the graphics tools?); and 30% Originality (Have you cracked something no-one's done before?)

The winning entry was 'Should have crashed at a mate's' developed by Samantha Morris, a 23-year old undergraduate Honours student in Visual Communication Design at the University of Newcastle (see Figure 2).

Figure 2. The winning entry in the RTA's online 'Pimp our ads' competition 'Should have crashed at a mate's' by Samantha Morris. See website: pimpourads.com (image taken from Redshaw et al. 2008 [8])

Morris's poster shows a young man lying trapped under an overturned car, with the slogan 'Should have crashed at a mate's'. The judges were impressed with the clever use of language, and that the poster presented novice drivers with both the behavioural problem (unsafe driving due to impairment by fatigue, alcohol or drugs) and a simple behavioural solution (stay overnight at a friend's place rather than risk the unsafe driving) [19].

The winning poster was of such a high commercial standard that it went straight into production and was released as an outdoor poster campaign that was displayed across New South Wales using bus backs, outdoor advertising at bus stops, taxi backs, and in youth and street media. As cited in a report by the University of Newcastle [19, p22], the then New South Wales Minister for Roads, the Hon. Eric Roozendaal MLC, said 'The design was shown to groups of young drivers and was found to be so powerful it is ready to go exactly the way she designed it'.

Other commended entries from the Roads and Traffic Authority's 'Pimp our ads' competition are shown in Figure 3.

Figure 3. Commended entries in the RTA's online 'Pimp our ads' competition. See website: pimpourads.com (image taken from Redshaw et al. 2008 [8])

The Land Transport NZ 'Stop your mate driving drunk' SMS campaign

Other communications and information technology media are also being used to deliver road safety appeals. In New Zealand, for example, the government agency responsible for road safety, Land Transport NZ, ran an anti-drink driving campaign using advertising promoting anonymous SMS messaging to people whose friends thought they were likely to attempt to drive drunk. It was known that if a young male was drunk and

decided to drive home, his friends would be worried. But it was also known that his friends wouldn't actually say anything to stop him - in the world of young adult peer pressure, this is a very un-cool thing to do. What was needed was a way for friends to express their concerns anonymously [8].

This campaign allowed a direct marketing approach using communications technology to deliver a road safety message at an appropriate time and place to influence the decision of an individual as to whether he or she would engage in a risky and illegal behaviour.

Developed by advertising firm Clemenger BBDO, the campaign 'The Phone Legends' provided people with a tool to be able to send an anonymous telephone message to a friend or colleague to not drink and drive. Posters and bar coasters printed with the motto 'Stop your mate driving drunk' (see Figure 4) were placed in participating licensed premises. People could dial an automated messaging service, supply the mobile phone number of the friend or colleague who is likely to drink and drive, and choose from one of four fictitious voice messages that outline the possible consequences of driving drunk. The voice messages were convincing, allegedly from a plastic surgeon, a nurse, a hotline messaging service, and a home helper. The prospective drink driver then receives a voice message from that character on his mobile phone: a humorous yet timely reminder of the consequences of drink driving. The posters and bar coasters were placed in over 200 licensed premises in New Zealand, and more than 12,500 people made use of the service during the campaign period.

Figure 4. Poster and bar coasters developed for 'The Legends' element of the Land Transport NZ 'Stop your mate driving drunk' SMS campaign (image taken from Redshaw et al. 2008 [8])

The Victorian 'YellowCard' campaign using video messaging to mobile phones about risky and dangerous driving

A similar campaign concept was launched in 2009 to enable young people in Victoria to send a yellow card (a device used by sporting referees as a warning to players for inappropriate behaviour) to their mates to ask them to stop their dangerous driving and to remind them about the consequences of ignoring the road rules [8]. The 'YellowCard' campaign website (see Figure 5) lets concerned people send an anonymous video message to their mate, letting them know what sort of driving behaviour they're worried about, and what might happen to the dangerous driver if he or she continues.

Figure 5. Send a YellowCard at http://yellowcard.tv/ (image taken from Redshaw et al. 2008 [8])

The 'YellowCard' campaign is an initiative of the Victorian government, but rather than following the traditional approach of using road safety agencies, safe driving groups, motorist organisations or police telling people how to drive, the 'YellowCard' campaign concept is designed to allow people to tell their friends that they are disappointed with their dangerous driving.

Discussion

Traditional road safety advertising via media such as television, print media, radio and static roadside advertising is being overtaken by a transition to broader campaigns that include the internet, digital marketing and direct marketing: the RTA's 'Speeding. No one thinks big of you' campaign, with its multiple advertising elements of 'Pinkie', 'Hectic', and 'Slowdown Notes' provides a good example of such evolving practice [5, 6] that has been subject to significant documentation and evaluation. The evidence is that the target populations will respond and participate, but the challenge is to harness the possibilities offered by these new approaches and to deliver effective and timely road safety messages.

The adoption of these new approaches is already occurring in New South Wales [8]. Following the success of online advertising and interactive road safety websites using YouTube and MySpace, in October 2008 the New South Wales government announced that government agencies were being instructed to get smarter in the way they inform the community about government activities and issue public safety and health warnings [20]. Agencies including the RTA (road safety), New South Wales Health (health promotion), and the WorkCover Authority of New South Wales (workplace safety), received a policy directive to use technology rather than traditional means

to advertise; this means more use of online advertising and less spending on radio, television and outdoor advertising in the delivering of public awareness campaigns. As well, the policy directive requires agencies to seek to share advertising development costs with other Australian jurisdictions where a generic campaign is possible, such as with road safety messaging. It must be noted, however, that while the possibilities offered by new technologies for advertising are to be utilised, a major underlying reason for this policy shift is budgetary—the costs associated with traditional advertising media are much more expensive than online advertising; indeed, another element of the policy directive requires government agencies to publish the cost of advertising campaigns [8].

Already, road safety agencies are using web-based services to promote road safety. To cite two current examples, in Victoria, the Transport Accident Commission publishes a regular email road toll alert and provides links to its main website (the TAC Safety website at www.tacsafety.com.au), while in Queensland, the Department of Transport and Main Roads uses the Here For Life email list to regularly deliver specific road safety messages (see hereforlife@tmr.qld.gov.au).

The rapid adoption and popularity of Facebook, Twitter, and even research-oriented social media such as LinkedIn and ResearchGate, serve to illustrate that the use of these new information technology and communications approaches is likely to increase in the future [21, 22; for an example of a recent analysis and proposal specifically relating to school bus safety, see 23, and for a discussion of the role of social media in disaster response, see 24]. Keegan [21] has provided a brief review of the implications. Already, television soaps are being adapted or routed for web broadcast, and series are being made specifically for internet delivery, including, as examples of this trend, web soaps such as MySpace's Quarterlife and Endemol's The Gap Year, and Chelsea OMG, a soap on the social network Bebo . These soaps are designed for audience interactivity, including intrusions into real lives with the option for viewers to become 'friends' of the stars. They also feature a radically shortened episode length (a full-length episode in this genre is three minutes). Not only is there a trend involving the routing of television through the internet, web television itself is developing rapidly with users creating their own programs and then uploading them to YouTube and vodpod, or moving to sites that provide users with their own global channel on mobile telephones and computers (see, e.g., sites such as Kyte, hulu.com, wi-fitv, magnify.net, and mogulus.com). In the United Kingdom, worldtv.com, when linked to the mobile channel Qik, enables a user to put video from the camera or a smartphone directly on to the user's own global television channel.

The scope for a new genre (or genres) arising from developments in information technology and communications is great, particularly as the capabilities of computer, digital camera and smartphone technologies continue to increase. In an informative review, Heaton [22] has argued that the internet is a new form of advertising that is developing its own methodology, separate from print and other electronic media (television, cinema, etc.). For Heaton, there are no 'pages' in the internet, and the 'browser view' should be the central focus of design as the only thing that matters online is what the user sees at any given point in the browser window. The scrollbar is a crucial mechanism inherent to the internet, and, unlike the print medium, what is placed down the 'page' can remain relevant if information and advertisements are placed in adjacent locations in a manner that supports both contents. Thus, in an internet environment, every advertisement can, with appropriate design of the webpage, have the same market value regardless of its placement. Heaton argues that what matters for internet advertising is not placement but rather avoidance of clutter: a lack of clutter dramatically increases the effectiveness of the message. Another difference comes from the inherent availability of the internet at any time or day, which enables differential placement and pricings for advertisements. These concepts are already emerging in practice: for instance, Heaton cites a website selling advertisements by the hour on weeknights to movie studios who want to advertise and potentially increase business for new weekend releases [22].

New information technology and communications approaches to road safety advertising and social marketing are exciting and developing fields. For example, these technologies have the potential to enable further research into road safety for young people—an at-risk group for road trauma—and, when the safety determinants are better understood, should facilitate the implementation of new countermeasures during the school years and late adolescence and lead to a reduction in the road trauma incidence and involvement for young drivers and their passengers. These technologies, and the possibilities they offer for data tracking and collection, may enable the better testing of psychosocial influences on youth road safety behaviour, including, for example, the assessment of the relative strength of psychosocial influences within and across gender and ethnicity. Gender and ethnicity factors, and their effect on peer normative attitudes and behaviour, are very poorly understood currently (see, for example, the study reported by Andreeva, Reynolds, Buller, Chou and Yaroch [25] for an account of the influence of psychosocial factors in sun safety behaviours, another area of health risk affecting adolescents).

Concluding comments

The marketing of road safety has, in the past, relied on mass media advertising to highlight risk and illegal or inappropriate behaviour. The development of alternative digital media allows for reconsideration and the recasting of the marketing of road safety. Specific, targeted marketing can be undertaken to highlight the business case for investment in safety technologies [26, 27] at both an individual level [28] and at commercial fleet levels [29]. It seems that much can be learned from marketing initiatives in other areas. For example, it might be useful to use digital road safety marketing campaigns that focus on direct-to-consumer approaches that can support the adoption of what might be called simple 'private-sphere' behaviours that individuals can undertake to minimise risk or to increase

compliance [28]. Crompton and Kasser [30], in a discussion of environmental campaigning, have identified negative aspects and positive aspects of human identity that might serve as general starting points for exploring the importance of individual human identity in responding to social and health problems such as the safety of use of the road transport system. As derived from their analysis, three aspects of human identity that might be negatively associated with people's concern about road safety issues and with their motivation to adopt pro-safety behaviours are:

1. values and life goals that are self-enhancing, materialistic aims for possessions and status and which are known to be associated with negative attitudes and behaviours such as not using public transport and using more resources to support their lifestyles
2. a social identity that treats safety proponents, traffic enforcement officials etc. as out-group members and in denigrating ways
3. coping with anxiety and guilt induced by advertising that uses fear and threats related to illegal or risky behaviours by adopting an array of 'emotional management strategies' such as becoming apathetic about those behaviours, seeking pleasurable diversions, or denying their own complicity [30].

In contrast, three helpful aspects of human identity associated with more positive safety attitudes and behaviours might be:

1. values and goals that are intrinsic, and which might include prioritising the safety of one's family and peers
2. evincing a concern for the safety of members of the broader community (and thus showing behaviours that are consistent with such concern)
3. adopting active behaviours that reduce the likelihood that illegal and risky events will arise (sometimes referred to as 'mindfulness' or as resilience) [31].

The development of digital technologies creates the possibility of new communication strategies that might be more effective in fostering and achieving improved knowledge and understanding of risk and safety for all road user groups, and in promoting positive behaviour change towards safer road use. What is needed, however, is the sponsorship and development of a systematic program of exploration, documentation and evaluation of the use of the internet, digital technologies and direct marketing in road safety advertising and social marketing in order to support the exploitation of these new possibilities for innovation and intervention.

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What can we learn from recent evaluations of road safety mass media campaigns?

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Abstract

Mass media campaigns can play an important role in promoting road safety issues to a large proportion of the population. In order to understand what elements make a road safety mass media campaign effective and how we might enhance future campaigns, a review of the literature published during the last decade was conducted. Any general principles concerning effective mass media campaign design and development were identified within the literature. Following this, recent evaluations of road safety mass media campaigns were examined to determine whether campaigns were adopting these best practice principles and the quality of these evaluations was reviewed. A number of broad principles that can enhance the effectiveness of road safety mass media campaigns were identified. While campaign designers appear to be increasingly adhering to these principles, there is still much room for improvement. Closer examination of the road safety campaigns revealed that few were subject to thorough scientific evaluation. It is suggested that evaluations may need to be based on 'before and after' comparison of behaviours or variables that can be objectively observed and are closely linked to safety.

Keywords

Campaign evaluation, Mass media, Road safety advertising, Threat appeal

Introduction

Mass media campaigns are used extensively as a means of promoting road safety issues. The use of mass media campaigns

is based on the premise that targeting the population as a whole has the benefits of potentially altering the knowledge or attitudes of a large proportion of the population and providing social support for behaviour change [1].

Mass media advertising and the provision of information to road users are relatively cheap countermeasures to road crashes, per person reached. A ten million dollar campaign in a city of one million people is only $10 per person, which might be thought very little when the annual cost of road crashes may be about $700 per person (as it is in South Australia), even if the campaign does not reach everyone in the community. However, it has been controversial for decades whether mass media campaigns have any worthwhile effect.

There is quite a substantial body of opinion, based on evaluations of individual campaigns, that mass media campaigns will not usually reduce crashes [e.g. 2, 3]. Strecher et al. [4, p. 35] argues 'One-size-fits-all mass media interventions that run independently of other strategies have demonstrated little or no behavioural improvement'. On the other hand, advocates of advertising point to significant changes in some attitudes over the past 30 years, for example, less tolerance of smoking and drink driving. Indeed, research suggests mass media campaigns are generally more successful in fulfilling an agenda setting role (i.e. changing social norms) by increasing awareness of an issue or problem rather than altering behaviour [1].

To determine the effectiveness of recent mass media campaigns, a scientific outcome-based evaluation is desirable. However, a rigorous evaluation is difficult and costly to achieve and may not necessarily provide definitive answers (for a discussion, see [5]). In the absence of such an evaluation, a more constructive approach is to review the literature to determine what conditions are necessary for mass media campaigns to successfully change road safety related outcomes. In the past, a number of studies have used meta-analytic techniques or have reviewed the literature to determine key elements associated with effective road safety mass media campaigns [e.g. 6, 7]. However, this paper aims to provide a timely update on the current status of evidence by reviewing the most recent literature.

The purpose of the present paper - which includes some parts of the report by Wundersitz et al. [8] - is to review research literature published over the last decade to identify any general principles associated with effective road safety mass media campaigns and to also comment on what might be done to improve campaign design, development and evaluation. Comments concerning potential improvements to future campaigns will be based on a review of recent road safety mass media campaign evaluations, and how they compare to best practice, as stated in the literature.

Method

Australian and international mass media literature published during the last decade (2001-2009) was identified and reviewed to determine general principles associated with effective mass media campaigns. Given that public health and road safety media campaigns have much in common (e.g. goal of reducing injuries, changing health related behaviours), the review included public health literature, where necessary, but the primary focus was on road safety.

Literature searches were performed using the following electronic reference databases and sources: PubMed, Academic Search Premier (Media and Health), PsychInfo, Informit (ATRI, Humanities and Social Sciences), OvidSP (Transport), TRIS, and the Cochrane Library. The search strategy was customised for each database and included journal articles, reports, conference papers, reviews and electronic materials. The bibliographies of included papers and reviews were also examined to identify relevant literature. While this review was not intended to be exhaustive, it was intended to be representative of literature published in the English language during the last decade.

To examine how recent road safety mass media campaigns are designed and evaluated, and how they might be improved, the literature review focused on studies evaluating the effectiveness of road safety mass media campaigns. The campaigns included were those involving at least one form of mass media (e.g., TV, press, radio) either alone or in conjunction with other interventions. At least one form of mass media had to be purchased. It is acknowledged that by confining this review to published evaluations the literature may be biased towards studies that achieved a positive result; unsuccessful results are less likely to be published.

Each evaluation of a road safety mass media campaign identified in the literature was examined and assessed in terms of: the target behaviour and audience; the main campaign message; approach used to convey the message; the campaign duration and intensity; the different types of media used; any activities or enforcement accompanying the campaign; method of evaluation; and any outcomes of the evaluation with particular emphasis on scientific evidence, that is, campaign effectiveness in the sense of changes in objective measures such as crashes or behaviour (as distinct from recall or change in attitudes).

Results

The literature search uncovered a large body of research relating to mass media campaigns from a wide range of different perspectives. Over 125 publications specifically related to road safety mass media campaigns were identified with most of these being experimental studies or review articles. Of these, only 14 publications were evaluations of individual campaigns that met the inclusion criteria.

Best practice principles from the literature

Noar [9] commented that in the last decade health mass media campaign designers have increasingly adhered to general principles of effective campaign design, rather than discovering

new principles. While this comment was based on health literature it is also applicable, to some extent, to road safety. The present review of literature from road safety and public health suggests the following principles might enhance the effectiveness of mass media campaigns.

Campaign design and development

- Strategically develop the campaign. Clearly define the campaign objectives and select appropriate variables that can measure whether these objectives were achieved [e.g. 10].
- Use systematic data driven processes to identify the target behaviour and the target audience [e.g. 9].
- Segment the target audience then tailor the message to the motivation and needs of these subgroups. There is increasing evidence that one style of message may work for one audience but not another [e.g. 2, 11].
- Use a psychological theory as a conceptual base for the campaign; theoretically guided campaigns have a greater chance of success [e.g. 7, 9, 10].
- Integrate mass media with other activities such as enforcement, legislation, and education [e.g. 6, 7, 10].
- Messages might be communicated more effectively when the mode of communication matches campaign goals and the target group preferences [e.g. 4, 9].
- Different types of media should be combined to reach as many as possible in the target group [e.g. 10, 12].
- There is some evidence from occupational health and safety back pain mass media campaigns [13, 14] suggesting messages need to make explicit behavioural recommendations relevant to the specific context of the desired behaviour.

Type of appeals

- Threat appeals aiming to evoke fear have often been used in road safety advertising. Despite much research, the literature examining the effectiveness of threat appeals is inconclusive. There are some suggestions that fear appeals can have an impact but only when specific conditions are satisfied [15]. The fear appeal must describe a threat (i.e. severity, personal relevance, vulnerability) and suggest a specific plan for reducing or avoiding the threat (e.g. a safe behaviour) that is possible to carry out, be perceived as effective, and allow the target audience to believe that they are capable of performing the behaviour [15]. Campaigns may be counterproductive without these elements, as individuals may believe that they are unable to protect themselves from the threat, resulting in defensive and maladaptive responses [e.g. 16]. On this basis, fear appeals should be used with caution.
- Gender may influence the effectiveness of different emotional appeals. There is some evidence suggesting that positive emotional appeals (e.g. humorous) may be more persuasive for males than fear appeals and vice versa for females [17, 18].

Evaluations of road safety mass media campaigns

To further determine what elements might enhance a mass media campaign, it is best to look at accumulated knowledge from past campaigns. This section provides an overview of road safety mass media campaigns that were subject to an evaluation to determine their effectiveness, and the evaluation was published and made available to the public. Therefore, these evaluations cannot be viewed as representative of all road safety mass media campaigns, only those that match the sampling criteria. Fourteen evaluations of road safety mass media campaigns were identified and they were of varying quality in terms of the quality of the evaluation and the type of outcome measures used.

A description of each of the evaluated campaigns published from 2001 to 2009 is summarised in Table 1 (see Appendix) with the studies listed in reverse chronological order. The level of detail for each individual campaign is heavily dependent on descriptions provided in the research paper describing the evaluation. A number of important observations are made concerning the different design, delivery and evaluation methods used in these campaigns. Note that two different campaigns (speed and motorcycles) were evaluated in one publication; therefore, in most of the following results the total number of observations will be 15.

Target behaviour and audience

A variety of road safety behaviours were targeted by the campaigns including speed (n=5), drink driving (n=3), seatbelts (n=2), drug driving (n=1), risky driving (n=1), young driver vulnerability (n=1), motorcyclists (n=1) and road user attitudes and behaviours (n=1).

Six of the campaigns targeted the general driving population of which four were campaigns targeting speeding. The remaining nine campaigns cited more specific target audiences or subgroups identified as being at greater risk. These subgroups were demographically based with six targeting (young) males and three targeting young drivers in general.

Campaign approach and message

Generally, few details were provided about the content of mass media advertisements in the evaluations but it appears that almost all of the campaigns were intent on highlighting some aspect of the consequences of unsafe driving behaviour. An attempt was made to inspect campaigns on their websites but many campaigns were no longer viewable online. This was not surprising given that most campaigns were conducted in the earlier part of the last decade. More than half of the campaigns focused on the consequences related to enforcement, particularly the risk of being caught and punishment for unsafe behaviours. Several of these campaigns took an informative approach warning drivers of increased speed enforcement [19] or the commencement of drug testing [20]. The other campaigns focussed on more personal, emotional consequences such as crashing (killing others, injuries to self or others) or incurring social disapproval from risky behaviours such as

speeding [e.g. 21, 22]. Of interest, some evaluations suggested that messages emphasising financial or lifestyle consequences such as loss of licence were more likely to influence behaviour than messages highlighting loss of life or limbs [23, 24].

Only one campaign mentioned using a theoretical model when developing the campaign [25]. The 'Foolsspeed' campaign in Scotland was based on the Theory of Planned Behaviour (TPB) [26], a model that explains and predicts behaviour in terms of key psychological determinants. The TPB was used to shape a series of four television advertisements, with each advertisement message designed to address a key determinant of behavioural intentions according to the TPB: attitudes regarding speeding and speed choice, subjective norms in relation to speeding, perceived behavioural control, and affective beliefs (i.e. the positive benefits of calmer driving).

Few evaluations mentioned the type of appeal used in the campaign. Of those that did, two earlier studies adopted graphic shock or threat based campaigns [27, 28], one used humour to create awareness of drug testing [20] and another intentionally depicted more realistic, credible scenarios rather than a hard-hitting threat based approach [22].

Around half of the campaigns incorporated specific behavioural instructions on how to achieve the desired safe behaviour in the main campaign message or slogan. Some good examples of campaigns that adopted this practice include a seatbelt campaign from the United States (US) 'Operation ABC – Always Buckle Children' [29], the Victorian 'Wipe off 5' speed related campaign [19] and the UK motorcycle campaign aimed at drivers 'Take longer to look for bikes' [30].

Length and intensity of campaigns

The length of the campaigns varied across the studies ranging from two weeks to five years. Six campaigns were undertaken for less than one year while six campaigns were operational for at least one year of which three lasted for five years. The length of the campaign was not specified in three evaluation studies.

While evaluations often listed media schedules with respect to timing, only three evaluations [31-33] gave any details related to variations in the level of intensity of the campaigns and one provided frequency information [34]. Solomon et al's [32] evaluation of enforcement and publicity campaigns encouraging seatbelt use at night in three different US counties attempted to link intensity levels with outcome variables. The type and amount of enforcement and media in each county varied and was tailored to the county. The study was further complicated by the fact that each county had different seatbelt laws (i.e. primary, secondary). The campaign consisted of four waves and the amount spent on media varied between waves with the greatest amount of dollars spent on Wave 1 (to capture attention) and the smallest amount spent on lower cost media in Wave 3. Solomon et al. [32, p.36] concluded: 'Results from this study showed little or no consistent relationship between amount of dollars spent on paid media and awareness, risk perception or change in belt use behaviour.'

Campaign media

The vast majority of campaigns (n=13) used a combination of different media with television being the most common communication medium (n=12). Radio (n=9) was the next most frequently used medium to deliver campaigns followed by billboards/posters (n=5), cinema (n=2) and press (n=1).

The internet is the only medium that has the ability to provide information in an interactive manner combined with games and films but only two recent campaigns (United Kingdom speed and motorcycle campaigns [30]) mentioned using online activities. This finding is likely to be, at least partly, reflective of the inherent time lag involved in the publication of evaluations. Merchandise and promotion at a sporting event (AFL game) was used in one Australian anti-speeding campaign and stickers in urinals were used during a Scottish anti-drink driving campaign.

Some campaigns also earned free media publicity, that is, they generated media interest through press releases or public events. The practice is most useful for campaigns with few monetary resources but is also generally an opportunity to promote road safety issues. While only two campaigns documented that they received free publicity, it is likely to be under-reported and so it probably occurs much more frequently.

Supporting activities

Despite the known benefits of incorporating mass media campaigns with other supporting activities [e.g. 6], there were only eight mass media campaigns in which it was known that media was integrated with other activities. Of these, six were combined with enforcement activities. These six campaigns were predominantly anti-speeding campaigns, lasted for longer than one year and reported positive findings. Interestingly, none of the reviewed campaigns specified that education materials or a change in legislation accompanied the mass media component.

Evaluation quality, methods and outcomes

Few of the road safety campaigns were subject to rigorous scientific evaluation, that is, using an experimental design and objective behavioural outcomes. Five studies were cross-sectional surveys, eight were uncontrolled before and after evaluations and two were controlled before and after evaluations. The inclusion of a control group is not always feasible, particularly when entire populations are targeted, as is the case in national mass media campaigns (e.g. New Zealand supplementary road safety package). Some of the before and after studies without a control group used a number of statistical procedures to control for other confounding variables.

Six studies reported objective behavioural measures while the other studies focused on indicators of message recall, awareness, attitudes, behavioural intentions or self-reported behaviours. Of the behavioural measures used, one study conducted observations of seatbelt use while the remaining five attempted to link campaign effectiveness to crashes. Evaluations that attempted to measure changes in behaviour resulting from the combination of enforcement and publicity generally reported

positive results. However, findings on the effectiveness of advertising alone (predominantly speeding campaigns) were largely inconclusive because advertising and enforcement effects could not be separated. An exception was Cameron et al. [31] who reported no interaction between the effects of speed enforcement and publicity; however, the study examined changes in speed camera hours of only one-month duration. Longer periods of speed camera activity might result in different interactions with mass media campaigns.

Discussion

The mass media related literature reviewed in this paper identified a number of broad principles that can be adopted to enhance the effectiveness of road safety mass media campaigns. While many of these principles have been known for some time, it was evident from evaluations of campaigns published during the last decade that many of these principles have not yet been put into practice. This paper has shown that there is still some room for improvement when designing and evaluating such campaigns. The most salient areas for improvement are now discussed.

Realistic expectations of campaigns

Road safety mass media campaigns are generally more successful in conveying information and changing attitudes rather than altering driver behaviour [35, 36]. Despite this, many campaigns focused on behaviour change. While road safety advertising is unlikely to directly change behaviour it may be useful for agenda setting or helping to form beliefs or reinforce existing beliefs. For example, the 'Speeding. No one thinks big of you' campaign developed by the RTA in New South Wales was developed to create social disapproval of speeding, particularly among young people [21]. The researchers evaluating the 'Foolspeed' campaign in Scotland acknowledged the limitations of mass media advertising as a means of stimulating behavioural change and were satisfied with the campaign achieving a change in attitudes toward speeding and in affective beliefs [22]. Future campaign designers need to have realistic expectations regarding what road safety advertising can achieve.

Use a theoretical basis for the campaign

For many years, reviews of the mass media literature in road safety and public health have advocated basing campaigns on explicit theoretical framework [e.g. 6, 7, 10]. However, very few of the mass media campaigns reviewed were designed around psychological theories. One of the few exceptions was 'Foolsspeed' [22], a five-years anti-speeding campaign based on the Theory of Planned Behaviour.

The Transtheoretical Model of Change [37] is one of the more widely used psychological theories at present, receiving much attention in the area of behaviour change and health promotion such as smoking cessation [38], promoting physical activity [39] and encouraging commuters to cycle [40]. A major contribution of the model is that it considers the readiness of the individual to change their behaviour and recognises that characteristics implicit to each population are pertinent for creating or resisting change. Knowing at which stage the target audience is situated, or indeed subgroups within the target audience, can be useful in the development of road safety campaigns such that different messages match the different stages of readiness to change. While this theoretical model is appealing it is not without critical review of conceptual and methodological issues surrounding the stages [for a review see 41].

Shift away from threat appeals

Two campaigns in Australia and New Zealand used graphic threat-based appeals in the early 2000s [i.e. 27, 28]. The research literature highlights the importance of including specific elements in fear campaigns (i.e. evoking fear, suggesting a safe behaviour that is perceived as effective and possible to carry out) to avoid defensive responses. A lack of specific information made it difficult to determine whether these principles were adopted.

In more recent years, there was a shift away from threat appeals to more rational and realistic approaches [e.g. 22]. A recent review of 45 anti-speeding campaigns found that the approaches taken were typically rational persuasion or hard-hitting emotional persuasion [42]. In the present review campaigns targeting males did not appear to use threat based appeals, consistent with the literature that suggests positive emotional appeals might be more effective than threat appeals for males [17, 18].

Emerging research suggests response efficacy (the belief that a coping strategy can avert a threat) may influence the effectiveness of positive emotional appeals (i.e. humour and pride) as well as threat appeals [43]. This suggests that future campaigns using positive emotional appeals should also consider featuring messages that provide effective emotion relieving strategies or safe behaviours for the target audience.

Combine different forms of media

Research indicates campaigns using multiple forms of media can be as effective in communication as television only campaigns and print only campaigns [12]. In addition, different types of media can have synergistic affects; for example, newspapers are used to prime people to watch television campaigns, television campaigns might promote visiting a website and websites can create awareness and interest in topics (i.e. through interactive games) primarily advertised on television.

Information is increasingly being forwarded through social media networks on the Internet whereby people will refer friends and family to websites of interest through social networking sites. Some of the biggest advantages of social media are the ability to quickly spread concise messages and facilitate the two-way flow of information. Social networking is most popular among younger people; therefore, they should be considered not only a target audience but also a medium. Many of the reviewed campaigns used multiple forms of media to

promote their message amongst the target group [e.g. Think! anti-speeding campaign, see 30] but few mentioned using websites or social networks when targeting young people. Matching the type of media to target group preferences is highly desirable.

Provide better documentation of campaign activities

Very few of the campaigns gave a detailed description about the mass media campaign duration and intensity, with the exception of Cameron et al. [31], Solomon et al. [32] and Angle et al. [33]. Consequently, it is difficult to provide any indication as to how long a campaign should be conducted or the intensity of exposure.

Studies from the US have considered the relationship between money spent on campaigns (a pseudo measure of intensity) and campaign effectiveness. Consistent with Solomon et al.'s [32] finding of a lack of relationship, a National Highway Traffic Safety Administration (NHTSA) sponsored study [44] found that some US states had higher seatbelt use rates than other states due to higher levels of enforcement rather than demographic differences or funds spent on media.

The general lack of information describing the intensity and coverage of road safety mass media campaigns needs to be addressed so that there is a better understanding of the relationship between exposure and campaign outcomes.

Conduct scientific campaign evaluations using appropriate behavioural measures and adequate methodological design

Over 15 years ago, Donovan et al. [15] attempted to review Australian road safety campaigns but found that 'Few campaigns are adequately documented, and perhaps fewer are appropriately evaluated.' For the most part, these conclusions are still valid. There were few mass media campaigns that were subject to thorough scientific evaluation with most evaluations measuring only audience response to campaigns such as recall of the advertisement message or self-reported attitudes, rather than measuring any behavioural change per se. These findings are also consistent with Phillips and Torquato's [42] conclusions following a review of 45 anti-speeding campaigns from 20 different countries.

Less than half of the studies in the present review reported using behavioural measures. Five evaluations used crashes as an outcome measure but the variability in crash data means that it is not an optimal outcome measure for mass media campaigns (for a discussion see [5]). Moreover, when a decrease in crashes was observed, in most cases the effects of the mass media campaign could not be isolated from other factors such as enforcement [e.g. 19, 27]. Only one evaluation [32] compared objectively observable behaviour that was closely linked to safety (i.e. seatbelt use) before and after the campaign. Insensitive outcome measures are likely to inaccurately estimate the effectiveness of a campaign leading to incorrect inferences about the campaigns impact.

Evaluation designs were generally simple before and after comparisons among the target population. While it is heartening to see that more recent evaluations appear to be including baseline measures, there were no randomised trials and only two evaluations included a control group [32, 34]. The inclusion of a control group is not always feasible, particularly when complete populations are targeted (i.e. national mass media campaigns). However, they should be strongly considered when designing local or regional campaigns.

Behaviour and attitude change resulting from mass media campaigns might occur over a number of years or decades but such longer-term effects are not easily measured. Very few studies evaluate the longer-term effects of road safety media campaigns, most likely due to methodological difficulties such as separating the effects of the campaign from other factors. One of the reviewed studies examined crashes over a six year period but found only shortlived effects confined to the duration of the campaign [34].

Tay [45] maintains that the perfect evaluation of countermeasures does not exist so it is important that road safety interventions not only be evaluated but re-evaluated by different analysts using different outcome measures and evaluation methodologies. His comments were made following multiple analyses of data examining the effect of the New Zealand media campaign against drink driving, which resulted in different conclusions [28]. While conducting multiple scientific evaluations is certainly desirable, it must be acknowledged that it is a difficult and costly process.

To improve our understanding and knowledge of what factors increase the effectiveness of road safety campaigns, more scientific campaign evaluations using appropriate objective behavioural measures and sound methodological design (i.e. use control groups and before and after measures) are needed. However, for the most part, it is likely that there will only be weak evidence about the effectiveness of media campaigns (i.e. how much to spend, what media to use, campaign message, appeal and content etc.) for some time.

So how might decisions be made about campaigns now, and what should be done to improve the decisions about campaigns in the future? If examining changes in the number of crashes is unlikely to provide any strong evidence due to the strong variability in crashes, more evaluations need to be based on before and after comparison of behaviours or variables that can be objectively observed and occur reasonably frequently. The behaviour needs to be closely linked to safety, and this link needs support from some credible theory in order that a safety change can confidently be inferred from a behaviour change. The improved understanding of risk factors such as speed and alcohol provides some optimism for this approach.

The way in which campaigns are approved and funded often means that there is little time or inadequate resources for baseline measurements of the safety-related behaviour to take place. Consequently, there is a need for ongoing programs measuring the frequencies of important safety related variables and behaviours such as blood alcohol concentration, speed and the use of restraints.

Conclusion

The research literature reviewed in this paper identified a number of general principles that might be used to enhance the effectiveness of road safety mass media campaigns. While campaign designers appear to be increasingly adhering to these principles, an analysis of road safety mass media campaign evaluations published during the last decade revealed that there is still much room for improvement.

Conducting an evaluation of a mass media campaign is costly but its importance should not be undervalued. Consistent with previous reviews, few mass media campaigns were subjected to thorough scientific evaluation with evaluations typically based on audience responses rather than outcome measures that directly related to the behaviour of interest. The ideal evaluation methodology is not always feasible or practical but, where possible, it should be based on before and after comparisons of behaviours or variables that can be objectively observed and are closely linked to safety. Systematic ongoing measurements of safety-related behaviours (e.g. speed) would allow baseline measures to be easily obtained before campaigns are implemented. The inclusion of more detail about the campaign content, approach and intensity in campaign evaluations would also greatly assist campaign developers in understanding what works and does not work.

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Appendix

Table 1. Descriptions of evaluations of road safety mass media campaigns published from 2001 to 2009

Reference, location	Target behaviour and approach	Target audience	Campaign message or slogan	Campaign duration, intensity and media	Other supporting activities	Evaluation method (*N*)	Outcome	Scientific evidence
Solomon et al, (2009) United States	Enforcing seatbelt use at night time	Young males 18-34 yrs	Enforcement centred message tailored to individual county and national 'Click it or ticket'	TV and radio ads in week prior to and during enforcement for each of 4 waves. Intensity varied by region and wave. National campaign used during Wave 2.	Media supporting high visibility enforcement. Some earned media.	Pre and post test surveys around each of 4 campaign waves in 3 counties, 2 control counties N= approx 400 each survey	Awareness and perception of enforcement surveys. Largest increases in campaign awareness during Wave 1 and 2. Perceived risk of ticket did not increase.	Observational seatbelt surveys. Significant increases in seat belt use at night observed in two counties using checkpoint style enforcement supported by publicity.
Angle et al, (2009) United Kingdom	Speed- Long-term personal, emotional consequences of speeding for driver. Focus on 30mph speed limit. Motorcycles-Drivers look out and motorcyclists be aware	Speed - all drivers. Motorcycles – car drivers, urban and leisure motorcyclists	THINK! brand Speed campaign 'Kill your speed or live with it'. Slogan 'It's 30 for a reason'. Motorcycles: How close? 'Take longer to look for bikes'	Speed – Feb-March 2009. TV (500 TVRs), radio, cinema, posters, YouTube. Motorcycles- March 2009 but long running campaign. TV, radio, on-line.	Speed –unknown Motorcycles – Think! Motorcycle Academy, sponsorship of British Superbikes championship	Pre and post surveys based on personal interviews. N=approx 2000, 65% drivers)	Awareness and attitudes. Attitudes towards speeding did not change significantly. Speed TV ad – 20% recall Motorcycle ad has now reached saturation point with impact now in decline.	None
Angle et al, (2008) United Kingdom	Increasing awareness of personal consequences of drink driving when get caught (i.e. lose licence and job)	Males 17-29 yrs	THINK! brand Campaign 'Personal consequences' TV/cinema ad - Moment of doubt. 'Don't drink and drive'.	Three bursts in Summer 2007, Christmas 2007 (247 TVRs) Summer 2008 (347 TVRs) Third burst: TV- 4 weeks Cinema-2 weeks Radio-3 weeks	Partnership marketing campaign Ambient advertising in pubs	Pre and three post test surveys based on personal interviews. N=approx 2000	Awareness and attitudes. 94% of target group aware of campaign. TV ads- 65% recognition for males 16-34yrs (Christmas 2007), 88% recognition for males 16-34yrs (Summer 2008). 60% thought caught by police if drink driving. No comparison with pre level.	None
Watsford (2008) NSW, Australia	Create social disapproval of speeding	Males 17-25 yrs	'Speeding. No one thinks big of you.' (Pinkie campaign)	One TV ad. Duration and intensity unknown.	Unknown	Tracking survey – Pre-test/post-test N = u/k	Awareness and intentions: 97% awareness in target group, 95% awareness in community. 78% self report 'will encourage them to obey speed limit'. Simple comparison of NSW road fatalities in 2006/07 to 2007/08. Reductions in speed (32%), young driver (30%) and speeding young driver (45%) fatalities but can not causally link to advertising.	None. Reductions in fatalities cannot be causally linked to advertising. No controlling for other factors.
Stead and Eadie (2007) Scotland	Reduce inappropriate and excessive speeding	General driving population.	'Foolsspeed' 1. 'Mirror'- attitudes 2. 'Friends and	Five year campaign. Four TV ads. 1. Spring 1999	None	Ten focus groups. N=u/k	Recall/awareness: Respondents identified with driving behaviours and consequences of	None

Table 1. Continued

	based on the Theory of Planned Behaviour. Realistic approach.	Sub-group of known speeders: males aged 25-44 yrs in urban areas.	family'- subjective norms 3. 'Simon says' – perceived behavioural control 4. 'Doppelganger' - affective beliefs	2. Spring 2000 3. Summer 2001 4. Winter 2004, Autumn 2005. Other publicity materials. Intensity unknown			speeding. Realistic advertising might encourage deeper self-reflection but more dramatic ads were more engaging. Suggestive that ads need to show dramatic but credible consequences to get emotional responses that make people reflect meaningfully on their driving behaviour.	
D'Elia et al (2007) Victoria, Australia	Speeding (low level) – Small reductions in speed can reduce crash risk. Also informing that speed enforcement has increased.	General driving population	'Wipe off 5'.	Whole package: Dec 2000-July 2002. Advertising: Aug 2001–July 2002. 6 TV ads supported by radio and billboard. Also had 'Wipe off 5 week', merchandise and promotion at AFL game.	Speed-related package -Use of covert operations -Increase in speed camera hours -Lowering of speed detection threshold -50km/h speed limit introduced -Restructure of speeding penalties	Time trend analysis through statistical regression modeling.	Telephone surveys of awareness and attitudes. Some positive responses (e.g. believe more chance of being caught speeding).	Attempted but inconclusive. Crash reductions reported for whole package but can not isolate advertising effects.
Whittam et al (2006) United States	Highlight the consequences of risky driving.	Young drivers aged 16-19 yrs	'What's the hurry?'	4.5 mth campaign. Two TV, ads, two radio ads and 16 billboards. Frequency ads played: TV – 4332 times Radio – 1080 times	None	Longitudinal (6yr) time series analysis including a nonequivalent control group.	Telephone surveys of awareness and recall. (N=661) 98% recall by target group. 20% of parents of 14-15 yrs reported talking about ads with kids.	22% decrease in at-fault crashes for drivers 16-19yrs during the campaign. Short-term effects that only lasted as long as the campaign.
Scottish Executive Social Research (24) Scotland	Increase awareness of young driver vulnerability on the road	Novice young drivers	Young driver campaign	Two week campaign. One radio ad, 180 outdoor posters, 30 ads on buses.	None	12 focus groups	Recall and reaction to campaign. Three months after campaign, half recalled poster when prompted, none recalled bus ads. Gender differences and variations in driving ability affected message absorption; most effective among females and learner drivers. Reasons for male disinterest: female character, depiction of mild injuries and not linked to cause of crash, lack of activities they could relate to and authoritarian tone.	None
Mruk (2004) Scotland	Drink driving – Highlighting likelihood of being caught.	Young males aged 17-29 yrs	'Don't risk it'	Christmas holiday period to Feb. Radio, TV features, posters, urinal stickers. Intensity unknown.	Usual enforcement.	14 focus groups, 10 in-depth interviews.	Recall, awareness and understanding. Messages highlighting financial/lifestyle consequences (i.e. lose licence) are most likely to influence behaviour. Loss of life or injury is emotive but not useful in preventing drink driving.	None

Table 1. Continued

Milano et al (2004) United States	Increasing restraint use using enforcement-related messages.	Males aged 18-34 yrs	'Operation ABC' (always buckle children) with message 'Click it or ticket'.	Media (TV, radio, print) preceded enforcement by 1-2 wks, continued for 1-2 wks into 2-3 wk enforcement period.	National mobilisations including intensified enforcement and some earned and public service media.	Telephone surveys – pre (n=600) and post media (n=800)	Awareness and perceptions. Evidence that message reached the target group. Advertising over consecutive years had higher recall and perceptions of police enforcement than advertising over one year.	None
Ormston (2003) Scotland	Drug driving – Increasing awareness of drug testing (uses humour)	Young drivers aged 17-24 yrs	'Now who's laughing?'	One TV ad. Duration and intensity unknown.	None	Telephone survey (N=730), peer focus groups	Awareness and understanding. The ad was seen as informative but there were doubts about the credibility of the enforcement message. Young drivers had problems identifying with the characters. Lack of info about legal consequences.	None
Cameron et al. (2003) Victoria, Australia	Speeding – Emotive and enforcement style	General driving population	Varied	Campaign 1996 to 2000. TV ads June 1999 (270 TARPS) and Nov 1999 (340 TARPS). See report for further details.	Increases and decreases (one month) in speed camera enforcement.	Telephone surveys (N=1115 over 5 waves) Poisson regression modeling and logistic regression	Perceptions and behavioural intentions. Some evidence that publicity increased risk of detection but did not change speeding behavioural intentions. Inconclusive findings regarding effect of interaction between enforcement and publicity, most likely because drivers did not notice changes in enforcement (covert in nature).	No interaction between effects of speed enforcement and publicity on crashes, possibly due to short period (1mth) of change in enforcement. High publicity awareness (500 Adstock units) associated with 12% reduction in crashes but not crash severity
Guria and Leung (2002) New Zealand	Change bad driving attitudes and behaviours. Emotion and shock approach	All road users	Unknown	Five year campaign. Intensity and media used are unknown.	Part of supplementary road safety package that also included more risk-targeted enforcement (i.e. speeding, drink driving, seatbelts)	Principle component regressions. Ten year annual models.	None.	Attempted but inconclusive. Over the five years, estimated savings of 285 to 360 fatalities but individual effects of advertising and enforcement could not be separated.
Tay (2002) New Zealand	Change attitudes and behaviours toward drink driving using fear-based approach (graphic crash scenes).	Young male drivers aged 18-25 yrs who consume alcohol	Unknown	Four year campaign. Intensity and media used are unknown.	Campaign supplemented police enforcement.	Questionnaire after four year campaign (N=201)	Attitudes and behavioural intentions Significant increase in perceived risk of fatal/injury crash and decrease in intention to drink drive. Campaign did not have a stronger impact on target audience relative to non-target audience. However, little change in perceived risk of apprehension, most likely because campaign focused on fear of injury.	None.

TARP = Target Audience Rating Points, TVR = Television rating. A term used for assessing the audience to an advertisement. If a TV advertisement is watched by 10% of the target audience it achieves 10 TARPs or 10 TVRs.

The impact of threat appeal messages on risky driving intentions: A Terror Management Theory perspective

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Abstract

This paper considers the impact of exposure to road safety threat appeals on intention to take driving risks among young male drivers. In particular, attention is given to the potential for driving-related self-esteem and the personality variable of impulsiveness to moderate this impact. The paper describes an experiment in which participants were exposed to mortality salient or neutral facts. The dependent variable was self-reported intention to take driving risks. Participants (n=80) were male university students with a full driver's licence. Participants with high driving-related self-esteem, who were exposed to death-related facts and images, reported greater intentions to take driving risks than those exposed to neutral information. Impulsiveness was identified as a significant contributor to risky driving intentions. Though limited in its ecological validity, the study presents an opportunity to reconsider our understanding of resilience to driving-related health promotion campaigns.

Keywords

Risky driving, Self-esteem, Terror Management Theory, Threat appeal

Introduction

Young male drivers are over-represented in road traffic accident statistics, with evidence indicating that young males are more frequently involved in road traffic accidents than any other age group [1]. The source of these statistics lies not just in fast and reckless driving. In parts of the Republic of Ireland and United Kingdom youth car-cultures exist, with high-risk driving often playing a large role in these cultures. It is no surprise, then, that road safety and law enforcement agencies pay specific attention to this high-risk group and, working with academic institutions, are attempting to develop a more sophisticated understanding of the psychological factors implicated in risky driving.

Current efforts to address road safety concerns in the Republic of Ireland include driver education, training and testing, legislation to restrict the extent to which vehicles can be modified, as well as television and radio-based campaigns aimed at deterring people from reckless driving. It is the latter, road safety advertising campaigns, that is of primary interest here, and in particular the use of mortality salient 'threat appeals' that convey the message that 'dangerous driving kills'. 'Threat appeals' are often employed as a deterrent strategy in these campaigns. Though often referred to as 'fear appeals', 'threat' is thought to be the more appropriate term, allowing for a wider study of mediating emotions and cognitive responses [2,3]. Through presenting the viewer with the reality of the negative consequences that might occur as a result of engaging in dangerous driving, threat-based campaigns are thought to motivate avoidance of such behaviour [4].

However, the efficacy of these threat appeals in moderating driving behaviour is unclear, with mixed results reported [3]. One potential explanation of these inconsistencies is that some individuals perceive risky driving as an important aspect of their self-esteem [5], and that exposure to threat appeals can elicit defensive responses in these individuals, which are manifest as an increased willingness to take driving risks (e.g. [6-9]). One theoretical framework which attempts to account for these defensive responses, and which assigns a central role for self-esteem, is Terror Management Theory [10].

Terror Management Theory

Terror Management Theory (TMT) proposes that the fundamental source of our anguish and distress in life stems from our fear of death, and that our ultimate motive in life is to manage this fear [10]. According to TMT, when individuals are reminded of their vulnerability to death, their immediate coping mechanism (proximal defence) is to deny this vulnerability by ignoring the threat, suppressing it, or using logic-based cognitive distortions to exaggerate their immunity from death [11]. When confronted with a threat appeal claiming that eating fast food can lead to coronary heart disease, for instance, a person may use the proximal defence that 'I am young, so it won't happen to me'.

After this initial response, mortality salient thoughts may pass beyond conscious awareness, but may still linger on a sub-conscious level. According to TMT proponents, the individual copes with sub-conscious mortality salience by bolstering two core psychological structures – cultural worldview and self-esteem. On the former, the individual may respond by more firmly embracing the values of his/her society (cultural worldview) as this makes him/her feel connected to others, and thus safer, in the face of the threat of death. On the latter, the individual may bolster his/her self-esteem because in doing so, he/she can deny vulnerability to death and thus avoid fear-derived anxiety [11-13].

The complexity for health-promotion professionals, and of key relevance to the current study, is that the bolstering of self-esteem can take the form of engaging in risky behaviours that are linked to self-esteem. Theoretically, then, exposure to threat-based road safety campaigns could lead those with 'self-esteem linked to driving' (driving-related self-esteem), to respond with more extreme driving. A number of recent studies have attested to this, with findings of increased binge drinking [14], increased fitness intentions [15] and increased intentions to drive dangerously [6], following exposure to mortality salient information. In a recent study conducted in the UK, Jessop et al. found that participants who had been exposed to the mortality related risks of driving reported greater intentions to take driving risks than those exposed to neutral information, provided this behaviour was perceived to be relevant for their self-esteem [6]. This effect did not hold true for female drivers, findings consistent with a study by Taubman Ben-Ari and Findler [16].

TMT, personality and risk-taking behaviour

Personality variables have been linked both to responses to mortality salience [17] as well as to propensity towards risk-taking behaviour [18]. Greenberg and colleagues highlight the potential for situational and personality variables to influence an individual's judgements and responses to a mortality salient threat [17]. Their study found that individuals who are high in the trait of authoritarianism are more likely to use defensive mechanisms as a response to mortality salience. Further research into TMT and personality has found evidence of an interaction between mortality salience and sensation seeking [19], attachment style [8, 20], as well as an exacerbating role of mortality salience on phobic and compulsive behaviours [21].

Personality has been found to be a significant moderator of risk-taking behaviours such as dangerous driving [18, 22]. In a study by Zuckerman and Kuhlman, generalised risk taking was related to scales for impulsive sensation seeking, aggression and sociability, but not to scales for neuroticism or activity [18]. A study by Dahlen et al. examined the factors involved in unsafe driving, and found impulsiveness to contribute significantly to the prediction of aggressive and risky driving [22].

Impulsiveness is concerned with an individual's control over their thoughts and behaviours [23], and is associated with a lack of planning and decision making [24]. It has been linked to risk taking, as well as to angry and aggressive driving [25] and driving under the influence of cannabis [26]. A study by Owsley, McGwin and McNeal found that participants who reported having previous driving violations were more likely to score highly on impulsiveness [27]. While links between personality variables and risk taking have been well documented, they have not been widely explored within a TMT framework.

The current study

Following the research of Taubman Ben-Ari et al and Jessop et al. [6, 7], the current study explored the effect of viewing death-related facts and graphic, static images of road traffic accidents on participants' self-reported intentions to take driving risks. Further, it examined the extent to which personality variables may further explain variations in intended risk taking.

The current research explored one core hypothesis: that the mean level of reported intention to take driving risks after exposure will be greater in the group exposed to mortality salient information than in the group exposed to neutral facts, but that this finding will be superseded by an interaction effect between condition (mortality salient/control) and driving-related self-esteem, where only those with high-driving-related self-esteem will show an increase in intended risky driving behaviour. No hypothesis was proffered in relation to personality.

Method

Participants

A total of 80 drivers took part in this study. All participants were male university students in the Republic of Ireland between 17 and 24 years of age (M = 21.33, SD = 1.64) and all were in possession of a full driver's licence.

Measures

Driving as Relevant to Self-esteem (DRS) scale. Participants completed a self-report scale which assessed the relevance of driving for their self-esteem [7]. This scale contained 15 items, seven of which probed potential positive implications of driving for an individual's self-esteem (e.g. 'driving allows me to feel valued by others') and eight of which probed negative implications of driving (e.g. 'driving hurts my social relationships'). Participants rated the extent to which they agreed with these 15 statements by responding on a seven point scale, ranging from 1 (not at all) to 7 (very much). The 15 items were then averaged (with negative items being reverse coded) to create a mean DRS score for each participant. This scale had acceptable internal reliability (α = .72); however when item 5 was removed from the analysis, this figure increased to .75. Item 5 ('driving allows others to derogate [insult, humiliate] me') was therefore omitted from the analysis. Higher scores reflected higher perceptions of driving having positive implications for self-esteem.

Mortality salience manipulation. Participants in the experimental (mortality salient) condition were asked to read five facts about driving which were accompanied by three images of road traffic accidents. The facts were obtained from Irish Road Safety Authority (RSA) data and referred to mortality-related risks of driving which are relevant to young male drivers (e.g. 'For every km driven, a 17 year old male is 8 times more likely to be involved in a crash than a middle aged man'). These facts and images were followed by the warning 'dangerous driving kills'. Participants in the control condition were asked to read five neutral facts about driving which were unrelated to risks, crashes or deaths (e.g. 'The total number of licensed vehicles at 31st December 2008 was 2,497,568').

Distracter task. Research has tended to suggest that distal TMT defence responses occur after a delay or a distraction [12]. Participants were therefore asked to engage in a word-search activity for 3-4 minutes following the mortality salience manipulation. The words used in this word-search were neutral and unrelated to death.

Manipulation check. Participants were asked to complete a word fragment completion task to assess death-thought accessibility [28-30]. Twenty-two words were used in this task. Eight of these could potentially be completed to make either a death related word, or another word unrelated to death (e.g. COFF_ _ could be completed to make either coffin or coffee; KI _ _ ED could be completed to make killed or kissed; CO_ _ SE could be completed to make corpse or course etc). Scores between 0 and 8 were then calculated for each participant and compared across experimental conditions.

Eysenck IVE questionnaire. Participants were asked to complete the IVE questionnaire [31], a scale designed to measure impulsiveness, venturesomeness and empathy. Impulsiveness is a core personality trait which has been found to relate to driving behaviour and road safety [32-34]. This questionnaire consisted of 54 items which required Yes/No answers.

Intentions to take Driving Risks scale (IDR). Upon completing all of the above, participants were asked to complete a self-report scale measuring their risky driving intentions [IDR; [7]]. They were asked to read ten scenarios, each of which described a situation in which the individual might be tempted to take a particular type of driving risk. These scenarios were based on a study by Taubman Ben-Ari et al. [7] but adjusted in terminology so as to reflect Irish culture. For each scenario, participants were asked to indicate the percentage chance that they would perform the action described. They responded on an 11 point scale which ranged from 1 = 0% chance to 11 = 100% chance. A mean IDR score was the calculated for each participant, where higher scores indicated higher intentions to take driving-related risks.

Procedure

Participants were recruited opportunistically on a university campus and questionnaires were administered in groups. They were randomly allocated to either the mortality salient (N = 40) or the control (N = 40) condition. The researcher informed all participants that the study examined a number of influences on driving style, including personality, that participation was voluntary and that all responses would remain anonymous. The researcher emphasised that the materials were to be completed in the order presented.

Results

As a manipulation check, a one-way ANOVA was carried out to determine whether there was significant difference in death-thought accessibility between participants who were exposed to death-related facts about driving (mortality salient condition) and those who were exposed to neutral driving facts (control condition). The ANOVA revealed that participants in the mortality salient condition completed more word fragments to make death-related words (M = 3.88, SD = 1.09) than those in the control condition (M = 2.65, SD = 1.00), F (1, 79) = 27.39, p < .001, η^2 = .26.

The results of a bivariate correlation matrix (see Table 1) revealed that impulsiveness correlated significantly with intention to take driving risks (r = .27, p <.01). A hierarchical multiple regression analysis was then conducted to explore this correlation further and to determine whether condition, DRS, or their interaction influenced risky driving intentions (see Table 2). Participants' DRS scores were mean centred to reduce the potential for multicollinearity. Regression was favoured over a 2x2 ANCOVA as the latter would have required splitting DRS to form two groups which can occlude effects and statistical power [35].

Table 1. Bivariate correlation matrix of variables predicting intentions to take driving risks

	1	2	3	4	5	6
1 IDR Average	1.00					
2 Condition	-0.47**	1.00				
3. DRS Average	-0.07	-0.15	1.00			
4. Impulsiveness	0.27*	-0.12	-0.06	1.00		
5. Venturesomeness	0.15	-0.14	0.13	0.19	1.00	
6. Empathy	0.06	-0.08	-0.04	0.01	-0.07	1.00

*p<.01, two-tailed, **p<.001, two tailed

Impulsiveness was entered in the first block, followed by condition (re-coded with the experimental condition allocated a value of -1 and the control condition allocated a value of 1) and DRS (mean centred) in the second block. The interaction between condition and DRS (centred) was entered in the third block. The criterion variable was participants' mean IDR score. No strong relationships were observed between the predictor variables with inter-predictor correlations < .9. VIF values (<10) and tolerance values (>.1) for all predictor variables were adequate, suggesting that multicollinearity was not present.

In Block 1, impulsiveness was a statistically significant predictor of IDR (ß = .28, p = .01), with higher impulsiveness associated with greater intention to take driving risks. Overall this predictor accounted for 8% of the variance in intention to take driving risks (R^2 = .08, $R^{\wedge 2}$ = .07, F (1, 78) = 6.48, p = .01). The addition of condition and DRS in Block 2 significantly improved on the model (R^2 Change = .21, p < .001), and both impulsiveness (ß = .22, p = .03) and condition (ß = -.46, p <.001) were significant contributors to the model but DRS was not. Examination of the descriptive statistics would suggest that those exposed to mortality salient information reported greater intentions to take driving risks than those exposed to neutral facts. Overall the model emerging from Block 2 was statistically significant, explaining 28 % of the variation in IDR (R^2 = .28, $R^{\wedge 2}$ = .26, F (2, 76) = 10.97, p < .001).

Table 2. Hierarchical multiple regression predicting intention to take driving risks

	β	*SE*	*p*.	ΔR^2
Block 1				0.08*
Impulsiveness	0.28	0.05	0.01*	
Block 2				0.21**
Impulsiveness	0.22	0.05	0.03*	
DRS	-0.12	0.18	0.23	
Condition	-0.46	0.15	0.00**	
Block 3				0.00
Impulsiveness	0.22	0.05	0.03	
DRS	-0.12	0.19	0.25	
Condition	-0.46	0.15	0.00**	
DRS*Condition	-0.02	0.19	0.83	
Total R^2				**0.28****

Note: **p*<.05. ***p*<.001. DRS was mean centred. β= Standardised Beta Coefficient. Model 1 adjusted R^2 = .07, Model 2 adjusted R^2 = .26, Model 3 adjusted R^2 = .25.

Finally, the inclusion of the interaction term (condition x DRS) in Block 3 of the regression did not significantly improve on the model. In this final model, impulsiveness (ß = .22, p = .03), and condition (ß = -.46, p < .001) remained statistically significant, and the magnitude of the standardised beta coefficients suggests that condition was a stronger contributor to the overall model (Total R^2 = .28, $R\hat{}^2$ = .25, F (1, 75) = .05, p < .001). Given the non-significant interaction between condition and DRS, the hypothesis that the TMT anxiety-buffer effect (increased risk taking) would only be evident among those with high driving- related self-esteem is rejected. In this sample, there was a main effect for exposure, such that exposure to mortality salient threat appeals was associated with greater intention to take driving risks, regardless of driving-related self-esteem. This finding is considered in more detail below.

Discussion

In the current study, participants exposed to death-related facts and images reported increased intentions to take driving risks, providing partial support for the main hypothesis. If we are to accept TMT logic, the findings of the current study can be explained in the following way: reminding a person of his/her mortality initiates the onset of TMT defence mechanisms. These mechanisms, in turn, precipitate increased efforts to enhance self-esteem. Such efforts are evident in behaviours that serve to increase self-esteem, irrespective of whether these behaviours are dangerous or potentially life threatening. The authors found no significant interaction between DRS and condition. This seems to contradict TMT, which posits that increased risky driving intentions will only occur among participants who perceive this behaviour to be beneficial for their self-esteem. This suggests that, perhaps, it is not TMT defence mechanisms which are responsible for the findings. However, the authors believe that the non- significant finding for driving-related self-esteem is due to very high levels of driving-related self-esteem in this sample. The potential range for this measure was 0-7. The lowest reported DRS score in this study (2.6) was higher than the median score reported for the same scale in the original paper (i.e.1.92 [7]). In essence, the issue here is two-fold. First, the mean DRS score was high compared with previous studies. Second, driving-related self-esteem scores in the sample were negatively skewed, and tightly clustered towards the high end of the spectrum, which may point to the need for a more sensitive response format for the scale. These very high levels of driving-related self-esteem mean that it was not possible to test the impact of self-esteem on intention to take driving risks. The authors ended up with a homogenous sample of individuals with high driving-related self-esteem, with this population in general responding with greater intentions to take driving risks having been exposed to the mortality salient information. This leads to the main effect for condition.

A second aim of the research was to explore the potential for personality dimensions to further explain variation in driving behaviour. The present study assessed three core personality traits using Eysenck's IVE questionnaire. The IVE was selected for this study since previous research has identified impulsiveness as a significant predictor of dangerous driving and other forms of risk taking [36, 37]. An initial bivariate correlation matrix revealed a significant correlation between impulsiveness and risky driving intentions. A regression analysis was then performed to examine the amount of variance explained by impulsiveness. Consistent with previous research [38], it was found to be a significant predictor of participants' intentions to take driving risks.

Impulsiveness is characterised by behavioural disinhibition. In studies examining risk-taking behaviours such as reckless driving, drug and alcohol use and smoking, impulsiveness is often considered as an explanatory variable [39]. This connection between impulsiveness and risk taking may be due to the fact that impulsive individuals can behave in an unplanned and unpredictable manner in order to satisfy a desired outcome [40]. The results of a recent meta-analysis into sex differences in impulsiveness suggest that women tend to be more sensitive to the negative consequences of risk-taking behaviours than men, leading them to engage in fewer risky activities. Cross et al. [39] go on to point out that the exploration of behaviours that are both impulsive *and* risky is critical, in that it is this form of risk taking that is likely to underlie criminal behaviour.

Recent research has begun to view impulsiveness as a multidimensional construct, encompassing a cluster of traits including sensation seeking, risk taking, novelty seeking, boldness, adventuresomeness, boredom susceptibility, unreliability, and unorderliness [41]. In a paper by Whiteside and Lynam, the multi-faceted nature of impulsiveness is explored, and four separate psychological processes relating to

impulsiveness are identified: urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking [42]. Considering impulsiveness as an umbrella term for a number of distinct, but related, constructs will better guide future research in the area of risk taking behaviour.

The findings of the present study support the assertion that threat appeals may not work for some young male drivers, but attention is drawn to the following aspects of the literature in this area. First, there are discordant findings in the literature, and given the tendency for non-significant studies to be infrequently published, non-significant findings may be under-represented in the TMT literature, and thus effect sizes may be artificially inflated. The available literature may, to some extent, be artificially supporting TMT.

Second, there is a problem in terms of the ecological validity of outcomes. The current study assessed risky driving intentions using self-report measures. While previous studies have found that self-report driving intentions correspond well to actual driving behaviour [34], there are unmistakable drawbacks to using this type of scale. Other studies have assessed driver behaviour using the Video Speed Test [43] or driving simulators [7]. Such outcome variables are also not without limitations. The gold standard in driver behaviour research is the use of in-vehicle devices installed in the participants' own cars (e.g. see [44]), which until now has been prohibitively expensive. However, with GPS now standard on many mobile phones, and many applications offering car monitoring, this may become the trend for future research (e.g. see [45]). Ecological validity and psychological realism could be further increased by incorporating actual road safety advertising campaigns into experimental psychological experiments (e.g. see [46]).

Third, the role of 'personality' in risky driving needs to be better understood. General personality domains (e.g. impulsiveness) should be disentangled into sub-facets of the dimension. Loo suggests that personality research should use, where possible, subscale scores derived from primary personality dimensions [47]. He argues that researchers may obtain more reliable correlations by breaking down overall scores into its various components. Specifically, his study examined the roles of three dimensions of extroversion (impulsivity, sensation seeking and decision time) in relation to driver behaviour, and found that impulsivity carried the relationships with all three driving-related measures [47].

Overall, the present research suggests that, among a sub-group of drivers, exposure to threat-based messages about dangerous driving may result in maladaptive behavioural intentions. This has important practical implications. While there is still a pervasive belief that fear is the most effective deterrent, there are many who maintain that threat appeals simply do not work [48]. The findings of the current study support this position, but should be considered in the context of the study limitations noted earlier.

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Dangerous safety: Extreme articulations in car advertising and implications for safety campaigns

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Abstract

The paper presents focus group discussions of two popular SUV television advertisements which emphasised fun and extreme sports, through off-road scenes. Safety was a perceived message of the ads and varying degrees of consideration were given by participants to the implications for on-road driving of the association with extreme sports. There was little awareness or discussion of the possible impact of particular driving styles shown in the ads on safety in complex traffic situations, even though the ads had clear implications for on-road driving. The responses to the ads represent social and cultural rather than purely individual views of driving practices and resonate with the intention of the advertisers showing the diversity of identifications with cars. Campaigns need to address these themes through a holistic perspective emphasising the good of society as opposed to manufacturers' desires to increase sales by appealing to and reinforcing expectations of greater speed, power and performance.

Introduction

The social and cultural context within which young people learn to drive is an important influence on how driving is taken up and practised [1]. The media is a significant formative agent in western societies and as part of the promotion of consumer discourse and desires and wants, helps to shape the expectations and needs related to cars. The media helps to 'frame' our experiences of driving, gender, age and so on [2, 3]. The desire for increased speed is constantly cultivated by manufacturers through advertising [4, 5].

The approach taken in this paper is that driving is a socially mediated practice and the framing of cars and driving is largely a social activity. The system of automobility is possible through extensive social involvement in the production of motor vehicles, roads and traffic regulation [6]. Cars are not meaningless objects but are articulated in that they have specific meanings inscribed in them often specifically related to the type of vehicle [7, 8]. In addition, it has been argued that there are dominant articulations that determine the meanings attached to cars in general [9]. Sports cars are often associated with young males and popularly signify virility. Sports cars are also strongly associated with particular styles of driving and have been found to be more involved in crashes than other types of vehicles [10].

Some of the norms impacting on young drivers in particular are not primarily related to safety but are concerned with promoting image, lifestyle and mobility [1]. Norms derived from their own social context and cultural demands connect with the messages and meanings conveyed in media portrayals of driving practices and are brought together in young people's approaches to cars and the driving styles they adopt. The meanings inscribed in cars need to be part of the analysis of driver behaviour. A study of vehicle types and driver risk taking found that the 'higher aggressivity' of truck based Sports Utility Vehicles (SUVs) and pickups makes their combined risk higher than that of almost all other cars with the exception of sports cars [10]. Therefore media portrayals that make such vehicles more attractive to consumers may have a negative impact on-road safety.

The relationship between risk-glorifying media exposure and risk-taking thoughts, feelings and behaviours has been studied quite extensively as demonstrated in a meta-analysis by Fischer et al. [11]. They found a positive connection across different research methodologies (correlational, longitudinal and experimental) between exposure to 'risk-glorifying media content and subsequent risk-taking inclinations and behaviors' (p.382). Risk taking behaviours are a major cause of childhood and adolescent injuries so that media glorification of risk taking will most likely have most impact on this group. Participation in extreme sports (which is relevant to the research reported below) has been considered as a major public concern and is increasingly the subject of scientific research along with other risk-taking behaviours such as binge drinking, smoking, unprotected sex and reckless driving [11, 12].

Power and safety appeals in automobile advertising were investigated as long ago as 1981 [13]. It was popularly believed that safety did not sell and similar views appear to hold today. Although there are more complex ways in which the safety aspect can be appropriated in advertising, power appeals are clearly still evident. Cossé and Swan investigated the impact of public policy on auto advertising and concluded that safety did receive some additional attention that coincided with public policy. The association of driving with sports in car advertising has also been around for some time [14].

In one of the first analyses of meaningful themes in car advertising, Bristow [15], in a study in the UK of television advertising for cars, found that the most important themes were quality, and drive and handling - that is, performance and power. Performance relates to the speed and handling of the car, and is expressed in advertising in a range of creative ways, many of which emphasise an aggressive competitiveness. Bristow notes that advertising is selling more than a mode of transport. It emphasises image, appeals to aspirations for the best, boasts improved quality of life, and being envied by others. The

wording in some advertisements was noted for its suggestion of speed and power as exciting. Other content analyses of car advertising have since shown that themes antagonistic to safety are prevalent in advertising [16-18].

One of these content analyses was conducted in Australia in 2005 [16]. As it was focused on content analysis after the introduction of the voluntary code of practice in 2002, it did not include impact on driver perceptions. The study reported in this paper was a qualitative study aimed at identifying the way that these ads framed car use in relation to risk taking using more recent ads.

Method

This paper reports on a study of young people's associations and responses to television car advertising. Nine focus groups were held with 60 young people aged 18-25 years in various locations in New South Wales, including inner Sydney, Western Sydney and the Bathurst region. Young people were drawn from youth groups and through Road Safety Officers who worked for local councils in the regions. There were even numbers of male and female participants. One focus group (group F) was all male and one was all female (group B), both in Western Sydney. The remainder were mixed gender groups. These will be known in what follows as the R1 and R2 groups (inner city), the B1 and B2 groups (country), the Mu group (urban), the M group (country) and the U group (urban).

Ads were shown in the focus groups on a laptop computer and then questions were used as prompts to encourage discussion, such as 'what did you think of that ad?', 'who do you think the ad is aimed at?' and 'what sort of driving does it suggest?' The ads selected were intended to cover a range of vehicle types and advertising styles and to appeal to different age groups. They were all graphic depictions in that they showed the vehicles performing in some way, rather than in showrooms or offering special sales incentives. This paper reports results for two of the ads, specifically selected because of their use of associations with extreme sports.

Focus groups were tape recorded and transcribed verbatim. Following discourse analysis [19] transcripts were read through and major themes identified. Using NVivo software transcripts were systematically coded and further themes identified. The themes were discussed and finalised by three researchers. Text from transcripts was captured within different themes and subthemes. One of the major themes was 'driving style' and subthemes were identified within it. The subthemes relating to the two ads to be discussed in this paper will be presented.

The focus group methodology was used to encourage discussion amongst participants where agreement and disagreement about the identified themes in the ads was possible so that varied responses could be expressed. There was diversity in the responses and discussion here is intended to reflect that diversity. The focus groups gave participants an opportunity to think about the ads in ways they may not do in daily life, and to build and comment on others' responses.

Advertising is often largely unquestioned, a part of the background of daily life that is not reflected upon even though it plays a significant part in cultivating and reinforcing particular meanings in our society:

> A media culture has emerged in which images, sounds and spectacles help produce the fabric of everyday life, dominating leisure time, shaping political views and social behaviour, and providing the materials out of which people forge their very identities. [3, p.1]

The meanings the ads are intending to connect with can be strongly suggestive of themes that are not conducive to road safety. The extent to which young people picked up on these meanings and were able to reflect on them was a central interest of the project. Young people in the focus groups would see the beginning of an ad and exclaim, 'I love this ad' and would raise other similar ads they liked. As viewers they are not passive recipients of the meanings in the ads but often engaged with them though not necessarily reflectively or critically. Advertising serves to create meanings and will often connect meanings by association. The ads to be discussed are good examples of such associations.

The two ads discussed in this paper are both for compact four wheel drive vehicles, or SUVs, that were advertised in a way that represented young people and associated the vehicle with extreme sports. Both were shown on Australian television in 2004. SUVs, generally referred to as 4WDs (four wheel drives), are a popular vehicle in Australia and appeal to a range of age groups. The focus group responses were varied and so as well as indicating that they could identify meanings that were problematic for road safety, the responses of young people to these ads indicated that the meanings transferred from extreme sports and related to off-road driving were being transferred to on-road driving.

> The ad for the Ford Escape shows five of the vehicles in different colours engaged in a game of soccer on the beach. The ball appears to bounce off the cars as they slide around in the sand. Both males and females are shown driving the cars and there appear to be a range of ages represented. The ad includes sporty, fast moving, fun, carefree, competitive, rough manoeuvres accompanied by road handling sounds, braking noises, male voices whistling, energised music and speeded up film. At the end of the ad a car 'hits' the ball out to sea in an illustration of tremendous power.
>
> The ad emphasised Ford's tagline at the time, 'no boundaries', often illustrated with a supernova explosion at the end of the ad suggestive of tremendous power. In this ad the voiceover states: 'With the power of the V6 Escape there are no boundaries'. The tagline 'We have ignition. No Boundaries' suggests anything is possible and draws on the power of a space rocket from which the well known line comes. The themes shown in Table 1 indicate that the central message of the ad relating tremendous power and fun with freedom was getting through.

Figure 1. Description of Ford Escape ad

The Nissan X-Trail 'extreme' advertisement showed various 'daggy' examples of sport such as ping pong and badminton, all conducted by people with unattractive haircuts, shown at unflattering angles, and accompanied by slow music. The music then became faster and up-tempo with images of snowboarding, dirt bike riding and white water kayaking, clearly identifying the car as fast, colourful and exciting. The male driver of the vehicle and a male passenger are visible at times as the car is pounded through creeks and over rocky terrain and dirt roads, throwing up dust and water in its wake. Speed is indicated in the fast-moving backgrounds and the potential for losing control shown in the sliding of the back of the vehicle as it turns, spraying dirt and sand. The voiceover running throughout the ad claims:

There are sports [croquet, badminton, elastic tennis] and there are extreme sports. Just like there are compact 4 wheel drives... and there's the Nissan Xtreme. An extreme all-mode 4WD system. An extreme interior and extreme power. The X-Trail. Only Nissan takes the compact 4WD to the extreme. Song: Just wait til you drive it! (Voiceover of ad for Nissan X-trail V6)

Figure 2. Description of Nissan X-Trail ad

The statements and discussion segments presented here are intended to convey the expressions and meanings presented by focus group participants. While quotes are selective they are shown in the context in which they were presented. Themes are presented as they were raised by participants so they may be contradictory or similar as they are not exclusive or systematic in their relationship to the ad.

Findings and Discussion

In the following, responses to the two ads are presented and discussed. The ads considered are television ads for the Ford Escape shown in six focus groups and the Nissan X-Trail shown in three focus groups. In both cases the vehicles being advertised were V6 models and both vehicles were shown in off-road situations, one on a beach and the other in various locations. Evaluation of the focus group discussions in this paper is focused on the identification of driving styles in the ads, and the implications of the ads for on-road driving.

Ford Escape

The ad is described in Figure 1 and themes from discussion of the Ford Escape ad are shown in Table 1. The all-male group F suggested the ad was recommending fun and playfulness and that the excitement of driving in a daring and risky, extreme way is carried over into everyday driving. One participant talked about driving home as 'driving hard', showing a clear connection to on-road driving and the kind of person who drives 'hard' as someone who takes risks and pushes the limits through fast cornering. At the same time, the vehicle is considered as being able to take the rough treatment.

Table 1. Identified themes - Ford Escape

Fun/Reckless	Buy this, you're going to have fun! You're going to play soccer, pick up chicks … (M2, Group F)
	And you won't flip it if you take corners too quick! (M3, Group F)
	It's fun to drive around recklessly! (F1, Group M)
	Go fast and do doughnuts! (M1, Group Mu)
	The idea of playing a game of soccer in the car sounds good. Being able to slide around. (M2, Group Mu)
Exciting driving	Exciting. Exciting driving. You feel that person, they drive hard even when they drive home. (M1, Group F)
Crazy driving	It's showing you can dodge through traffic, because it was going … (F1, Group R1)
	Crazy driving. (M1, Group R1)
	Yeah, I think it's crazy, yeah. Going in and out. I reckon the way it's doing that, I reckon it's in and out of traffic, like, you know? You can dodge traffic. (F2 Group R1)
No boundaries	And it's got no boundaries, so that means … (M1, Group M)
	Just do what you want. (M2, Group M)
	Try something different, you can go anywhere. And, once again, I've picked up on the slogan, 'We have ignition'. So, it means it can go fast. Powerful. (M1, Group M)
	A lot of freedom, kind of thing. Freedom and power seems to be a pretty big theme, for these ads. (F1, Group M)
Safety	F1: No, that one actually appealed to me because it shows the skill of the actual car, and it shows that the car is safe doing all these things. (Group Mu)
Escapism	It's definitely escapism. (F2, Group M)
Irresponsible	Irresponsible. (M1, Group Mu)
Dominance	F1: Fast
	F2: Off-road, 4WD, rough terrain, power.
	F1: Dominance.
	F2: Yeah, its dominant. That whole idea goes with the 4WD, like, they can do anything.
	F2: 'You can do anything!' Yeah.
	F1: 'It's fun.' 'Buy this car and you'll have fun in a 4WD!'
	F2: But it's safe, because none of them crashed! (laughter)
	All: Yeah! (Group U)

The R1 group immediately related the driving style to driving on the road and considered the ad as showing 'crazy' driving such as dodging in and out of traffic. The M group talked about the ad as portraying recklessness and unpacked its meaning, relating it to speed and power which one male connected directly to the tagline 'we have ignition'. Speed and power were then related to freedom and 'doing what you want' by one female though others in the group did not pick up on the connection.

There were males in the R2 group for whom the ad did not really show performance as it did not show speed. They did not consider the soccer game on the beach to be a very convincing indication of performance. This view reinforces the connection between power and speed often fundamental to car advertising [16].

The Mu group described the ad as showing irresponsible driving but one female saw it as strongly suggesting safety and another male identified with the appeal of 'sliding around'. The car appears to facilitate safe driving in situations that might demand quick turning, and this is connected to power. While the type of driving the ad suggested to them was considered 'irresponsible', there was not a lot of criticism of the theme.

The theme of 'dominance' is related to having fun in a four wheel drive with speed and power clearly part of the equation. 'You can do anything', like 'no boundaries', also mentioned in another group, has the implication of being outside the rules, careless and irresponsible, allowing the expression of a range of styles, even reckless driving, but it appears as an innocent expression of the freedom everyone has a right to and which is ultimately safe.

The ad suggested to these young people that the car was capable of quick turns and slides, and this was important to normal driving for some. Others considered the ad to be suggesting reckless, crazy driving. The association between being reckless, and fun and excitement was clear though there was not criticism of it.

Nissan X-Trail

The ad as described in Figure 2 draws on the tradition of rally driving associations [4] though the vehicle has no rally performance record. The emphasis is thus on extreme thrill and excitement attractive to young males who talked about trying out manoeuvres such as slides to hone their car handling skills. The ad involved the implication that the rally style of driving demonstrated in the ad in off-road, 'fun' situations could be transferred to the context of on-road driving. The vehicle was intended to be seen as a fun vehicle that could take the rough play, and the driver by implication as a cool, fun kind of person, prepared to take risks and push the vehicle and their driving to extremes. Themes are shown in Table 2.

Picking up on the tag line of the ad, the women in the B group regarded it as 'extreme' rather than reckless as if this did not imply anything dangerous. The extreme sport theme of pushing boundaries was recognised but it was considered harmless.

When asked to say what sort of on-road driving was being suggested in the ad some in the group referred to an aggressive, 'pushy' style of driving. The off-road extreme style was not a problem but when the theme of pushing the boundaries was transferred to on-road driving, some were a bit more inclined to see it as a 'pushy' style.

The extreme theme of the ad is a play not only on the name of the vehicle, 'X-Trail', it is also an appeal to pushing the boundaries and to being a certain kind of person who likes to push things to the extreme. The first response of the M group was to relate the extreme idea to being crazy and classing people as nerds or extremists. There was an immediate connection to on-road driving as extreme, involving fast and crazy driving to be cool. One of the males went on to consider the implications of the extreme sport idea as it related to the car. He highlighted the appeal to the risk-taking element evident in the identification with extreme sport, and one of the women agreed with him.

The risk of crashing as exciting was identified as referring to those who are really prepared to go to extremes by putting themselves in a life and death situation, a theme that is being promoted in this advertisement. Safety is not the primary or even perhaps an underlying implication in this advertisement. Rather, the safety idea is avoided and the emphasis is placed on being reckless and facilitating recklessness. In the association with extreme sport, any safety implication has to be over-ridden by the potential for being out of control and for getting hurt [20].

There was some discussion in the R1 group as in the B1 group about four wheel drives, how ineffective they were in the city and their impact on pedestrians. The males then moved on to discuss the advantages as they saw them, and the technicalities of handling in four wheel drives, relating the rally driving emphasis of the advertisement to cornering:

> It's the handling of the 4WDs and sometimes with rear wheel drive. When I say 'handling' I mean, like, doing corners and stuff. Whereas a rear wheel drive, you have very poor handling. (M1, R2)

Table 2. Identified themes - Nissan X-Trail

Extreme	Not reckless. More, like, extreme. (F1, B)
	Yeah. Like, off-road, sand dunes. That sort of stuff. (F2, B)
	For that sort of car, it wasn't … (F1, B)
	They didn't show it in the city doing naughty stuff, it was … (F2, B)
	Where it's supposed to be done. Like, it's not … (F1, B)
	Off-road. (F3, B)
	Pushing boundaries. (F4, B)
	It's not like you would attempt that in the city. Even if you did have that car, you'd go, 'Oh, it'd be funner to do that in the dirt.' (F1, B)
	It's showing that you have to be doing, you have to be on the extreme, you have to be going that fast that, you know, being crazy like that, because

otherwise you're in this class with the people who are playing … (F1, M)

Ping-pong! (laughter) (M1, M)

Yeah! You're a nerd! (F1, M)

If you drive like that, you're cool. If you don't, you're a nerd. (M1, M)

It's sort of like, if you're a nerd, you can't have that car, as well, because you're not extreme. (M2, M)

You're out playing croquet. (F2, M)

Push it to the limit

I know that's promoting like it's 'push it to the limit', but wouldn't that, in a way, promote unsafe, like: 'If you have this car, you could kill yourself!' in other words? That's kind of the interpretation I get with the guy stacking it on the bike. He's driving the car, he's pushing it to the limit, so you push it to the limit in a car, there's a greater chance of you smashing. (M2, M)

But the ad is more appealing to people who are like that, so they'd be like, 'Yeah, you get hurt.' (F2, M)

Pushy

There's a type of person that comes right at the back of you and is really aggressive. Is in a hurry and, like, all this energy and can't wait at the petrol station for you to hurry up and fill up, or someone sort of aggressive, energetic, doesn't want to wait, instead of, you know, 'I'll go around instead of waiting for the person to turn right.' You know? Someone like that sort of, I don't like 4WDs, people who drive them. (F2, B)

They're pushy. (F4, B)

I'm a big fan of front wheel drives and four wheel drive cars. (M2, R2)

Yeah, most 4WDs, you get a lot of handling. The sports cars, like Integras, they have front wheel drive because they're good handling. They can take corners really well. (M1, R2)

The terminology of handling amongst these young males was similar to the rally driving talk the ad draws on and cultivates. The transfer of the rally driving implications of the advertisement to on-road driving were clear to them. They did not consider or question the implications of faster cornering in the traffic environment of the road but saw this as an aspect of the fun and challenge of cars in any environment. These comments relate to expressions of masculinity the implications of which cannot be discussed in this paper. Suffice to say that gender is one of the ways in which cars and drivers are made socially meaningful or articulated [1].

The B1 group in a country area said they did not identify with four wheel drives but considered them more of a city car. Nor did they identify with the extreme sports shown in the ad. Both males and females in the group stated that dirt bike riding was a more common activity in their area. Similarly the all-male group F thought the advertisement was not extreme enough in that they appeared to identify four-wheel driving with older people. When asked what age group they thought was being targeted they said older people with kids. One male disagreed and said it was meant to be appealing to guys like them:

No, not really, because that shows extreme sports. Like, me and you, we might go motorbike riding, you know what I mean? Chuck the bikes in the back, in the trailer, and then you take off in the bike, he doesn't ride a bike, he takes off in the 4WD. (M1)

Though there was identification with the extreme sport idea as 'like us', most of the group remained unimpressed by the whole idea of four wheel driving, being more into smart street driving which for this group meant driving on the road in an aggressive and challenging way with characteristic vehicles that were beyond the ordinary street vehicle in their style and power, as well as their uniqueness. They related less to the rally driving style than to drag racing and demonstrating powerful modifications of their vehicles through a smart, aggressive, street driving style. They were offended by the implication of the advertisement that if they were not into the kinds of extreme sports illustrated, they were not cool. Their sense of being cool was derived from their modified street cars which required being driven in particular ways. This group discussed losing their licences by doing things on the roads that were shown in car ads and how unreasonable that was.

Responses to this advertisement showed an evident transfer of the driving style of extreme off-road, rally type driving to driving on the street or the road. Though the responses were varied they showed a similarity in their recognition of the style of driving as technically challenging and fun.

The advertisement draws on the rally driving theme of pushing to the limits of both the vehicle and driving skill, and connects it to extreme sports where there is a clear life- threatening potential, and the difference between life and death relies on skill [20]. There is an aggressive potency to the association of extreme sports with the car driven largely on public roads recognised in various ways by the focus group participants though not in very critical or reflective ways. The ad relies on an implicit reference to the danger of the car while at the same time masking this danger in the emphasis on fun and excitement as relatively harmless expression.

Conclusions

The young people's responses to these ads are ambiguous in that, to some extent they can see the representations of speed and power as potentially harmful, but they do not tend to be reflective or critical about the representations. The connection of fun and sport to driving cars is concerning in that it suggests that driving on the road be considered as a sport activity, and that cars can be driven on the roads in fun and sporty ways that are risky and dangerous but nevertheless safe. The suggestions of pushing the limits and the threat or potential of losing control appeal to young males in particular, as do the messages of these advertisements. The ads suggest the car can take this kind of treatment and the occupants will be safe nevertheless.

Competitiveness and fun, adrenalin-pumping activity are connected strongly with cars in these advertisements without necessarily any regard for the consequences of this attitude on the road. The racy appeal and crazy sand driving can be considered safe, and justify safe speeding and breakneck handling, reinforcing for many young males and some females that they are able to handle it and to manage speed without crashing. Because these practices are shown in off-road situations, advertisers avoid being seen as showing bad driving on the road for which they could be sanctioned [21] and yet the connection to on-road driving is evident to the young people in the focus groups. This could have particular implications for young people in country areas where off-road driving is common.

The 'framing' role of the media is not directly causative and the impact of advertising though clear is not considered as proven [22]. Advertisers are not concerned with the good of society as a whole but rather with the effect on sales of unpopular images and publicity [22]. While the role of meaning formation through framing in the media is denied using the argument that there is a lack of research that is recognised as valid, advertisers will continue to cultivate unsafe practices and to frame safety itself in unsafe terms. Advertising is used because it works by reinforcing and promoting particular attitudes and practices that are in the interests of manufacturers but not society. Other 'safer' attitudes, more conducive to driving as a shared practice, are not cultivated though they are present in the evident cooperation practised on the roads.

Young people may be more vulnerable to the implicit meanings in advertising and in the process of finding out how to deal with those meanings in practice [23]. It is not merely adolescent development that should be the focus of research but also the social meanings about cars and driving that are being conveyed to young people [24]. Advertisements such as those considered in this paper reinforce the symbolism of the car for males particularly, as a means of aggressive expression and the demand for more speed, with no concern for the destructive consequences entailed. These associations require detailed examination so that they can be questioned and dismantled, and the connection between young males and driving cars in destructive ways can be challenged rather than reinforced. The enthusiasm of young males for cars needs to be managed in ways that clearly separate the sport of racing and risky, dangerous driving from everyday driving on the road.

Advertising is able to draw on meanings that are prevalent in the broader community. Some of the statements by young people show the evident connection between the advertising suggestions and the pre-existing meanings that go into them. Where young males have a desire for excitement and the opportunity to express a competitive and aggressive masculinity that requires constant adrenaline hits through cars, the advertisements considered here make the most of these meanings, and reinforce them. The more these styles of driving are employed in advertising to promote the performance and power of cars, the more it suggests that these are acceptable ways to use the car.

The young people are clearly able to identify the themes in the advertisements and to discuss them in a sophisticated manner though they are not always able to reflect on the implications of the driving styles suggested. It is clear from these discussions that particular styles of driving are promoted and even justified in advertising and this is what campaign advertising has to confront.

Campaign messages are concerned with the good of society as a whole in contrast to manufacturer advertising. Emphasis on social themes of cooperation and consideration that actually allow the roads to function in a relatively safe way could be used more creatively to present alternatives to the themes of advertising and to reinforce other meanings that are part of driving practice [25]. The relevance of speed limits to communities and not just drivers could be emphasised so that there is reflection on the impact of cars that goes beyond the desires of drivers alone. Realism about the potential for increased speed in motor vehicles needs to be cultivated in the community through constructive debate that campaign messages could contribute to. Manufacturers continue to push for, and promote, higher speeds reinforcing an expectation that speed will be ever increasing. Other ways of increasing quality of life could be cultivated that are not as costly to society as a whole and based on cooperation rather than aggressive, competitive driving.

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Considering a new framework for designing public safety 'filler' messages on highway variable-message signs: Applying the behaviour change wheel

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Abstract

This paper reviews literature regarding 'filler' (particularly safety) messages on variable message signs (VMS), then evaluates the applicability of Michie, van Stralen and West's behaviour change wheel for message generation using examples from Queensland. Although designed for generating health care interventions, the wheel readily extends itself to road safety. The paper concludes with a brief list of techniques for writing persuasive safety messages. This research was conducted because limited research is available on VMS safety messages or models for their generation. The literature review indicated that although controversy exists regarding the use of VMS for safety messages, more drivers would rather have the messages than blank signs; however, certain messages are seen as more useful than others. Further, VMS safety messages should not be expected to change the behaviour of all drivers but rather help a small share. The key benefit of this paper is that it proposes a comprehensive framework for generating VMS safety messages and describes strategies for writing them. Further research should be conducted on driver reactions to these messages.

Keywords

Behaviour change wheel, Filler messages, Road safety messages, Variable message signs

Introduction

Limited research is available on the design, use and effectiveness of 'filler' messages on permanently-mounted, highway variable-message signs (VMS) [1-2]. There is even controversy regarding whether these messages should be displayed at all [1,3-4]. In the 2010 Queensland Government Transport and Main Roads (QGTMR) manual titled *Variable message signs use and operation* [5], filler messages include 'road safety messages, community benefit messages and general transportation messages' (p.10). In Queensland and many other places, filler messages are displayed on VMS when there are no crashes, roadwork, or important traffic information to report that could influence driving plans. Appendix 1 of this paper presents filler messages listed in the manual, which states that these messages

> . . . are displayed when there is no requirement for higher priority messages and are limited to information which is likely to enhance the safety or performance of the state-controlled road network or influence or inform the public in cases of potential or declared natural disasters. Filler messages are not to be displayed when traffic volume exceeds 85% of the road capacity. (pp.11-12)

Figure 1 shows an example of a Queensland VMS that is displaying a filler message. VMS, which are also known as changeable message signs (CMS) or dynamic message signs (DMS), are panels of light emitting diodes (LEDs) on which driver messages can be displayed dynamically.

Figure 1. Example filler message displayed on a VMS along the M1 between Brisbane and the Gold Coast

There is a growing body of evidence that many drivers find VMS helpful when they deliver messages about current driving conditions. For example, in a telephone survey of more than 500 participants in the Washington DC area [6], participants gave nearly unanimous support (97%) for VMS messages that reported the exact locations of crashes so that drivers could decide where to exit and then re-enter the highway. As another example, in a survey of 257 Canadian drivers, 95% of participants agreed that VMS should display advance warnings of delays, crashes, and roadworks [7]. Further, an extensive literature review on VMS noted that these signs deliver many helpful outcomes such as effectively re-routing traffic, reducing driver speed to suit prevailing conditions, and removing congestion [8]. Thus, many drivers believe, and research is showing, that these signs serve a useful purpose. However, it is not fully known how well drivers perceive the effectiveness of these signs and act upon the information provided when they are displaying safety-related filler messages.

When there is no current traffic information to display, some researchers argue that the signs should remain blank while others say that safety and other public service messages should be displayed. A third alternative that some authorities follow is to display travel times; however, this option is feasible only when such information would be useful and the responsible agency can keep the information accurate (note that this alternative is followed for some VMS along the M1). Those researchers who believe that VMS should remain blank argue that if the signs display messages that drivers do not perceive as useful, they will ignore future messages and risk missing critical information [4]. Further, messages such as public announcements may even annoy many drivers. As an example, Dudek [1] reported that the Los Angeles public reacted negatively when the following VMS messages were displayed along a freeway: 'Next time try Amtrak to Las Vegas' and 'Relieve congestion – rideshare' (p.15). Those researchers who argue that VMS should always display some type of message typically say that the signs are expensive so should be kept operating, and that if the signs remain blank, people may wonder if they are broken [1-2,9]. To counter this argument, some researchers recommend that VMS display 'a small number of pixels' to indicate that they are functioning but have nothing urgent to report [4].

This paper first reviews international research on VMS filler messages and then considers a framework for designing these messages. It is proposed that Michie, van Stralen, and West's [10] behaviour change wheel, discussed later, would provide a useful model for developing filler messages. It is important to research the use and effectiveness of VMS filler messages and to develop theory about them since many drivers are frequently exposed to them and they may be providing helpful learning, reminding, and other functions that may complement or enhance the structures already in place for encouraging safe driving. The paper concludes by describing several techniques of persuasion for writing short safety-related messages that attempt to change driver behaviour.

Method

The research method consisted first of a literature review on international use of, attitudes towards, and effects of filler messages. Results from the literature were then compared to message displays as presented in the QGTMR manual [5] (see Appendix 1). Following this research, the paper argues that a model for designing better health care delivery and practice – the behaviour change wheel [10] – could be applied to the design of VMS safe-driving messages. Some specific techniques and examples for writing VMS safety messages are presented.

Literature Review

This section reviews the results of seven papers organised in publication date order that in whole or part studied the use of VMS filler messages.

Driver attitudes towards filler messages [6]

In focus group studies of 125 drivers and a follow-up telephone survey of more than 500 drivers in the Washington DC area, Benson [6] found markedly mixed reactions to VMS safety messages. From the focus groups, he reported that 'most participants agreed that VMS should include only traffic and road condition information' with one participant even saying that such signs should be treated as 'holy' (p.55). In contrast, Benson's telephone survey found that 67% (n = 337) of the

Table 1. Results of Benson's [6] survey questions regarding drivers' attitudes towards safety messages on VMS (p.50)

Is it a good idea to post road-safety-related messages on VMS?	Yes 337 (67%)	No 165 (33%)	
	Attitudes toward alternative use of VMS (*n*, %)		
	Excellent idea	Good idea	Poor idea
'Drive to survive'	49 (10%)	248 (48%)	216 (42%)
'Lights on in bad weather'	181 (35%)	263 (51%)	70 (14%)
'Tailgating is deadly'	171 (33%)	214 (42%)	127 (25%)
'Signal before changing lanes'	219 (43%)	199 (39%)	94 (18%)

participants supported the use of safety messages (see Table 1). However, these participants showed more enthusiasm towards very specific messages such as 'Signal before changing lanes' than general messages such as 'Drive to survive'.

Focus groups with Brisbane and Sydney drivers [2]

Pedic and Ezrakhovich [2] conducted five focus groups with Brisbane drivers and three with Sydney drivers about VMS road safety messages. Participants were found to be strongly supportive of using VMS for this purpose. Regarding message design, participants thought that messages should be displayed on a single frame and be 'concise and direct' (p.9). The research also found that drivers would be more likely to read safety messages on these signs if traffic-related messages were accurate and updated regularly.

Small survey of US transportation professionals [11]

In another study, Jones and Thompson [11] working in Alabama, sent a limited email survey to 87 transportation professionals to determine how VMS in their localities were used during normal traffic. They received eleven responses (see Table 2).

Table 2. Results of survey to transportation professionals (11 responses from 87 surveys [11] p.5)

Survey question	Yes	No
Should dynamic message signs display messages other than essential traffic control messages?	43%	57%
Would it be beneficial to drivers to display (non traffic-related) public safety messages?	50%	50%
Will displaying messages other than essential traffic control messages distract drivers?	35%	64%
Would displaying messages other than essential traffic control messages compromise traffic management objectives?	75%	25%
Would displaying messages other than essential traffic control messages cause drivers to ignore dynamic message signs?	85%	15%

Results of this survey indicate that most of the respondents (75%) believed that the display of filler messages on VMS would cause drivers to ignore these signs thereby reducing their effectiveness as traffic management devices. Nonetheless, the researchers [11] found that most of the surveyed agencies (61%) still used filler messages, and concluded that 'motorists are generally amenable to general messages on DMS providing they are carefully worded and informative' (p.10). Jones and Thompson recommended that drivers be educated about the different types of messages and how they contribute to improving the traffic system but did not state how this education should occur.

Use of filler messages in Bristol UK to encourage use of public transportation and decrease pollution [12]

Other research relevant to this study is the work of Chatterjee and McDonald [12] who studied the effectiveness of VMS in European cities. A part of this research focussed on driver responses to VMS in Bristol, UK, which displayed air quality information and messages to encourage drivers to travel by public transport. Typical messages said 'Air pollution high – use P + ride' or 'To city centre P + R 15 min car 24 min' (p.562). According to the study, while the pollution message was ineffective, '47% of survey respondents said that comparative travel times were effective in encouraging use of the Park and Ride system' (p.571). However, actual change that occurred as a result of these signs was small. Respondents (n = 852) said that after they saw the comparative travel times, they used Park and Ride for four percent of their trips. These results indicate that general public service announcements are ineffective and that the participants themselves may have overestimated the signs' effectiveness. According to the researchers, for public service messages on VMS to be truly effective, they need to be supplemented with other communication.

Focus group and survey of perceptions of VMS in Canada [7]

Tay and de Barros [7] studied perceptions of VMS in Canada by first holding a focus group and then conducting a survey with two participant groups. Although the focus group and survey concerned traffic-related and filler messages, this review considers only the information relevant to filler messages.

The focus group consisted of 16 transportation engineers and road safety experts. When asked what messages they could remember, all participants mentioned those about anti-drinking, the weather, seatbelt use, and driving courtesy. Thus, the participants had looked at the messages at least some of the time. The participants said, however, that the messages were repetitive and therefore something that they tended to ignore. As noted by the researchers, the VMS had become part of the driving background for these drivers. Participants thought that the messages should be designed and displayed to maintain interest. Some participants thought that the signs were too 'soft' and should be more 'hard-hitting' and current, providing examples such as 'xx people were killed this year' and 'xx % of the drivers today are speeding' (p.99). Some participants suggested that VMS should provide more personal messages to particular drivers about their current speed or how closely they were following. Most of the participants said that 'direct and immediate warnings' were more effective than 'soft-soft' messages in attracting attention. One participant thought that VMS should display only traffic-related information because other information reduced driver attention to them, but the other participants disagreed and thought they should be used for safety and driving behaviour messages.

For safety messages, most participants thought that emotionally-charged messages would be more effective than pure information in changing driver behaviour. However, a few participants thought that if a message was too emotional, it could have a negative effect. While most participants thought that both negatively and positively-charged messages could be effective, they thought that the greater effectiveness would come from negatively-charged messages, which stress the consequences of unsafe driving.

Following the focus group, the researchers ran a survey on two groups of participants, the results of which were combined. The first group had 94 participants consisting mostly of transportation engineering students but also friends and associates of the researchers. The second group had 613 participants who were drivers that had stopped at a popular highway petrol stop. The survey asked participants whether they remembered seeing any VMS messages along the highway and then provided them with a checklist upon which to note the types of messages seen. Many (82.5%) recalled seeing the messages, while 65% remembered the safety messages, 41% the weather information, 39% traffic-related information, and 13% other information.

The survey also asked drivers whether they thought it useful to display information about the 'weather, real-time traffic information, reminders not to drive too closely, general safety messages and reminders to be courteous on the roads' (p.104). Drivers agreed that such messages should be presented. The survey then asked drivers what they thought about specific messages. Most (89%) thought that VMS should display weather information; 71% thought that VMS should display reminders about following distance, but 22.3% were neutral and 6.6% were negative about them; 71.1% thought that VMS should display driving courtesy reminders, but 19.9% were neutral and 9% were negative about them; 72.4% thought that VMS should display general safety messages but 18.3% were neutral and 9.4% were negative about them; and 55.2% thought that VMS should display anti-speeding messages but 29.6% were neutral and 15.5% were negative about them. Thus, there was generally a positive attitude towards these messages.

Finally, the survey asked participants specifically about how they thought that two particular road safety messages affected them. They asked participants to state their level of agreement with the messages 'Reminders not to tailgate induce me to check my following distance' and 'Anti-speeding messages on message boards reduce my likelihood of speeding' (p.106). Regarding the tailgating messages, 51% agreed, 31.9% were neutral, and 17.1% disagreed. Regarding the anti-speeding messages, 32.7% agreed, 34.6% were neutral, and 32.6% disagreed. The researchers concluded that VMS safety messages should not be expected to change every driver's behaviour but should help a small share. Further, it may be that messages about some topics (e.g. weather conditions) are more effective than others (e.g. anti-speeding). The researchers also thought that road safety messages should be developed using theories and models of behaviour change and persuasive communication.

Survey of filler message use by US traffic agencies [1]

In the most comprehensive study to date of filler messages, Dudek [1] sent an online survey to managers or supervisors of US transportation agencies (state Department of Transportation and toll road agencies) to determine which types of messages they displayed instead of leaving VMS blank and how the public had responded to these messages. The survey presented participants with a range of VMS messages related to both more immediate road issues (e.g. crashes, roadwork) and filler messages, then asked which messages they currently displayed. The survey also asked for each agency's policies, guidelines, and practices for displaying filler messages, how these messages were categorised and prioritised, specific content of these messages, experiences and 'lessons learned' about the messages including public reactions, and any results from research that the agencies were conducting about filler messages (p.6).

The survey found that the choice to display non-traffic related messages was based typically not on the results of research, but on the preferences of management. Dudek reported that

> Very little, if any, objective data from focus groups or other research studies were used in the decision-making process for displaying the messages. A significant percentage of (Traffic Management Centers) TMCs that display these types of messages did not know the public's attitude about the messages. (p.2)

Dudek classified the US filler messages as being about speed, safety campaigns, public service announcements (PSA), or traffic law or ordinance. Table 2 presents examples of these messages.

Table 2. Examples of US filler messages [1]

Message type	Message purpose	Examples
Safety campaign	In the USA, such messages repeat or deliver part of a state's driver safety campaign	Buckle up for safety It's the law
		Drive hammered Get nailed
		Work zone safety week
Public service announcements (PSA)	Non-traffic related messages about general public concerns	Report DWI (driving while intoxicated) 1-877-DWI-HALT
		Blood drive Hinsdale Oasis
		Van and carpool Call 1-800-555-5555
		Air quality alert Today Tune to 530 AM
		Burn ban In effect for Nueces Cty
Traffic law or	Reminders of laws or penalties for violating laws ordinance	Georgia law Headlights on When raining
		Slow down or Move over for Emergency vehs
Speed	Reiterate the legal limit	Speed limit 55 Drive safely
	Provide advice about speed	Dense fog Advise 30 mph

One hundred agencies responded to the survey. They were asked specifically which types of filler messages they used and then to give the public's reason to the messages on a scale from very favourable to very unfavourable. Results showed that the most commonly displayed type of filler message in the US was the safety campaign message, which was displayed by 83% of the reporting agencies [1]. This type of message is also displayed in Queensland, as for example in the message 'RBT (random breath testing) Anytime, Anywhere'. Driver reactions to safety campaign messages as reported by the US agencies were 29% (n=24) in the favourable range, 18% (n=15) neutral, and 2% (n=2) unfavourable. Of note, about half (51% or n=42) of the agencies that displayed safety campaign messages had no information regarding drivers' reaction to them. In the US, such messages are typically part of states' safety campaigns, and according to regulations, 'should be current, displayed for a limited time, and should relate to a specific safety campaign' (p.33).

The next most commonly-used filler message as reported by US agencies was the Public Service Announcement (PSA). In Dudek's study [1], 30% of agencies reported that they displayed PSAs. Driver reactions to PSAs as reported by the US agencies were 27% (n=8) in the favourable range, 27% (n=8) neutral and 3% (n=1) unfavourable. Of note, 43% (n=13) of the agencies that displayed these messages had no information regarding the public's response to the signs. PSAs are also displayed occasionally on Queensland VMS (e.g. 'Blood stocks low. Call xxxxxx to donate').

The third most commonly-used filler message as reported in this study was the traffic law or ordinance message, which was displayed by 26% of the agencies. Public reaction to these messages was more positive than that for safety campaigns and PSAs. Driver reactions to traffic law messages as reported by the US agencies were 31% (n=8) in the favourable range, and 38% (n=10) neutral. Thirty-one percent (n=8) of agencies had no information on which to gauge public reaction to these messages. These messages, too, are displayed along the M1 (e.g. 'Texting + driving = $300 + 3 points'). Finally, speed messages were the least commonly displayed by agencies with only 15% of agencies using them. Three agencies (20%) reported public reactions to these messages between favourable and neutral, and 80% (n=12) of these agencies had no information regarding the public's reaction to the messages.

Looking at public response to all of the messages considered by Dudek [2], reactions were generally more favourable than unfavourable, but many people reported a neutral reaction and many agencies did not know what drivers thought about the messages or whether the messages were having any impact on drivers. These results indicate the need for further research on the public's reaction to filler messages.

Survey and on-road experiment of two VMS anti-speeding messages in Alberta, Canada [13]

Another study by Tay and de Barros [13] aimed to evaluate the effectiveness of the two VMS anti-speeding messages 'Speeding will catch up to you' and 'Don't save time, save lives'. According to the researchers, the first message focussed on 'the legal threat of speeding' while the second focussed on the 'physical threat' (p.19). The study began with a questionnaire that asked participants to rank their level of agreement with a series of statements about each message, one of which was: 'The message increases my likelihood of obeying the speed limits'. For the legally-threatening message, 2.1% of the 97 respondents strongly agreed and 22.3% agreed. For the

physically-threatening message, 1.1% strongly agreed, and 27.7% agreed. These results indicate that some drivers see a benefit in displaying VMS anti-speeding messages, and that for these drivers, the physically-threatening messages were seen as slightly more persuasive.

The next part of the study consisted of on-road tests of each message to determine and compare their effects. The researchers compared driver speeds at the site of a single VMS sign during periods in which no message was displayed and then when each of the test messages was displayed. Speeds were measured in both a fast and a slow lane. While the study found no noticeable decrease in the mean traffic speed for the legally-threatening message, it did find a noticeable decrease in the standard deviation of driver speeds (from 7.9 to 7.2 km/h in the fast lane and from 9.2 to 8.7 km/h in the slow lane) and a slight reduction in the percentage of drivers travelling at higher speeds. The standard deviation of driver speeds is a measure of the variance among speeds, and a decrease in it and the top end speed are thought to aid in reducing potential crashes. Thus, the legally-threatening message had minimal positive effects on driver speeds.

For the physically-threatening message, the mean speed decreased slightly (from 119.7 to 118 km/h in the fast lane and from 111.1 to 109.6 km/h in the slow lane), the percentage of drivers who were travelling above the speed limit decreased substantially (90.7% to 86%; 55.0% to 50.0%), but the standard deviation increased slightly (7.7 to 9.3 km/h; 8.9 to 10.1 km/h). There was a mixed result between the percentage of drivers who were travelling 15 km/h over the limit in the fast and slow lanes; in the fast lane, the percentage of drivers speeding increased from 9.8% to 15.9%, but in the slow lane, decreased from 3.9% to 3.3%.

In this study, although both of the tested anti-speeding messages had small but helpful effects on travel speeds, the physically-threatening message had a slightly stronger effect than the legally-threatening message. The fact that a high percentage of drivers were travelling above the speed limit in both the fast and slow lanes throughout the study could mean that the observed drivers believed that they would not be legally punished for speeding or that the punishments were not severe enough deterrents (the percentage of drivers travelling over the limit ranged from between 86% - 90.7% in the fast lanes and between 50.0% - 55% in the slow lanes). Perhaps the physically-threatening message was more effective because this possibility for punishment seemed more possible.

Literature review summary

It is now useful to summarise the reviewed research. First, not all and perhaps only some drivers will find safety or other filler messages (or for that matter any VMS messages) to be useful [6,7,13]. This finding is reasonable since research shows that individuals do not and cannot actively attend to every road sign [14]. Even when seemingly more important information is displayed such as a recommendation for drivers to divert because of a crash, it cannot be guaranteed that all drivers will attend to the information [12]. Having started this summary with the idea that not all drivers will find filler messages useful, the reviewed research nonetheless indicates that drivers generally would prefer to use VMS for displaying safety messages than to leave them blank [2,6-7,11]. Further, the reviewed research shows that if filler messages are to be displayed, drivers would generally prefer to see more specific than general messages [6-7]. In addition, emotionally-charged messages, particularly those emphasising the negative consequences of unsafe behaviour, are seen as being more effective in encouraging safe driving [7]. The research also provided evidence that some filler messages are having positive effects on driving safety [13].

Regarding specific filler messages, the Chatterjee and McDonald study [12] showed that general public service announcements on VMS are ineffective. Thus, more research is needed on how VMS filler messages could be used as part of larger public service campaigns. Further, the Dudek study [1] reported that drivers responded somewhat more favourably to traffic law or ordinance messages than to safety campaign, public service, or speed-related messages. This result can be considered in light of the studies conducted on static road signs [15-16]. These studies compared driver recall of general warning and crosswalk signs to more specific signs (e.g. speed limit change and police control area) and found that drivers better remembered the latter. The researchers theorised that drivers pay more attention to personally threatening than general messages. Tay and de Barros's [13] research in Canada examined drivers' perceptions and on-road behaviour towards two personally threatening anti-speeding signs. One threat was from the law and the other concerned physical safety. In this study, the physically-threatening message had slightly more effect on drivers' speeds. The paper now considers what might be a useful set of principles for designing filler messages.

Using the behaviour change wheel as a framework for designing VMS filler messages

For road signage in general, design follows the principle of *positive guidance*, which Russell [17] defined as 'the concept that a driver can be given sufficient information where he/she needs it and in a form he/she can best use… to safely avoid a hazard' (p.155).

In contrast to other road signage, VMS filler messages do not follow this principle yet like other signage certainly need specific frameworks on which to be designed. It is proposed here that a useful way to consider the function of VMS filler messages is as *behaviour change interventions for safe driving*. Further, a useful tool for considering a full range of such interventions is Michie, van Stralen, and West's [10] *behaviour change wheel* (Figure 2), which was developed for the purpose of encouraging healthy lifestyles and delivering more effective health care, but is of course also useful for designing and selecting behavioural interventions in many other contexts. The tool was designed for

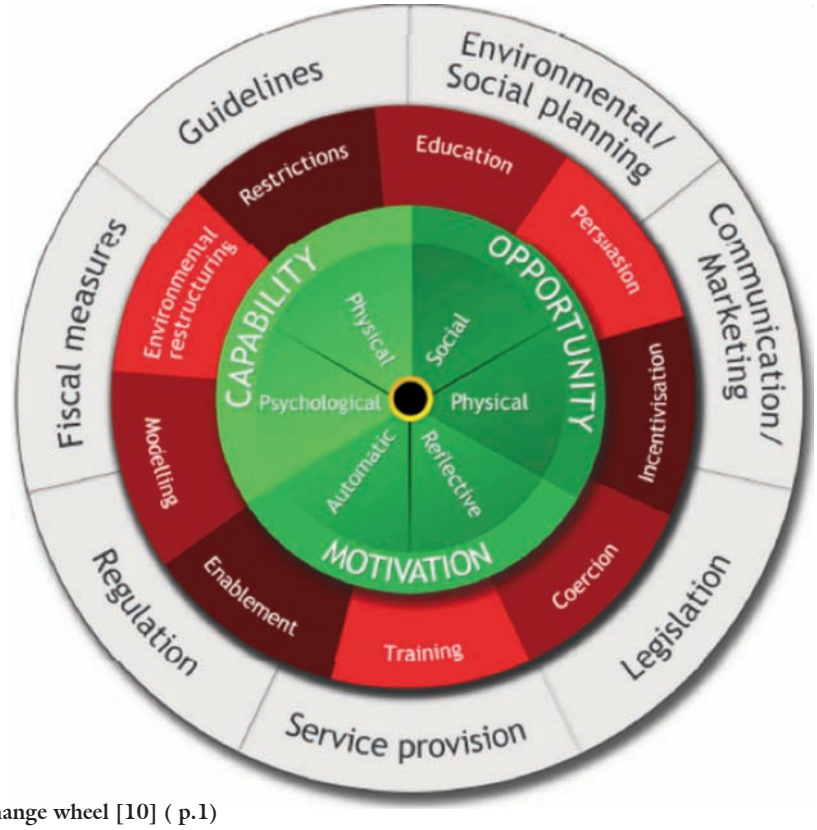

Figure 2. The behaviour change wheel [10] (p.1)

policy makers and practitioners. Tay and de Barros [13] have also noted that VMS safety messages should be designed using theories of behaviour change and persuasive communication. They suggested that designers of these messages apply theories and models such as 'the health belief model, protection motivation model, extended parallel process model, elaboration likelihood model, social cognition theory or theory of planned behaviour' (p.107). All of these theories and models fit within the structure of the behaviour change wheel and should certainly be considered in safety message design.

Michie, van Stralen and West [10] define behaviour change interventions as 'coordinated sets of activities designed to change specified behaviour patterns' (p.1). In developing the behaviour change wheel, they argued that to improve the likelihood of an individual adopting a prescribed behavioural change (an intervention), the person responsible for prescribing the change needs to have a method for characterising the various types of interventions (e.g. education, training, or coercion) and knowledge of how to link the interventions to the desired behaviour. To develop the wheel, the researchers reviewed nineteen behavioural change frameworks and seven categories of health care delivery policy, but found that none of the existing descriptions was comprehensive enough and that few demonstrated how they linked to a model of human behaviour. The researchers argued that the behaviour change wheel fills the gap found in their research. This paper will now describe the wheel and then focus on those parts of it that are applicable to designing VMS filler messages.

As shown in Figure 2, the central portion of the wheel provides a model of a person's willing behaviour, which is based upon that person's skills or *capability* to perform the behaviour, reason or *motivation* to perform the behaviour (which could include a habit), and environment or *opportunity* in which to perform the behaviour. Michie, van Stralen and West [10] define capability, motivation, and opportunity as follows:

- **Capability** is the individual's psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills.
- **Motivation** is all those brain processes that energise and direct behaviour, not just goals and conscious decision-making. It includes habitual processes, emotional responding, as well as analytical decision-making.
- **Opportunity** is all the factors that lie outside the individual that make the behaviour possible or prompt it. (p.4)

The middle ring lists nine categories of interventions that may influence different aspects of a person's behaviour. As shown in Figure 2, these categories are education, persuasion, enablement, training, incentivisation, coercion, restriction, modelling, and environmental restructuring. Because VMS messages are written communication, it is technically possible to directly use them only for the first three listed interventions of education, persuasion, and enablement. However, as shown in Table 3, VMS can be used to deliver messages about the other interventions. For example, while VMS cannot in and of

Table 3. Behaviour change interventions as listed and defined [10] (p.7) and with examples for VMS messages

Intervention	Definition	Example applications in VMS messages
Education	'Increasing knowledge or understanding'	Teach people about safe driving practices, road rules and vehicle care
Persuasion	'Using communication to induce positive or negative feelings or stimulate action'	Encourage people to imagine outcomes from positive driving behaviour or effective vehicle care, or any negative outcomes that could result from unsafe behaviours
Enablement	'Increasing means/reducing barriers to increase capability or opportunity'	Remind drivers to perform particular behaviours (e.g. during wet weather, display a message such as *Drive to the conditions*)
Training	'Imparting skills'	Provide information about advanced driver training programs
Incentivisation	'Creating expectation of reward'	Establish government rewards for safe driving (e.g. reduced car registration fees for vehicle owners having no driving violations) and display the rewards on VMS
Coercion	'Creating expectation of punishment or cost'	Display punishments for violating various driving rules
Restriction	'Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)'	Display various driving rules
Modelling	'Providing an example for people to aspire to or imitate'	Ask parents to behave as safe driving role models for their children (see [18]). Such messages could become part of a larger educational campaign.
Environmental restructuring	'Changing the physical or social context'	VMS signs themselves are a form of environmental restructuring

themselves deliver skills training, they can provide information about where to get training in driving skills.

On the outer ring of the behaviour change wheel are policy areas for encouraging change. The listed areas consist of creating new communication or marketing programs, government or professional guidelines, fiscal arrangements, regulations, legislation, environmental or social plans, and providing services. No discussion will be given here about policy change.

To use the wheel to design VMS filler messages, a designer would begin with a description of the behaviour desired from a target audience (e.g. all drivers should indicate before changing lanes) and then generate potential messages using the list of interventions. It is recommended that after generating such a list, the designer of course tests the messages with target audience members. The categorisation of road safety messages in the QGTMR manual [5] actually already follows this approach but could be more detailed. Road safety messages are categorised as follows:

- speed
- fatigue
- following distance
- vehicle maintenance
- excessive lane changing (p.12).

Other message categories that could also be listed include health and driving, distraction, road rules and violations, and motorcycle driving. To provide more detailed message categories, designers could list, for example, all of the types of vehicle maintenance that drivers should do to avoid crashes and then generate different types of intervention messages using those listed in the wheel. Advantages of using the behaviour change wheel to design messages are first that it helps designers to avoid neglecting potential options, and second that it encourages creativity by helping designers identify a range of approaches.

Techniques for writing persuasive VMS safe driving messages

This paper now reviews some possible techniques for writing persuasive VMS safety messages. The discussion is not meant to be exhaustive as the science of persuasion is incomplete. Other techniques than described here may be available to serve as structures for developing messages. The techniques described are not directly described by the behaviour change wheel since it is a larger framework, but rather are subsumed by ideas within it. The first technique described is the *assertion message*, which is commonly used by psychologists and communication specialists during attempts to change behaviour (for examples

see [19]). Other described techniques are taken from Thaler and Sunstein's book *Nudge: Improving decisions about health, wealth, and happiness* [20], which summarises current research on psychological biases and effects of different message types on decision making, and was recommended by the designers of the behaviour change wheel [10]. Ideas from this source that are discussed here are the construction of messages to encourage people to *actively think about their personal behaviour and its ramifications*, the design of messages to encourage behaviour change based on people's aversion to loss, and a consideration of the timing of certain messages based upon people's *availability bias*.

First, messages can follow the format of assertion messages, which both explicitly describe a desired behaviour and explain why it should be followed [19]. An example of a VMS safety message that is written in this format is 'Tailgating causes crashes. Follow at a safe distance'. Returning to previously reviewed research on VMS safety messages [6], people tended to prefer specific messages such as provided above to more general ones.

One technique of persuasion is to evoke people's imagination, for example to try to get people to actively think about their personal behaviour and its ramifications. Asking a question is a way to encourage thinking as in the current Queensland VMS messages 'Following too closely? Back off for safety' and 'Checked your tyres lately?'

Messages can also take advantage of people's *loss aversion* or fear of losing something [20]. Threatening messages use this principle such as 'Texting + driving = $300 + 3 points' or 'RBT [random breath testing]. Anytime Anywhere'. Returning to previously reviewed research on driver attention to signs [15-16], drivers paid more attention to personally threatening messages such as in the example provided than to general ones.

A psychological bias to consider when writing messages is the *availability bias*, which is a person's ability to bring something to mind [20].When someone has had recent and frequent exposure to an idea (e.g. advertising about McDonald's fast food), that idea will tend to be recalled first or near the top of the person's list of ideas when he or she is asked a question related to it (e.g. 'Where should we go for lunch?'). In regard to VMS, messages related to safety campaigns should be most effective during or shortly after the campaign, and therefore older messages should be deleted from VMS message banks.

Conclusions

This paper has reviewed research on the use of safe driving filler messages on VMS. Examples were taken from the Queensland manual for VMS [5]. Although there is controversy regarding the use of VMS to deliver safety messages, results indicate that more drivers would prefer to have these messages than not, that drivers prefer signs with more specific behavioural change messages, and that some of these messages are having positive effects on at least a small share of drivers. It is suggested that the behaviour change wheel developed by Michie, van Stralen and West [10] be adopted for developing messages, and that specific techniques of persuasion be tested to see how drivers perceive them and how effective they would be on-road. It is important to conduct further research on VMS safety messages.

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Appendix 1. General Road Safety Filler Messages [3] (p.29)

	Screen 1			Screen 2		
	Line 1	Line 2	Line 3	Line 1	Line 2	Line 3
1	Breaking	Road rules	Causes crashes			
2	Buckle Up	Be here	Here for Life			
3	Changing Lanes?	Always indicate				
4	Checked your	Tyres lately?				
5	Distracted drivers	Are dangerous				
6	Driver fatigue	Wake up	To the signs			
7	Drive Sober	Be here	Here for Life			
8	Drive Safely	Be here	Here for Life			
9	Following	Too closely?		Back off	For safety	
10	Give trucks	More space				
11	Indicate	Lane Changes		Be here	Here for Life	
12*	Keep left	Unless overtaking				
13*	Keep left	Unless overtaking	Share the road			
14	Merge safely	Choose a safe gap				
15	Motorcyclists	Be aware	Take care. Survive			
16	On medication?	Check it's safe	To drive			
17	Speeding?	Slow down		Be here	Here for Life	
18	Speeding when	Overtaking is illegal	Slow down			
19	Tailgating	Causes crashes		Back off – Be here	Here for Life	
20	Tailgating	Causes crashes		Don't follow	Too closely	
21	Tailgating	Causes crashes		Follow at a	Safe distance	
22	Texting + driving	= $300 + 3 points				
23	Health problems?	Safe to drive?				
24	Always drive	To the	conditions			
25**	Variable speed limits	Are enforced				
26***	Traffic info	Phone 131940				
27***	Traffic info	131940.qld.gov.au				
28	Towing?	Take care next XXkm				

* Messages for use in speed zones greater than 80km/h ** Messages for use in variable speed limit zones only.

*** Messages only for use in regions where 131940 service is active.

Editor's note: In the last issue of the journal (Vol 22 No. 3 - the special issue on heavy vehicle safety), references were inadvertently omitted from the peer-reviewed article *Investigating the role of fatigue, sleep and sleep disorders in commercial vehicle crashes: A systematic review* by LN Sharwood et al. The editor apologises for this omission. The complete article, with reference list, can be viewed on the College website: www.acrs.org.au/publications/journalscurrent.

Contributed articles

Regulation of motor vehicle advertising: Toward a framework for compliance research

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Abstract

There is concern that certain content within some motor vehicle television advertising may negatively influence the driving attitudes and behaviours of viewers, particularly young people, and hence have a negative impact on road safety. In recognition of this concern, many developed countries have adopted a self-regulatory approach to motor vehicle advertising. The basic elements of self-regulation are a code of practice or guiding principles governing advertising content and the establishment of a process for hearing and adjudicating complaints about alleged breaches of that code. However, as in other areas, the effectiveness of self-regulation is being questioned in that many motor vehicle advertisements in Australia and elsewhere appear non-compliant with self-regulatory codes. Applying lessons from studies of alcohol advertising, this paper first reviews the research assessing the content of motor vehicle advertising. A suggested research framework is then proposed to inform the development of motor vehicle advertising regulatory codes where they do not exist, and to better monitor compliance with codes where they do exist. The research framework suggested includes expert content analysis of ads, the impact of advertising on risk-taking cognitions and decisions in computer-simulated traffic situations, and assessing audience perceptions of, and reactions to, messages in advertisements mapped against regulatory code content. An example of audience reaction research is also presented.

Keywords

Advertising codes, Advertising research, Advertising self-regulation, Motor vehicle advertising, Road safety

Introduction

Road traffic crashes are a leading cause of death and injury worldwide. In 2008, over 1.2 million deaths were recorded and road traffic injuries ranked as the tenth leading cause of death worldwide [1]. By 2020, road traffic crashes are predicted to be the third leading cause of Disability Adjusted Life Years lost [2, 3]. In Australia, the Australian Transport Council reports that an average of four people die and 90 people are seriously injured on Australian roads every day, with subsequent substantial cost to the community both in economic loss and personal suffering [4].

Young people are disproportionately affected by road traffic injuries, representing 50% of overall global mortality [2, 3], with young males at higher risk for road traffic fatalities than females in every age group under 25 years[5]. In Australia, 25% of drivers killed or seriously injured are aged 17-25 year olds, although this group comprise only 16% of the total adult population[4]. Behavioural risk factors, amongst the young in particular, include risk-taking propensity, driver confidence, and lack of driver experience and skill, with speed a main contributing factor [6].

Motor vehicle advertising and marketing

Worldwide, global advertising expenditure in 2005 totalled approximately US$569.8 billion [7], with automotive advertising topping the category list ($22.7 billion). In 2009, 16 of the top 100 global advertisers were automotive companies, who collectively spent US$18.5 billion on advertising [8]. Ten of these companies also appeared in the top 100 national advertisers in the United States (US) in 2010, spending $11.3 billion on advertising [9].

In Australia, the 2010 advertising spend among the automotive sector was only exceeded by that of the retail sector: A$1.06 billion vs. A2.18 billion respectively [10]. In 2004, Toyota, General Motors and Ford Motor Co. were amongst Australia's top ten advertisers [11], and in 2006 were amongst the top 15 Australian advertisers [12].

Motor vehicle manufacturers develop products or product lines targeting specific demographic or lifestyle groups, with many lower-priced 'entry' models clearly targeted at young people. A number of studies, as well as reports in the trade press and advertising texts, describe the nature of appeals in motor vehicle advertising [7, 11, 13-15]. Functional benefits promoted

include fuel economy, driver comfort, ease of handling, safety features, passenger comfort, internal spaciousness, electronic components, engineering design and so on [16, 17]. However, these are often supporting benefits to an overall 'user' positioning, whereby the (potential) owner is depicted in terms of personality or lifestyle, such as young and cool, sexy, progressive, an adventurer, cosmopolitan, sophisticated, and so on. It is also common in motor vehicle advertising targeting young people (and those who think they still are) to show an additional benefit of the owner being admired by a member of the opposite sex. These appeals are embedded in a variety of execution styles, which often include unsafe driving practices [18-20]. Concerns that some content of motor vehicle advertising encourages negative driving behaviours and attitudes are growing in the US, Australia and elsewhere [14, 18, 20, 21].

The impact of advertising

Social Learning Theory [22] suggests that behaviours and values portrayed and rewarded in advertising can have a major influence on viewers, particularly young viewers, and often in unnoticed ways [23-25]. Although children and young people have some awareness of advertising techniques, their ability to cope with the complex constructs and appeals they are exposed to in the current media-saturated environment is limited, and they may be particularly susceptible to certain execution techniques and their associated emotions [14, 26, 27]. Portrayed behaviours can become normalised or aspired to [28]. Hence lifestyle and user positioning executions can have potentially negative effects where portrayed behaviours are inherently undesirable, but are shown being reinforced and without any negative effects [20].

A substantial literature confirms the influence of advertising on the attitudes and behaviours of children and young people [29-32]. Studies on tobacco advertising and promotion show a strong association between tobacco promotions and susceptibility to tobacco use [31, 33-35]: aggressive marketing and advertising to children is related to increased consumption of high energy, non-nutritious foods [26, 36-39] and alcohol advertising has been identified as increasing receptivity to alcohol and alcohol consumption [18, 28, 40-43].

Motor vehicle advertising

While no research was found directly linking the influence of motor vehicle advertising on attitudes and intentions with respect to unsafe driving practices, a number of studies suggest that themes used in motor vehicle advertising may promote and encourage speed and unsafe, risk-taking behaviour, particularly among young people [2, 14, 18, 20, 44-46]. Young people are particularly vulnerable to engaging in impulsive, risk taking behaviours anyway, particularly young males [21, 47]. Young males are also more vulnerable to peer pressure in relation to driving behaviour, and weight the benefits of risky activities more positively than females [14, 44]. The content of motor vehicle advertising uses a variety of mechanisms to appeal to young males, including user positioning and the over-representation of male drivers and male voice-overs [18]. Furthermore, neurobiological changes that are occurring in adolescents may stimulate attraction to impulsive, risk-taking behaviours depicted in motor vehicle advertising [44, 45]. Given advertising's known effects in other areas, and evidence that playing video racing games is related to increased salience of risk-taking cognitions and aggressive road behaviours in simulated driving situations [48], there is a real likelihood that motor vehicle advertising showing unsafe road behaviours in a favourable context will promote more favourable attitudes toward and encourage such behaviours amongst young people.

Advertising regulatory codes

Most countries have restrictions on the amount or type of advertising that can be shown on television and/or when various products can and cannot be shown. Tobacco advertising and promotion are now severely restricted in virtually all developed countries, and increasingly so in developing countries. Mindful of the vulnerability of young audiences, the World Health Organisation has called on member countries to discourage the marketing of junk food to children [49], and self-regulatory codes exist in most countries to limit the sort of benefits and lifestyle aspects that can be associated with alcohol consumption.

Given a concern that some motor vehicle advertising content may have a negative influence on driving attitudes and behaviours, many developed countries have adopted self-regulation codes for motor vehicle advertising. In Europe, the European Advertising Standards Alliance (EASA) [50] represents the collaboration between advertising industry organisations and national advertising self-regulatory organisations (SROs)that apply the principles of a regulatory code of practice of advertising regulation (the International Code of Advertising Practice). The principles of this code are based on a socially responsible approach to motor vehicle advertising and are supported by six detailed rules referring to unacceptable motor vehicle advertising practices: avoiding the portrayal or encouragement of unsafe, inconsiderate or aggressive driving practices; avoiding messages based on speed, performance and acceleration; avoiding encouraging a false sense of security leading to dangerous or irresponsible driving due to advertised technical advances and safety features; showingrespect for the environment; making it clear where appropriate that demonstrationsequences do not take place on the public highway; and adherence to relevant laws, good safety practice and highway codes [50].

The United Kingdom (UK) supplements these principles with more specific standards regulated by the Office of Communications (Ofcom). On UK television, the portrayal of any theme considered to encourage or condone irresponsible driving is tightly and specifically restricted [51, 52]. In the United States, the US Federal Trade Commission protects public interest by monitoring responsible advertising. However, there is no regulatory body specific to motor vehicle

advertising. Media organisations are responsible for policies and standards and advertisers are required to present material that is acceptable [20, 53]. Thus, the decision of whether content is irresponsible or misleading is usually the responsibility of a senior manager representing the manufacturer of the advertisement or the advertised product [20, 53]. US surveys revealed that these managers were more likely to reject advertising due to a breach of taste rather than the protection of consumers from harm [53].

In Australia, the Advertising for Motor Vehicles Voluntary Code of Practice [54] was introduced by The Federal Chamber of Automotive Industries in 2002, in response to growing concern by road safety experts about the level of content in motor vehicle advertisements depicting speed and aggressive driving practices [55]. The Code's purpose is to provide guidance for responsible content of motor vehicle advertising and to govern compliance by advertisers. Provisions provided to advertisers support a responsible approach to advertising, for example in ensuring advertisements do not depict, encourage or condone dangerous, illegal, or reckless driving. The Code guidelines are summarised in Appendix 1. Whilst the Code was reviewed in 2004, with subsequent improvements, it appears that many advertisements remain non-compliant, with unsafe driving practices continuing to be portrayed in car advertisements [15]. In 2005, motor vehicles ads attracted 15% of all product complaints received by the Australian Advertising Standards Bureau, second only to food advertising complaints (21%) [56]. However, few of these complaints were upheld, suggesting that mechanisms for enforcement of the code also need to be reviewed.

Toward a research framework to better monitor motor vehicle advertising compliance: lessons from the monitoring of alcohol advertising

While global concerns over the impact of alcohol advertising on underage youths and young adults resulted in most countries having voluntary or non-voluntary restrictions on the content and screening schedules of alcohol advertising, concerns with non-compliance with these codes spawned considerable research in an attempt to have advertising codes revised and enforced. In Australia, a review of the Australian Beverages and Advertising Code (ABAC) was conducted in 2004. This process resulted in increased compliance with the ABAC by advertisers and a decrease in complaints against alcohol advertising. In 2004, of all advertising complaints received by the national monitoring body, the Advertising Standards Bureau (ASB), the highest number of product category complaints (21%) were in response to alcohol advertisements [56]. Following the review, this proportion decreased in 2005, with alcohol advertising accounting for 7% of complaints received [57].

Research on alcohol advertising is considerably more extensive than that on motor vehicle advertising to date, and provides a possible research framework to assess the impact of motor vehicle advertising on audiences, as well as to inform the content of, and assess compliance with, motor vehicle advertising codes. Studies of alcohol advertising and self-regulatory code compliance can be categorised into three main types of approach:

- content analysis of themes in alcohol ads
- underage youths' and young adults' perceptions of the messages in alcohol ads
- the impact of advertising on underage youths' and young adults' alcohol attitudes, purchase intentions and consumption.

Content analysis of advertisements

Content analysis refers to analysing the major themes in the advertising copy and visuals. These consist of messages about the product being advertised (i.e., product attributes and benefits) and messages about the users of the advertised product (i.e., lifestyle and personality characteristics). These messages may be explicitly stated in the copy or are implicit in the visual signs and symbols used in the execution of the ad. The themes identified in the content analysis can then be mapped against regulatory code articles to indicate whether or not an ad breaches the code.

For alcohol advertising, there have been three types of content analysis studies. In the first type, the authors have simply content-analysed the advertisements and then conducted a broad post hoc comparison with regulatory codes. Most of these types of study have concluded that many alcohol advertisements contain appeals such as sexual and social success and therapeutic benefits that are attractive to young people and *could* contravene their country's alcoholic beverages advertising code [41, 58][59][43, 60]. The major weaknesses in these sorts of studies are that the identified themes are not based on any systematic mapping against the regulatory code articles, and the conclusions with respect to breaches are simply speculative.

The second type of study takes a more systematic approach by using the articles of regulatory codes as the content analysis framework. For example, Donovan et al. [61] used trained coders to assess the content of 93 alcohol advertisements appearing in magazines popular with young people in Australia on 28 measures specifically constructed to reflect the articles of the five sections of the Australian Alcoholic Beverages Advertising Code (ABAC). Their results revealed that 52% of the ads appeared to be in breach of one or other articles in the Code [61].

The content analyses in most studies of regulatory code compliance have been conducted by the authors or members of their research groups and hence have been open to the criticism of a public health bias. To avoid such criticism, Jones and Donovan [66] assessed compliance with the ABAC by using independent marketing experts to judge whether or not nine alcohol advertisements that had been assessed by the Advertising Standards Board (ASB) breached any articles of the

Code. The marketing experts (university professors of marketing) were supplied with a copy of the Code and each of the advertisements and asked to indicate whether each ad breached any Code articles, and if so, which one(s). The majority of the expert judges perceived seven out of the nine alcohol advertisements to be in breach of at least one (or more) of the Code articles. (The Australian Advertising Standards Board had ruled that none of the ads br eachedany articles of the Code.) The use of independent expert judges constitutes a thir d – and the recommended – type of content analysis study to assess regulatory code compliance.

Content analyses of motor vehicle advertising appear to be limited to the first type above. For example, Ferguson, Hardy and Williams [20] analysed 561 US motor vehicle television ads aired in 1998. Trained coders identified 22 themes using various cues to identify these themes; for example the theme of performance was identified by cues including rapid acceleration, vehicle moving at speed, vehicle cornering at speed, and claims of turning radius. Themes depicted in each ad were classified as primary if they were the dominant theme. The results showed that performance was depicted in 50% of all advertisements and was the most frequently depicted primary theme, being the primary theme in 17% of the advertisements. Within the theme of performance, manoeuvrability was the most frequent cue, with speed and power the next most common being present in 49% and 46% respectively of ads with a performance theme [20]. Ferguson et al. [20] imply that such ads would contravene a code that disallowed the use of speed in motor vehicle advertising.

Shin, Hallet, Chipman, Tator and Granton [18] content-analysed 250 automobile and truck advertisements containing a driving sequence greater than three seconds that aired in the United States and Canada over a four year period (1998-2002). Using over 20 cues (such as excess speed, racing, tailgating, no seatbelt, various distractions, and miscellaneous traffic violations), the ads were analysed for content depicting what they considered to be unsafe driving activities. They found that 45% of the ads contained a sequence of unsafe driving. Tamburro et al. [19] content-analysed 191 motor vehicle ads and 41 auto accessories ads screened in the 50 top rating sporting events televised in the US in 2001-2002. They found that 21% of the vehicle ads and 27% of the accessories ads depicted unsafe behaviour. Both Tamburro et al. [19] and Shin et al. [18] comment that televised sports commonly viewed by children appeared to air a large proportion of advertisements portraying risk-taking behaviour.

Following the 2004 review of the Australian Motor Vehicle Advertising Code, Schonfeld, Steinhardt and Sheehan [15] applied Ferguson et al.'s [20] themes framework to 97 ads air ed after the revised code came into effect and 115 ads air ed under the original Code. They found a reduction in the occurrence of 'performance' and 'fun to drive' themes in Australian advertisements. However, within the performance theme, the sub-themes of acceleration and power showed no change, and speed showed a non-significant decline. A more extensive report by the same authors confirmed these results [62], In short, many advertisements were still not compliant with the Australian code.

None of the identified studies systematically content-analysed motor vehicle advertising using self-regulatory codes as the specific theme framework or used expert judges to determine code breaches. However, Shin et al.'s [18] coding frame for unsafe driving practices was developed in conjunction with traffic police and critical care physicians who were able to provide expert opinion on behaviours considered likely to increase the risk of a crash and increase the severity of the consequences of a crash.

Perceived messages in advertisements

For alcohol advertisements, the aim has been to establish whether or not viewers perceive messages in alcohol advertisements that are disallowed by the self-regulatory code [40]. This approach avoids the criticism that even expert judges might disagree on possible code breaches and particularly where the wording of code articles is imprecise or ambiguous. Furthermore, in some cases, a breach of the code might not be literal but conveyed by visual images or symbols. Hence, a further – and logical - check on compliance would be to assess whether audiences perceived messages in ads that were specifically not permitted by the code.

For example, using standard advertising copy test procedures, Jones and Donovan [40] assessed young people's perceived messages in three Australian ads for a vodka–based, pre-mixed alcohol beverage and the extent to which these perceptions appeared to be consistent with the industry's voluntary code (the ABAC). The results indicated that the advertisements appeared to contravene the ABAC in that young people perceived the main messages in the ads to include that consumption of the product contributed to sexual success, social success and a significant change in mood.

With respect to motor vehicle advertising, Chapman and Blows [46] showed Sydney drivers aged 18-35 years a sample of 26 Australian motor vehicle advertisements 'selected because of obvious speed themes'. The ads were screened on Australian television from 2002 to 2003. Respondents were asked to indicate whether the ads featured any of twelve appeals and to rate these appeals as 'very obvious', 'a minor theme' or 'not present'. Over 50% of respondents identified speed as 'very obvious' in 15 of the 26 ads [46]. However, the results also showed that more than 50% did not rate speed as 'very obvious' in 11 of the 26 ads and the authors do not state how many respondents did not think the speed theme was present in each ad. Focus group participants in Sofoulis et al.[14] and Sheehan et al.[62] discussed their perceptions of motor vehicle advertising, but other than Donovan et al.[63, 64] discussed below, no other quantitative studies were found that reported on people's perceived main messages in motor vehicle ads.

Advertising impact on attitudes, intentions and behaviour

While many cross-sectional and longitudinal studies show that alcohol advertising and promotion predict attitudes to alcohol and drinking behaviours, few studies have looked at the immediate impact of specific alcohol advertisements. However, these have confirmed that alcohol advertisements *do* impact attitudes towards alcohol (expectancies), purchase intention and consumption, and primarily via advertising likeability. For example, Miller and Mizerski [65] examined the impact of beer advertising on young Australians aged 12 to 16 years and concluded that beer advertising has a potentially causal influence on underage teens' intentions to consume beer [65].

Chen et al. [58] investigated the affective responses of underage youth to specific elements commonly used in US alcohol television advertisements, such as animated characters, music, storyline and humour. They found that liking of specific elements contributed to the overall likeability of the advertisements and subsequent purchase intent of the product and brand promoted. At a population level, Snyder et al. [42] collected data from random samples of individuals aged 15 to 26 years from households in 24 US media markets as well as alcohol advertising expenditures in these markets. Their results indicated higher rates of alcohol consumption among youth who saw more alcohol advertisements. Further, youth in markets of higher expenditure drank morethan those in markets of lower expenditure. Snyder et al. [42] concluded that alcohol advertising does contribute to increased alcohol consumption of youth.

No motor vehicle advertising studies were found that attempted to systematically assess the impact of motor vehicle advertising on viewers' attitudes towards unsafe driving practices or on actual unsafe driving behaviour.

While assessing perceived message take-out and attitudinal effects are comparable for motor vehicle advertising and other product advertising, assessing the impact of motor vehicle advertising on risk-taking and unsafe driving behaviours is far more challenging than assessing the impact of alcohol, tobacco and food advertising on consumption. However, research for assessing the impact of video games on risk cognitions and driving behaviour could be adapted for this purpose. Fischer et al [48] used measures of risk-related cognitions and risk-related affect to assess the effects of playing racinggames versus neutral games. Such measures could be incorporated in standard copy testing methods applied to measuring motor vehicle advertising effects. Further, following Fischer et al. [48] individuals can be exposed to either motor vehicle advertising depicting risky and unsafe driving or to neutral advertising prior to undertaking simulated critical driving tasks that measure willingness to take risks in traffic situations. The extent to which the former display more risk-taking practices or make more risky decisions would indicate the impact of these depictions.

A research framework for improving motor vehicle advertising compliance with advertising codes

The above review suggests that more focused research would be helpful for identifying motor vehicle advertising that fosters or reinforces undesirable attitudes and behaviours and breaches applicable codes. Following the example of alcohol advertising, it is recommended that research into motor vehicle advertising include both expert content analysis and audience impact of the advertising, and that the results of the research be used to refine and revise self-regulatory codes on an ongoing basis. Following alcohol advertising research, it would be important to assess the impact of motor vehicle advertising on young people under the driving age as well as those of driving age.

Specifically it is recommended that:

(1) A systematic sample of motor vehicle advertising – electronic and print - be drawn on an ongoing annual basis.

(2) Content analysis of advertising themes be undertaken and mapped against code articles to identify possible breaches. Following Jones and Donovan [66] these judgements should be conducted by independent marketing experts using coding frameworks developed in conjunction with road safety experts.

(3) Target audience reactions to the ads, including message take-out, personal relevance and ad likeability be measured, along with impact on attitudes to driving practices. Where applicable, message take-out and other impact measures to be mapped against code articles for potential breaches and specific execution elements identified that impact on undesirable driving practices and attitudes.

(4) Target audience reactions be obtained for both underage youth and licensed drivers with an emphasis towards younger drivers (up to 25 years).

(5) Target audience reaction to the ads should be assessed following copy testing methods commonly used by commercial advertising researchers. These techniques naturally focus on the extent to which the ads can achieve their brand attitude and purchase intentions, and need to be augmented with measures that assess the unintended or undesirable impacts of advertising, in particular in this case, risk-related cognitions and affect. Such copy testing methods have been adopted and adapted for assessing the potential effectiveness for a variety of health and social marketing campaigns, including road safety advertising [67].

(6) Where indicated by the content analysis or audience reaction data, behavioural impact should be assessed using post exposure measures of risk taking in computer-simulated road traffic situations.

Evidence from the above would provide a sound basis to make and support relevant recommendations to better inform the content of motor vehicle advertising regulatory codes and to monitor compliance with these codes.

Target audience reactions to motor vehicle advertising: an example of improved monitoring of code compliance

The Federal Chamber of Automotive Industries (FCAI) Code in Appendix 1 states that the use of fantasy and exaggeration should not be used in a way that undermines the Code. The Code also asks advertisers to consider both explicit and implicit messages conveyed in advertisements. However, a perusal of Advertising Standards Board (ASB) deliberations suggests that members focus on explicit literal interpretations of Code articles in ads and simply ignore any implicit messages. Similarly, ASB members appear to use the fantasy exclusion as justification for dismissing complaints rather than taking steps to assess whether these executions convey messages contrary to the Code. While such actions may be seen to demonstrate a bias towards the advertising industry that employs them for this task, an alternative explanation is that the ASB members are simply not qualified to make judgements about implicit and indirect communications. Hence target audience reactions can be a useful source of information for the ASB when assessing ads against the Code.

In a recently published study [63]the authors selected three motor vehicle ads that had been the subject of speed and other performance complaints to the Australian Advertising Standards Bureau. Complaints about one ad had been upheld but complaints about the other two had been dismissed, largely on the grounds that although vehicular performance attributes were depicted, the ads used 'fantasy' or 'clearly exaggerated' executions to depict these attributes. The implication of the ASB's rulings is that when performance attributes are communicated in exaggerated or fantasy executions, then their impact is largely neutralised. This is a rather puzzling situation for an advertising industry body given abundant evidence that the creative use of visual metaphors or special effects can be equally, if not more, effective at communicating desired messages than literal executions [68, 69], possibly because such executions bypass the critical analyses that literal executions are subject to [70].

We exposed the three complained-about ads to N= 463, 14–55 year olds to assess the extent to which their perceptions of the content of the ads communicated themes that were contrary to the Australian self-regulatory code. Two types of message take-out variables were developed to assess Code compliance: one set relating to literal interpretations of vehicular depictions and messages in the ads and one set relating to indirect messages resulting from vehicular depictions. The first set focused on vehicular attributes being promoted in the ads and whether or not these complied with the Code (reported in [63]), and the second set focused on whether the vehicular depictions promoted positive expectancies about unsafe driving practices (reported in [64]).

With respect to literal Code interpretations, based on vehicular actions in the ads and the articles of the FCAI Code, respondents were asked whether they thought that the advertisement 'implied or suggested' that the advertised vehicle 'can take corners at high speeds', 'can accelerate quickly', and, relative to other vehicles, 'is more powerful' and 'can go faster' (than other vehicles). (Reflecting the claim in the one advertisement, the powerful and faster attributes were measured relative to sports cars). It was found that almost two thirds or more of respondents considered that each of these performance attributes was implied or suggested in all three ads. Overall, approximately 90% of respondents nominated at least one of these performance attributes as being promoted in the advertisement. That is, for the vast majority of viewers, all three advertisements were seen to be promoting the vehicle's performance, and, in particular, power, acceleration or speed capabilities even though the ASB had upheld complaints about only one of the ads. These results confirm that the use of metaphor, fantasy and exaggeration can be equally effective in communicating product attributes - in this case, performance attributes - of motor vehicles. They also show that advertisers can make use of this 'loophole' to avoid the Code's restrictions.

The Code also refers to not depicting driver behaviours that would be illegal. Hence respondents were asked whether the driver behaviour shown in the ad would attract the attention of police, and, if so, what action the police would take. Almost two thirds or more for each ad stated that police would stop the vehicle and issue an infringement notice or an official caution.

With respect to perceptions of positive expectancies about undesirable driving behaviours, again based on the actual vehicle depictions in the ads and the Code articles with respect to performance attributes, respondents were asked whether the advertisement implied or suggested that 'it's cool to drive a powerful car', 'it's a good feeling to go fast', 'you can make other drivers get out of your way when you drive a powerful car',and'it's fun to race other cars'. It was found that almost two thirds or more of viewers considered these advertisements were implying or suggesting 'it's cool to drive a powerful car' and'it's a good feeling to go fast' while approximately one third or more considered that the ads implied or suggested 'you can make other drivers get out of your way when you drive a powerful car' and 'it's fun to race other cars'. Overall, approximately four in five viewers of each ad considered that the advertisement promoted at least one of these positive expectancies.

Given the potential influence of modelling in advertising and as a further measure of implicit messages, respondents were presented with the following alternative driver descriptions and asked to nominate which alternative each advertisement was 'implying or suggesting' described people who drive the advertised vehicle: 'take risks when driving or be very careful when driving; exceed the speed limit when they think they can get away with it or always stay at the speed limit; be an aggressive driver or a courteous driver; try to beat other cars at lights or not try to beat other cars at the lights; take chances when overtaking or not take chances when overtaking'. It was found that between almost two thirds and three quarters of viewers of each advertisement nominated a driver with undesirable characteristics. Overall, almost all respondents nominated at least one undesirable driver characteristic for each of the three ads.

Conclusion

The above findings indicate that the current means of assessing motor vehicle advertising compliance with the FCAI are inadequate. The target audience research shows that ads that clearly breach the Code in terms of promoting speed, depicting reckless and illegal driving and promoting positive expectancies about unsafe driving behaviours, are being endorsed as compliant by the advertising regulatory body the Advertising Standards Bureau. The findings indicate that measuring target audience reactions to ads is a useful - if not necessary (in some cases) - tool for assessment of motor vehicle advertising code compliance. Just as commercial copy testing items and methods have been adopted and adapted to assess the potential effectiveness of road safety advertising (e.g., [67, 71]), the examples described above suggest they also can (and should) be used to assess Code compliance.

Appendix 1. FCAI Voluntary Code of Practice for Motor Vehicle Advertising in Australia*

CODE OF PRACTICE FOR MOTOR VEHICLE ADVERTISING

GUIDANCE TO ADVERTISERS

The FCAI supports a responsible approach to advertising for motor vehicles. FCAI asks advertisers to be mindful of the importance of road safety and to ensure that advertising for motor vehicles does not contradict road safety messages or undermine efforts to achieve improved road safety outcomes in Australia.

Advertisers should ensure that advertisements do not depict, encourage or condone dangerous, illegal, aggressive or reckless driving. Moreover, advertisers need to be mindful that excessive speed is a major cause of death and injury in road crashes and accordingly should avoid explicitly or implicitly drawing attention to the acceleration or speed capabilities of a vehicle.

FCAI acknowledges that advertisers may make legitimate use of fantasy, humour and self-evident exaggeration in creative ways in advertising for motor vehicles. However, such devices should not be used in any way to contradict, circumvent or undermine the provisions of the Code.

In particular, it is noted that use of disclaimers indicating that a particular scene or advertisement was produced under controlled conditions; using expert drivers; that viewers should not attempt to emulate the driving depicted; or expressed in other similar terms, should be avoided. Such disclaimers cannot in any way be used to justify the inclusion of material which otherwise does not comply with the provisions of the Code.

Advertisers should avoid references to the speed or acceleration capabilities of a motor vehicle (for example, "0-100 km/h in 6.5 seconds"). Other factual references to the capabilities of the motor vehicle (for example, cylinder capacity, kilowatt power of the engine, or maximum torque generated) are acceptable, provided that they are presented in a manner that is consistent with the provisions of the Code.

In interpreting and applying the Code, FCAI asks that advertisers take into account both the explicit and implicit messages that are conveyed by an advertisement. Advertisers should make every effort to ensure that advertisements not only comply with the formal provisions of the Code but are also consistent with the objectives and guidelines expressed in these.

GENERAL PROVISIONS

Advertisers should ensure that advertisements for motor vehicles do not portray any of the following:

(a) Unsafe driving, including reckless and menacing driving that would breach any Commonwealth law or the law of any State or Territory in the relevant jurisdiction in which the advertisement is published or broadcast dealing with road safety or traffic regulation, if such driving were to occur on a road or road-related area, regardless of where the driving is depicted in the advertisement.

(b) People driving at speeds in excess of speed limits in the relevant jurisdiction in Australia in which the advertisement is published or broadcast.

(c) Driving practices or other actions which would, if they were to take place on a road or road-related area, breach any Commonwealth law or the law of any State or Territory in the relevant jurisdiction in which the advertisement is published or broadcast directly dealing with road safety or traffic regulation.

(d) People driving while being apparently fatigued, or under the influence of drugs or alcohol to the extent that such driving practices breach any Commonwealth law or the law of any State or Territory in the relevant jurisdiction in which the advertisement is published or broadcast dealing directly with road safety or traffic regulation.

(e) Deliberate and significant environmental damage, particularly in advertising for off-road vehicles.

* *Source: Federal Chamber of Automotive Industries (2004)*

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Drivers' perception of two seatbelt wearing advertisements with different emotional appeals and cultural settings

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Abstract

In this study, a convenient sample of drivers provided their opinions and perceptions of two seatbelt wearing advertisements with different emotional appeals. One advertisement had a more negative emotional appeal (fear) while the other had more a positive emotional appeal (humour). More importantly, they were both produced overseas and one of them was from a very different culture from the viewers. However, both advertisements appeared to possess several of the key message characteristics prescribed by established scientific models. Results revealed that both advertisements were successful in increasing viewers' intention to wear a seatbelt and obey the seatbelt law. In addition, significant correlations were found between these adaptive intentions and several key message characteristics. Results attested to the importance of using established theoretical models when developing a road safety message.

Keywords

Advertisements, Fear appeal, Humour, Road safety, Seatbelt wearing

Introduction

Road crashes are a major cause of deaths and serious injuries in many countries. Around the world, about 1.2 million people are killed each year on the roads [1]. In the United States, for example, there are more than 42,000 traffic fatalities a year and the annual social cost is estimated at over $230 billion [1]. Similarly, about 3000 road users are killed each year on Canadian roads, resulting in an estimated social cost of about $25 billion [2]. Among the various factors contributing to traffic fatalities, not wearing a seatbelt is widely considered as a major fatality risk factor in the event of a crash [3-4], although the overall safety effects of mandatory seatbelt wearing laws have been widely debated [5-15].

One obvious way to encourage vehicle occupants to wear their seatbelts voluntarily is through persuasive communications. Road safety messages have been widely used around the world to modify a variety of driver behaviour, including seatbelt wearing [16-20], drink driving [21-29], speeding [30-38], fatigue [39-40] and red light running [41-45]. It should be noted that while television advertisements remain the most debated and studied, road safety messages have been communicated via many other channels as well, including printed brochures [43-45], billboards [43,45], electronic message boards [37,46-48] and even roadside memorials [42,49]. Also, communications using negative appeal, mostly fear-based, remain the most common [50-53] although positive appeals, like humour, have been used occasionally [54-55].

Objective and significance of study

The purpose of this study is to examine the effectiveness of two seatbelt wearing advertisements that utilise two different emotional appeals: humour and fear. It will extend our knowledge in several important aspects. First, it analyses seatbelt wearing instead of drink driving, and thus will enable us to check the robustness of previous results [55] with respect to different risky behaviours. Second, it includes a sample of taxi drivers in addition to the usual sample of university students used in most studies.

Third, it utilises two advertisements that are both made overseas from the viewers' perspective. One video is made in the United Kingdom (UK) which has a similar culture to Canada but drives on the other side of the road and the characters in the video have a very distinctive UK accent. It is clear to the viewers that the advertisement is made in the UK. The other video is made in Malaysia and in the Malay language although English subtitles are added for the critical messages. The characters in the video are Asians and the driver is also driving on the other side of the road. The important question that can be examined indirectly is whether these communication messages are universally effective, when examined within a scientific conceptual framework, or whether they are ineffective because of the lack of local context and relevance.

Last but not least, this study examines the relationship between adaptive intention and the key message characteristics derived from relevant behavioural change and communication theories. The importance of utilising established scientific theories in the evaluation of road safety countermeasures cannot be overstated. First, it advances our understanding of how or why the measures implemented are effective or not. Second, it provides a scientific basis for the selection of variables and statistical methods. Third, it allows us to generalise the findings within the conceptual framework used. Finally, it provides theory and evidence-based recommendations to develop more effective road safety messages in the future.

Conceptual framework

A review of the literature found many behavioural change models that can be used to assist in the development of a successful communication message and/or education campaign [43]. These models include the Functional Theory of Behaviour, the Theory of Planned Behaviour, the Persuasive Communications and the Elaboration Likelihood Model, Kotler's 4 Ps of Marketing, the Trans-Theoretical Model of Change, the Health Belief Model, Fear Appeals, the Social Cognition Model and the Economic Model of Consumer Choice. Note that some of these models can be used to guide the development and implementation of the campaign or program while others can be used to guide the design of the message itself [43].Since this study examines the efficacies of two seatbelt wearing videos and not the entire campaign, several of the more relevant models that are used to guide the questionnaire design will be summarised.

The Elaboration Likelihood Model (ELM), for example, hypothesises that persuasive communication should comprise two routes: a central route that focuses on the logical or rational motivation for change and a peripheral route that focuses more on the extrinsic qualities of the argument such as credibility and other source characteristics.

In the Health Belief model (HBM), the likelihood of the individual taking the recommended preventive health action is assumed to be dependent on the perceived benefits of taking the preventive action minus the perceived barriers to taking the preventive action. In effect, this assumption is similar to the economic theory of consumer choice or the utility maximisation theory. This net benefit of the preventive action is then weighed against the perceived threat of not taking preventive action or the perceived cost of not taking the preventive action. The perceived cost of not taking action is in turn derived from the perceived susceptibility or the likelihood of a crash and the severity of the crash. Educational and publicity campaigns, therefore, should aim to increase this perceived threat. According to this model, road safety campaigns act as a cue to action and should highlight the likelihood and severity of a crash.

Many theoretical models have been developed that utilise fear as an appeal or motivation to behaviour change including the protection motivation model, the parallel response model and the extended parallel process model. The key constructs in the Extended Parallel Process Model (EPPM) are fear (driving force or motivation for change), response efficacy (coping strategies shown) and self-efficacy (perceived personal control over behaviour). Essentially, the model hypothesises that if the level of fear arousal and message efficacy are both high, then the individual will engage in adaptive behaviour (adopt recommended behaviour) to deal with the health threat portrayed; whereas, if the level of fear is high but the message efficacy is low, then the individual will engage in maladaptive behaviour (defensive avoidance mechanisms) to reduce the fear.

In summary, most of the theoretical models target two things at varying degrees: threat associated with the risky behaviour and the benefits associated with adopting the safe driving behaviour. These constructs have to be clearly perceived by the audience as they form the central route of persuasion, which is the basic logical or rational motivation for change. The behaviour targeted should be very specific and clearly illustrated in the message, and the logic and arguments (actions and consequences) shown have to be realistic and convincing.

In addition to the central route, the peripheral route of persuasive communication stresses the need for the message to be delivered in a credible manner and the use of an independent and trustworthy source will enhance the likelihood of the message being accepted. Finally, the use of emotions such as fear, shame or guilt, to increase the drive for behaviour change should also be considered.

Method

The simplest and most widely used approach to examine the audience's perception of an advertisement was to conduct a questionnaire survey. The survey was approved by the Conjoint Faculty Research Ethics Committee of the University of Calgary. During the recruitment, participants were informed that the aim of the project was to examine drivers' perceptions of two road safety advertisements and no other information about the nature of the advertisements or focus of the study were provided. The two advertisements to be evaluated were shown to the participants and the participants were then asked to provide their opinions of the advertisements. The two videos were shown in random order to different participants to reduce any potential order effects.

Participants

A total of 212 drivers from the city of Calgary in Canada participated in the survey. The participants were recruited from two convenient locations: a local university and the taxi holding area (designated car parks where taxis wait before proceeding to the passenger pick up areas) at the Calgary airport. University students represented the young driver population who were over-represented in traffic collisions, while the taxi driver population was explicitly targeted because a large percentage of these professional drivers would not wear seatbelts regularly. Hence, these two sub-populations formed a significant portion of the target population for any seatbelt wearing advertisements.

Of the 212 drivers, 59% were university students, 28.3% were taxi drivers while the remaining12.7% consisted mostly of staff working at these locations. In terms of demography, 35% of the sample were female while the remaining 65% were male as compared to the 41.7% of female and and 52.9%of male drivers in the province of Alberta [56]. The age distribution of the respondents was: under 30 years (54.7%), 30-49 (33.5%), and 50 and above (11.8%). Hence, this sample was younger

than the driving population in Alberta [56] due largely to the over-representation of university students. The slight differences in the participants profile were expected since sampling was focused on two targeted sub-populations. Nevertheless, care should be exercised when interpreting the results of this exploratory study since the sample might not be representative of the general driving population.

Materials

Two videos were used in this study. One video was produced in Malaysia by the vehicle manufacturer Proton Saga as a community message and available at several YouTube sites (e.g., http://www.youtube.com/watch?v=niCX8e0YglE). The advertisement showed a young female driving in the evening on a deserted road; the driver sneezed and a ghost in the backseat handed her a tissue; the driver screamed and jammed on her brakes; the ghost was flung out of the vehicle as the vehicle came to an abrupt stop; another ghost approached the ejected ghost and slapped her on her head and said, 'Next time, wear your seatbelt in the backseat'. This advertisement utilised mostly humour as an emotional appeal although there might be some fear incorporated as well. More importantly, this video was selected as a humour-based advertisement because many of the comments posted on the website described it as humorous (e.g., 'hilarious!!!', 'can still make me laugh after all these years', 'lol', 'hahaha' etc).

The second video was produced in the United Kingdom and also readily available on the internet and several YouTube sites (e.g., http://www.youtube.com/watch?v=-Kv2SULi-wg). It showed four young adults in a vehicle that was involved in a collision. The one unbelted passenger was hurled around in the vehicle, killing the other three occupants as well as seriously injuring himself. The crash scenes were quite graphic and bloody, thus focusing on fear as an appeal. The advertisement continued with an emergency worker saying, 'Three dead and one seriously injured; the one without the seatbelt did the damage' and then ended with the caption 'No Seatbelt, No Excuse'.

To validate assumptions on the different emotional appeals, participants were asked if they agreed or disagreed that the advertisements shown were frightening and/or humorous using the standard 5-point Likert scale. For ease of statistical analysis, the following coding scheme was used: 'Strongly Disagree'=1; 'Disagree'=2; 'Neutral'=3; 'Agree'=4; 'Strongly Agree'=5. The distribution (%) of the responses were tabulated and reported in Table 1.

Table 1. Emotional appeals assumed and perceived in videos

Item	SD	D	N	A	SA	Mean
Humour-based video						
The advertisement shown is frightening	26.8	26.9	20.8	19.3	6.1	μ_f^h =2.51
The advertisement shown is humorous	13.2	9.0	19.8	44.3	13.7	μ_h^h =3.36
Fear-based video						
The advertisement shown is frightening	2.4	3.8	18.4	49.5	25.9	μ_f^f =3.93
The advertisement shown is humorous	54.7	23.1	9.0	9.4	3.8	μ_h^f =1.84

Note: Mean calculated using: Strongly Disagree (SD) = 1; Disagree (D) = 2; Neutral (N) = 3; Agree (A) = 4; and Strongly Agree (SA) = 5.

Table 2. Test of emotional appeals in videos

Test No.	Null Hypothesis	Alternate Hypothesis	t-statistic	p-value	Degrees of Freedom
		Humour-based video is humorous			
1	$\mu_h^h = 3$	$\mu_h^h > 3$	4.34	< 0.01	211
2	$\mu_f^h = 3$	$\mu_f^h < 3$	-5.74	< 0.01	211
3	$\mu_h^h = \mu_f^h$	$\mu_h^h > \mu_f^h$	6.24	< 0.01	211
		Fear-based video is frightening			
4	$\mu_f^f = 3$	$\mu_f^f > 3$	15.01	< 0.01	211
5	$\mu_h^f = 3$	$\mu_h^f < 3$	-14.56	< 0.01	211
6	$\mu_f^f = \mu_h^f$	$\mu_f^f > \mu_h^f$	20.33	< 0.01	211
		Comparison of the two videos			
7	$\mu_h^h = \mu_h^f$	$\mu_h^h > \mu_h^f$	13.35	< 0.01	211
8	$\mu_f^f = \mu_f^h$	$\mu_f^f > \mu_f^h$	14.07	< 0.01	211

Table 3. Summary statistics of message characteristics and driver intentions for humour -based and fear-based videos

Item No.	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Humour-based video							
1	This video shows me that the threat associated with not wearing a seatbelt is very severe	5.7	16.0	19.3	42.0	17.0	μ_1^h =3.49
2	This video shows me that the threat associated with not wearing a seatbelt is likely to happen to me	9.9	25.5	23.6	33.0	8.0	μ_2^h =3.04
3	This video provides a clear strategy to cope with the danger of not wearing a seatbelt	9.0	25.9	25.9	26.4	12.7	μ_3^h =3.08
4	This video shows me a way to cope with the dangers of not wearing a seat belt that is effective	7.1	24.5	34.9	25.9	7.5	μ_4^h =3.02
5	This video shows me a way to cope with the dangers of not wearing a seatbelt that I am willing to do	9.0	17.0	36.8	31.6	5.7	μ_5^h =3.08
6	The benefits of adopting the strategy shown to avoid the danger are very clear to me	6.6	12.7	30.2	40.1	10.4	μ_6^h =3.35
7	The cost of not adopting the strategy shown to avoid the danger is very clear to me	4.7	16.5	29.7	38.7	10.4	μ_7^h =3.33
8	The driving situation and message in video shown are realistic and credible	21.7	18.9	24.5	25.5	9.4	μ_8^h =2.82
9	The video increases my intention to wear a seatbelt while driving	6.6	19.0	33.2	28.0	13.3	μ_9^h =3.22
10	The video increases my intention to obey the 'seatbelt law'	7.5	17.0	31.6	31.6	12.3	μ_{10}^h =3.24
Fear-based video							
1	This video shows me that the threat associated with not wearing a seatbelt is very severe	0.9	0.5	2.8	44.8	50.9	μ_1^f =4.44
2	This video shows me that the threat associated with not wearing a seatbelt is likely to happen to me	2.4	5.7	18.9	42.9	30.2	μ_2^f =3.93
3	This video provides a clear strategy to cope with the danger of not wearing aseatbelt	0.9	5.7	21.2	43.9	28.3	μ_3^f =3.93
4	This video shows me a way to cope with the dangers of not wearing a seatbeltthat is effective	1.9	9.4	21.2	42.0	25.5	μ_4^f =3.80
5	This video shows me a way to cope with the dangers of not wearing a seatbelt that I am willing to do	1.9	8.0	16.5	45.8	27.8	μ_5^f =3.90
6	The benefits of adopting the strategy shown to avoid the danger are very clear to me	0.9	5.2	11.3	46.2	36.3	μ_6^f =4.12
7	The cost of not adopting the strategy shown to avoid the danger is very clear to me	0.5	1.4	9.4	47.6	41.0	μ_7^f =4.27
8	The driving situation and message in video shown are realistic and credible	0.5	3.8	14.6	43.9	37.3	μ_8^f =4.14
9	The video increases my intention to wear a seatbelt while driving	0.0	4.7	12.7	43.9	38.7	μ_9^f =4.17
10	The video increases my intention to obey the 'seatbelt law'	0.5	3.3	17.9	42.0	36.3	μ_{10}^f =4.10

Note: Mean calculated using 'Strongly Disagree'=1; 'Disagree'=2; 'Neutral'=3; 'Agree'=4; 'Strongly Agree'=5.

Several t-tests were then conducted to check these assumptions and the results were reported in Table 2. Results showed that viewers perceived the humour-based video to be quite humorous (test 1) but not very frightening (test 2). Also, more viewers perceived the humour-based video to be humorous than frightening (test 3). Hence, it was possible to conclude that the humour-based video was perceived by viewers as a humorous video.

Second, viewers perceived the fear-based video to be quite frightening (test 4) but not very humorous (test 5). Also, more viewers perceived the fear-based video to be frightening than humorous (test 6). Hence, it was possible to conclude that the fear-based video was perceived by viewers to be frightening.

Finally, viewers perceived the humour-based video to be more humorous than the fear-based video (test 7). Moreover, they perceived the fear-based video to be more frightening than the humor-based video. Hence, it could be concluded that the two videos were clearly differentiated in terms of emotional appeal and our assumptions regarding their respective emotional appeals were valid.

Variables and Analysis

The main part of the questionnaire consisted of ten items measuring the respondents' perceptions of the advertisements (Table 3). The items were adapted from similar questionnaires used in previous studies [23, 34, 37, 39, 53-56]. The first two items measured the perceived severity and likelihood of threat (HBM). Item 3 measured the perceived message efficacy (EPPM) while the next two items measured self-efficacy (EPPM). Items 6 and 7 measured the perceived cost of threat and benefits of adopting the coping strategy (HBM). Item 8 measured realism and credibility of the message (ELM). Finally, items 9 and 10 measured adaptive intentions (HBM, EPPM).

Participants' responses were measured using the standard 5-point Likert Scale. For ease of analysis, the following coding scheme was used: 'Strongly Disagree'=1; 'Disagree'=2; 'Neutral'=3; 'Agree'=4; 'Strongly Agree'=5. First, the distributions of the responses obtained for each item were tabulated to provide an overall picture of the participants' perceptions of the videos. Second, the mean responses were calculated and reported to provide a simple way to interpret and compare the different items. Of particular interest to this study were the mean responses of items 9 and 10 which measured the effectiveness of the videos in terms of the respondents' intention to wear a seatbelt and obey the seatbelt law.

Third, to check that the message had increased the viewers' adaptive intention, four t-tests were conducted to confirm that these mean scores were significantly higher than the neutral score of 3. Fourth, eight t-tests were conducted to check for differences in viewers' ratings of the key message characteristics in the two videos. Fifth, to compare the relative effectiveness of the two videos, two t-tests were also conducted to confirm that the differences in the mean scores for adaptive intentions were statistically significant.

Sixth, the correlations between the effectiveness of the videos and their message characteristics were computed to test the validity of the measures and the underlying models used. Finally, a series of t-tests were conducted to validate the statistical significance of the correlation coefficients.

Results

The summary of the results from the survey are reported in Table 3. Overall, both videos performed relatively well, with the majority of the respondents perceiving the key message characteristics in the video. More importantly, a relatively large share of the respondents agreed or strongly agreed with the statements that the videos increased their intentions to wear a seatbelt (item 9) and to obey the seatbelt law (item 10).

Effectiveness of videos

To test the hypotheses that the two videos were effective, several t-tests were conducted and their results are reported in Table 4. The mean scores for both adaptive intentions items for both videos were found to be significantly larger than the

Table 4.Testing the effectiveness of the videos

Test No.	Null Hypothesis	Alternate Hypothesis	t-statistic	p-value	Degrees of Freedom
		Humour-based video is effective			
1	$\mu_9^h = 3$	$\mu_9^h > 3$	2.93	< 0.01	211
2	$\mu_{10}^h = 3$	$\mu_{10}^h > 3$	3.16	< 0.01	211
		Fear-based video is effective			
3	$\mu_9^f = 3$	$\mu_9^f > 3$	20.59	< 0.01	211
4	$\mu_{10}^f = 3$	$\mu_{10}^f > 3$	19.08	< 0.01	211
		Comparison of the two videos			
7	$\mu_9^f = \mu_9^h$	$\mu_9^f > \mu_9^h$	11.11	< 0.01	211
8	$\mu_{10}^f = \mu_{10}^h$	$\mu_{10}^f > \mu_{10}^h$	10.78	< 0.01	211

Table 5. Correlations between message characteristics and driver intentions for humour -based and fear-based videos

Items	Wear Seatbelt		Obey Law	
	Coefficient	p-value	Coefficient	p-value
Humour-based video				
This video shows me that the threat associated with not wearing a seatbelt is very severe	$\rho^{h}_{1,9}=0.515$	< 0.01	$\rho^{h}_{1,10}=0.566$	< 0.01
This video shows me that the threat associated with not wearing a seatbelt is likely to happen to me	$\rho^{h}_{2,9}=0.441$	< 0.01	$\rho^{h}_{2,10}=0.487$	< 0.01
This video provides a clear strategy to cope with the danger of not wearing a seatbelt	$\rho^{h}_{3,9}=0.456$	< 0.01	$\rho^{h}_{3,10}=0.417$	< 0.01
This video shows me a way to cope with the dangers of not wearing a seatbelt that is effective	$\rho^{h}_{4,9}=0.476$	< 0.01	$\rho^{h}_{4,10}=0.449$	< 0.01
This video shows me a way to cope with the dangers of not wearing a seatbelt that I am willing to do	$\rho^{h}_{5,9}=0.360$	< 0.01	$\rho^{h}_{5,10}=0.397$	< 0.01
The benefits of adopting the strategy shown to avoid the danger are very clear to me	$\rho^{h}_{6,9}=0.364$	< 0.01	$\rho^{h}_{6,10}=0.361$	< 0.01
The cost of not adopting the strategy shown to avoid the danger is very clear to me	$\rho^{h}_{7,9}=0.401$	< 0.01	$\rho^{h}_{7,10}=0.372$	< 0.01
The driving situation and message in video shown are realistic and credible	$\rho^{h}_{8,9}=0.500$	< 0.01	$\rho^{h}_{8,10}=0.584$	< 0.01
Fear-based video				
This video shows me that the threat associated with not wearing a seatbelt is very severe	$\rho^{f}_{1,9}=0.228$	< 0.01	$\rho^{f}_{1,10}=0.255$	< 0.01
This video shows me that the threat associated with not wearing a seatbelt is likely to happen to me	$\rho^{f}_{2,9}=0.325$	< 0.01	$\rho^{f}_{2,10}=0.319$	< 0.01
This video provides a clear strategy to cope with the danger of not wearing a seatbelt	$\rho^{f}_{3,9}=0.394$	< 0.01	$\rho^{f}_{3,10}=0.348$	<0.01
This video shows me a way to cope with the dangers of not wearing a seatbelt that is effective	$\rho^{f}_{4,9}=0.286$	< 0.01	$\rho^{f}_{4,10}=0.310$	< 0.01
This video shows me a way to cope with the dangers of not wearing a seatbelt that I am willing to do	$\rho^{f}_{5,9}=0.284$	< 0.01	$\rho^{f}_{5,10}=0.253$	< 0.01
The benefits of adopting the strategy shown to avoid the danger are very clear to me	$\rho^{f}_{6,9}=0.369$	< 0.01	$\rho^{f}_{6,10}=0.358$	< 0.01
The cost of not adopting the strategy shown to avoid the danger is very clear to me	$\rho^{f}_{7,9}=0.366$	< 0.01	$\rho^{f}_{7,10}=0.347$	< 0.01
The driving situation and message in video shown are realistic and credible	$\rho^{f}_{8,9}=0.374$	< 0.01	$\rho^{f}_{8,10}=0.337$	< 0.01

neutral score of 3, indicating that the majority of the sample agreed or strongly agreed that the videos increased their intentions to wear a seatbelt and obey the seatbelt law. Hence, we could conclude that both these videos were effective in improving safe driving behaviours.

As shown in Table 4, the mean score for the two adaptive intentions items (items 9 and 10) were higher for the fear-based video than the humour-based videoand these differences were statistically significant. Hence, we could conclude that the fear-based video was more persuasive than the humour-based video although both messages were effective in changing drivers' adaptive intentions.

Relationships between key message characteristics and effectiveness

To examine the effects of key message characteristics on adaptive intentions, the correlation coefficients between the two

items measuring adaptive intentions and the key message characteristics for the two videos were computed and are reported in Table 5. The correlation coefficients were fairly moderate and ranged from 0.228 to 0.584. The positive coefficients indicated that an increase in these key characteristics perceived in the messages was associated with an increase in the effectiveness of the messages. Moreover, all the estimated correlation coefficients were statistically significant, providing some support for the various theoretical models discussed in the conceptual framework used.

Discussion and conclusion

Publicity campaigns and safety messages have been used in many areas to change viewers' behaviour, from risky driving to applying sunscreen, with varying degrees of success. In the road safety arena, one highly debated topic is the effectiveness of seatbelt wearing publicity campaigns [17-20]. From a scientific perspective, this confusion is not surprising because many of the road safety publicity campaigns and messages are not developed based on established theoretical models but on professional best practices in commercial advertising which often have a different focus or purpose.

This study reviewed some relevant behaviour change and persuasive communications models to identify eight key message characteristics that are significant determinants of the effectiveness of health and safety messages and can be used to design and evaluate typical road safety messages. In designing a road safety message, transportation authorities and other policy-makers should focus on ensuring that the message shows: the threat associated with the targeted behaviour is severe; the likelihood of a threat happening to the viewer is high; a coping strategy that is effective; a coping strategy that the viewer is willing to do; the benefits of adopting the coping strategy is clear; the cost of not adopting the coping strategy is clear ; and the driving situation and message are realistic and credible.

To test the validity of the conceptual frameworks used, two seatbelt wearing advertisements with these key characteristics were shown to a convenient sample consisting mainly of college students and taxi drivers. It was found that both advertisements were effective in changing viewers' intentions to wear a seatbelt and to obey the seatbelt law, despite having different emotional appeals and different cultural settings. These results attested to the importance of using a formal theoretical model or a conceptual framework based upon established scientific theory when developing road safety messages. The role of local context and relevance appeared to be of secondary importance and should be used mainly to enhance these key message characteristics.

It should be noted that the sample consisted of more male than female participants. In terms of message relevance, the humour-based video featured only female vehicle occupants while the fear-based video featured two male and two female occupants, although the unbelted occupant who killed the others was a male passenger. Hence, there might be some potential gender bias [52-55] in the responses. However, this was not expected to be significant because of the strength of the key message characteristics which formed the central route of persuasion and the clear cultural differences in the videos which should have dominated any gender bias due to message relevance.

Although the messages were evaluated for their emotional appeals and validated, a quarter of the participants considered the humour-based video to be frightening while an eighth of the respondents considered the fear-based video to be humorous. Nevertheless, the expected emotional appeals were found to be quite dominant in the videos shown and any potential confounding effects should be relatively small. It should also be stressed that the design and development of humour-based videos would not require the inclusion of any threat, especially physical threat, even though this characteristic would be somewhat difficult to avoid in most road safety advertisements.

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How important is community support to the success of the National Road Safety Strategy?

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Sir Robert Peel is regarded as the father of modern policing. He developed a set of principles to guide the emerging Metropolitan Police in the London of the 1800s. Included in his set of principles was the observation that ' The ability of the police to perform their duties is dependent upon the public approval of police actions'. This concept remains current across modern policing organisations and, if you visit the homepage of the New Westminster Police Service you will see the principle prominently displayed as part of their mission statement [1]. Peel's observation about the need for public support raises the question as to whether the same principle applies to road safety efforts i.e. whether public support is required to achieve the road safety targets such as those proposed in the National Road Safety Strategy [2]. In this paper, it is argued that the support of the public is crucial to achieving these targets particularly given community attitudes towards issues such as speeding.

The primary influencers of public opinion

The news media play a significant role in defining Australia's road crash problem. The news media also provide commentary on the effectiveness of proposed interventions and, as we have seen recently in relation to speed camera operations in NSW [3], the media exerts significant pressure on the political process by campaigning against some road safety countermeasures. The media do this in two main ways: by defining what is 'normal' through the use of thematic framing devices, and by creating spurious debates about the effectiveness of proposed interventions.

The news media normalise the 'crash as accident' scenario whereby road users are killed by seemingly unpredictable events. The media is full of stories about the human tragedy associated with road trauma: a family is lost, children are orphaned, a promising student is killed. The pattern is repeated and packaged in a predictable way: scenes of mangled wreckage, an ambulance leaving the scene, an interview with emergency service personnel who typically describe the crash as 'the worst they have seen'. Grieving relatives and community leaders mourn the loss. What is missing from these narratives is a discussion of risk factors and possible counter-measures – information that could improve community understanding of these issues.

The message coming out of this coverage is one of unexpected and unpreventable loss. This view is reinforced by the language surrounding the crash event: police 'accident' report forms, police 'accident' investigation teams and 'accident' databases. These terms imply official reinforcement of the accident-paradigm, as do quotes from emergency responders.

An accident, by definition, is an unpredictable event beyond the control of the individual – according to the Oxford dictionary 'an incident that happens by chance or without apparent cause'. Overseas researchers argue that describing crashes as 'accidents' fails to convey important safety information and potentially builds barriers that may block or inhibit the adoption of road safety countermeasures. In many respects those that are least qualified to comment, the news media, reinforce and restate the public narrative around crashes and it is easy to understand why. There is no real challenge to the existing paradigm and, on the rare occasions where road safety authorities speak out, they are immediately mired in conflict.

This phenomenon was illustrated when racing car driver Mark Skaife called for higher speed limits and better training for car drivers. The comment generated considerable debate in the news media [4]. The reporting suggested road safety laws were turning Australia into a 'nanny state' where the community is burdened by unnecessary regulation. The debate provided an opportunity, in the broadsheets at least, for a detailed scientific response from road safety experts [5]. As with all such debates the quick news 'grab' and emotive response dominated, particularly in the electronic news media, and a much smaller number of media consumers would have been exposed to the contextual arguments put forward by Mooren and Grzebieta [5].

The annual report produced by the Productivity Commission into Government Service Provision (which contains a chapter on Police and a section on Road Safety) indicates there is a significant proportion of the population regularly exceeding the speed limit by 10 kilometres per hour or more [6]. This suggests that the issue of speed remains a contested area with the public holding different views (as reflected in their on-road behaviour) to those involved in trying to improve safety and reduce road trauma.

As Tom Vanderbilt, a keynote speaker at the 2010 National Road Safety conference, writes on his blog *How We Drive*:

> Since the car was invented, drivers have been reluctant to give up what they see as their 'rights,' even as these supposed rights keep changing. This is why, for example, cars are sold without 'speed governors,' a device that would greatly reduce, if not eliminate, the illegal — let's call it what it is — act of speeding, and certainly reduce fatalities and injuries. It took years for people to accept that drinking and then getting behind the wheel was not a good idea, and obviously many still do think it's acceptable. As the science emerges that cell phone conversations, not simply dialing, can seriously impair a driver's attention and reaction times, the

> very reasons we criminalise drunken driving, I'm not sure what the distinction is that should be made if a driver kills a pedestrian while drunk versus while on their cell phone, or for that matter who kills a pedestrian because they were driving 25 miles over the speed limit. Does one get years in jail and the other a slap on the wrist? Don't they both show an equal disregard for the law? People are leery of imposing stricter laws on negligent driving because it's always been viewed as a 'folk crime,' like fudging your taxes, sort of widespread and not as serious as others. People are reluctant to criminalise what they see as 'normal'behaviour. But how did it become normal behaviour?[7]

Media framing of speeding as 'normal' driving behaviour and speed cameras as 'revenue raisers' is a major impediment to improving road safety outcomes. Recent reviews of speed camera operations in NSW and the UK have further reinforced this populist perception. On achieving government in NSW, the new Premier, Barry O'Farrell, immediately ordered the Auditor-General to conduct an audit to address motorists' concerns that cameras had been used as mere cash cows. The NSW Auditor-General found overall there was no evidence that the state's speed cameras are used as revenue raisers; however, he found that 38 of the 141 fixed cameras should be examined 'as they appear to have no significant road safety benefit' [3] thus reinforcing public concerns about the cameras' effectiveness.

Public mistrust of speed cameras appears universal. The UK Parliamentary Office of Science and Technology noted:

> National news coverage of speed cameras, especially in the tabloid press, has been largely negative. The word 'scameras' has been widely used and campaigns have been run to discredit the Partnerships by suggesting that safety is not their primary aim. Vandalism of cameras is often reported in the press, with cameras shot at, spray painted, set on fire and even bombed.[8]

Another factor impacting on public perceptions of what is safe is the marketing of motor vehicles. The issue came to a head in 2002 with the relevant Federal Minister, Senator Boswell, noting '…on the one hand we have governments and safety organisations spending millions of dollars to remind the public that speed kills, but on the other hand we have even more money being spent on car ads that promote excessive speed' [9]. The Federal Chamber of Automotive Industries (FCAI) subsequently introduced its 'Advertising for Motor Vehicles Voluntary Code of Practice' in August 2002 for newly-produced advertisements, expanding its scope in December 2002 to apply to all Australian motor vehicle advertisements. The code was revised in July 2004 as a result of stakeholder feedback.

A research project [10] was undertaken in 2004 to evaluate the effectiveness of the Australian code and its subsequent revision in regulating the content of motor vehicle advertising in this country. A random sample of 380 Australian motor vehicle manufacturer advertisements from 1999-2004 was selected for the study to enable a comparison of content before and after the introduction of the voluntary code and its revision. As noted by the researchers, the most encouraging result coming out of the study was that the occurrence of the primary themes of 'Performance' and 'Exciting/Fun to drive', both of which have some sub- themes which could be interpreted as encouraging unsafe driving, have diminished significantly since the code was introduced. The researchers noted 'While this is a positive outcome, if indeed performance themes in advertisements are likely to encourage unsafe driving practices, then it would be desirable to encourage manufacturers to continue this good work and steadily reduce the occurrence of performance in future motor vehicle advertisements. The continued 'educative process' of manufacturers described in the revised code may serve an important purpose of encouraging safe depictions in motor vehicle advertising' [10]. Concerns remain about the marketing of certain vehicles and the undue emphasis on excessive power and speed.

Clearly, speeding is a major issue and this has been acknowledged in the NRSS:

> Speed is highly implicated in a large proportion of serious casualty crashes. As well as having a direct causal role in many instances, speed contributes significantly to the severity of most crashes. Measures addressing vehicle speed can mitigate the severity of crashes regardless of the underlying reasons for the crash. The speed problem is partly a behavioural issue, with motorists frequently choosing to travel at illegal or inappropriate speeds. However, speed limits across the network should be aligned with Safe System principles. [2]

The question needs to be asked as to whether the NRSS has placed appropriate emphasis on addressing the broader social factors impacting on community attitudes towards issues like speeding? The following argues that more needs to be done.

Marketing the National Road Safety Strategy

The National Road Safety Strategy 2011-2020(NRSS) was released on 20 May 2011 by the Australian Transport Council. The strategy is 'founded on the internationally recognised 'Safe System' approach formally endorsed by the OECD' [2]. This approach accepts that people using the road network will make mistakes and therefore the whole system needs to be more forgiving of those errors. The strategy acknowledges that 'road safety is a shared responsibility' and that 'achieving lasting change will require governments, industry and the broader community to work together'.

The NRSS envisages that in order to achieve its targets, cultural change will need to occur, that is 'we all need to change the way we think and act in relation to road safety'; **its ultimate success will depend on the willingness of individual community members and organisations to support the changes that are needed** (highlighting added). In releasing the strategy, the Australian Transport Council identified the need to promote public understanding of key policy directions

in road safety and encourage public discussion about new road safety proposals. The need to engender public support for road safety policy is therefore a key part of the strategy and is critical to its success. The strategy provides limited details of how this might be achieved noting that 'Council plans to develop a National Road Safety Strategy website as a prime means of sharing road safety information and reporting on progress'. The strategy also indicates that it will ensure that public education campaigns and resources are aligned with the Safe System objectives of this strategy. This suggests a continuation of existing public education strategies that focus on tactical road safety campaigns about specific countermeasures and restricts policy debates to a small number of, largely internal, key stakeholders. Unfortunately, the news media tend not to be embraced as key stakeholders in road safety strategies [11]. More on this later.

Whilst the creation of a website is a good idea, most road safety authorities already have them. What is needed is a strategy that identifies and addresses fundamental community norms about issues like speeding. If we accept the proposition that road safety authorities need the support of the community to achieve their objectives, a more active engagement than proposed under the NRSS is required. The difficulties in achieving this are acknowledged but there are pointers to the way forward.

Leadership

France provides an example of the impact of executive leadership in improving road safety outcomes and engendering community support. As noted by the Federation Internationale de l'Automobile (FIA) [12], for many years the road safety situation in France was disturbing with the numbers killed and injured significantly higher than in some neighbouring countries. In 2002, in his Bastille Day address, President Chirac announced that road safety was one of the top priorities of his new presidential term. As observed by the FIA, road safety is not traditionally a subject that Heads of State make a major theme of one of their most important speeches of the year. But President Chirac did just that. And he encouraged his Ministry of Transport, the police, public authorities and above all the French people to take action to promote road safety. Notable progress has been achieved since that time. President Chirac was subsequently awarded the first FIA World Prise for Road Safety, the Environment and Mobility.

Sweden provides another example of national leadership with the adoption of its Vision Zero road safety philosophy with the aim that, eventually, no one will be killed or seriously injured within the road transport system. In October 1997, the Road Traffic Safety Bill founded on Vision Zero was passed by a large majority in the Swedish parliament. The Vision is an expression of the ethical imperative that 'It can never be ethically acceptable that people are killed or seriously injured when moving within the road transport system'[13].

Vision Zero changes the emphasis in responsibility for road traffic safety. In all current road transport systems, the road user has almost total responsibility for safety. In most countries, there are general rules that the road user should behave in such a way that crashes are avoided. If a crash occurs, at least one road user has, by definition, broken a general rule and the legal system can therefore act. The results in Sweden have been dramatic with fatalities on Swedish roads falling from 541 in 1997 to 431 in 2006 and a fatality rate that is amongst the lowest in the OECD.

The Australian political system is significantly different to that of France and Sweden. However, there is an opportunity for the Prime Minister, perhaps in conjunction with the Premiers, to more actively prosecute the road safety agenda. As we head towards the London 2012 Olympic Games, there is already much discussion surrounding our medal targets. Sports Minister Mark Arbib [14] launched a new initiative - the Green and Gold Project - that is designed to try to regain Australia's place among the top five Olympic nations at London 2012. It is a pity that Australia's political leadership has not embraced the opportunity to engage the public in a more active debate about road safety and adopt the sort of ambitious targets we see in the sporting arena.

The fact that the NRSS has adopted the terminology of 'crash' or 'collision', reflecting recent practice by the World Health Organization, the OECD and the National Highway and Traffic Safety Administration in the US, is to be welcomed but more needs to be done to encourage the news media and other stakeholders to adopt this practice.

Reframing media discourse

As argued in the author's Churchill Fellowship Report [11], there is a critical need to reframe media discourses about road safety. Newspapers typically present fatal crashes as dramas with a victim/villain storyline; in keeping with this narrative strategy, newspapers are most likely to cover stories where a driver survived to take the blame. By highlighting crashes that diverge from the norm, focusing on the assignment of blame to a single party, and failing to convey the message that preventive practices like seatbelt use increase odds for survival, newspapers remove crashes from a public health context and position them as individual issues.

Connor and Wesolowski [15] examined the public health messages conveyed by newspaper coverage of fatal motor vehicle crashes to determine the extent to which press coverage accurately reflects real risks and crash trends. Crash details were extracted from two years of newspaper coverage of fatal crashes in four Midwestern cities in the United States. Details and causal factors identified by reporters were compared to data from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS). The newspapers covered 278 fatal crashes over the two year period, in contrast to 846 fatal crashes documented in FARS. Newspapers assigned blame in 90% of crashes covered, under-reported restraint use and driver's risk of death, failed to reflect the protective value of restraints, and misrepresented the roles played by alcohol and teen drivers. The study found newspaper coverage did not

accurately reflect real risk. Commissioning a similar project to examine the media frames in Australian newspaper reporting of road crashes could provide insights into cultural practices here and provide guidance for the social change process mentioned in the NRSS (certainly, based on the Churchill Fellowship study [11], the emphasis on such things as holiday road tolls seem to receive disproportionate attention in the Australian media compared to other countries).

As Cuthbert [16] argues, the media's anti-speed-camera discourse leads to disdain for speeding as a cause of injury. This discourse implies speed cameras are a paternalistic infringement of our privacy and wallets and are not effective at reducing speed. There are parallel discourses in print media and radio that publicise speed camera locations. Together, these result in a 'see if you can get away with it' attitude to speeding. This results in motorists behaving as 'manipulators' and 'defiers' towards speed cameras [17]. Even drivers who reduce their speed are encouraged to display similar defiant behaviours such as flashing their headlights at oncoming cars to warn of a radar unit ahead and reporting speed camera locations to radio stations. To overcome these attitudes and get maximum effectiveness from speed cameras, Cuthbert argues the negative discourse should be reframed to resemble the positive discourse. If speeding kills people during the holidays, it will kill during non-holiday periods; if speed cameras have reduced speeding during holidays they can reduce speeding at other times. The 'revenue raising' discourse could be diffused by the public return of funds generated by speed camera to road safety projects. Reframing the debate could also involve shifting the penalty emphasis away from fines towards loss of demerit points or warning letters for low range offences.

Commentary on individual crashes and trends over holiday periods is eagerly sought by the news media. These contacts provide police and other road safety commentators with an opportunity to redress the imbalance in reporting and to push important safety messages. Police and other road safety professionals could try and place less emphasis on the human drama of the crash and focus on known risk factors and broader safety messages.

The media could also be engaged at a professional level and be educated about the impact of their reporting. This has occurred with some success in relation to how the media reports on issues relating to mental illness and suicide. Research [18] established that media portrayals perpetuated a number of community myths about these problems. The *Mindframe Media and Mental Health Project* built a collaborative relationship with the Australian media and mental health systems to enable a more accurate and sensitive portrayal of suicide and mental health issues. Key activities undertaken by the project included:

- the development of a resource kit for use by media professionals including a companion website
- delivery of face-to-face briefings with a diverse range of media organisations providing opportunity for discussion on issues to consider when reporting [18].

The print and web-based resources are designed to help media professionals continue to report suicide and mental illness responsibly and accurately. Police, road safety authorities and the media could work together in a similar fashion to develop media resources to assist journalists in their reporting of road crashes. Consideration could be given to the development of guidelines that would assist police, other emergency responders and road safety experts when communicating with the media – this is something we are not good at. The NRSS provides an appropriate framework for such work.

Conclusion

The National Road Safety Strategy has acknowledged that cultural change is needed to achieve its targets. At this stage it is hard to see how this will be achieved. The community needs to be actively engaged through strong leadership and a more active approach towards addressing the primary drivers of public opinion. The news media play a crucial role in this process and yet it is largely ignored in the NRSS. There are precedents for positive engagement as we have seen with the marketing and sale of new motor vehicles and with reporting on other important social issues. We should adopt them.

About the author

Dr Jiggins is an Associate Fellow of the College, and Chair of the ACT and Region Chapter. In 2008 he was awarded a Churchill Fellowship to study the reporting of road crashes in the print media.

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It sounds counterintuitive, but can mobile phones be used to reduce driver distraction?

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Abstract

Being on the phone while driving is highly distracting. Drivers are four times more likely to crash while talking on a phone, and over 20 times more likely if texting. VicRoads needed a new way to educate young drivers about the dangers of using a phone while driving. Accordingly, it developed the iPhone App, *CityGT*.

Gaming and social media sites were used to inform the public about *CityGT*'s release. Outdoor billposters and specially branded cars were also deployed around Melbourne to promote its launch. Thousands of people attended a major launch which was held on 6 September 2009 at Melbourne's Federation Square. Research showed that *CityGT* succeeded in bringing the safety issue to mind for young drivers. It was downloaded more than 30,000 times, was ranked in the top three hottest Apps on iTunes, and was one of 2009's most popular free Apps on the Australian iTunes store.

Introduction

In Victoria, more young people die from road crashes than any other cause. Each year around 120 people are killed and 2,300 are seriously injured in crashes involving 18-25 year olds. This is about one-third of Victoria's road toll [1]. Inexperience is a major cause of these crashes; however, when coupled with other factors such as distraction, the consequences can be lethal.

International and local research is clear: being on the phone while driving is highly distracting. Drivers are four times more likely to crash while talking on a mobile phone [2-6], and over 20 times more likely if texting [7].

Despite these risks, an increasingly large proportion of the Victorian population own mobile phones and carry them in their vehicles. Mobile phones remain an integral part of life for most adult Australians. In Victoria, the use of hand-held mobile phones while driving is illegal, and the dangers have been well publicised over recent years [8].However, around three-quarters of 18 to 24 year olds still admit to regularly using their mobile phones while driving [9].

Traditional methods of targeting young drivers about the dangers of mobile phone use while driving did not appear to be getting through to them. VicRoads was looking for a way to cut through and engage with young drivers about this safety problem.

To educate this age group about the dangers of using a phone while driving an iPhone application called *CityGT*, was developed. The primary goal of *CityGT* was to reach young drivers aged 18-25 years and communicate the dangers of using a mobile phone while driving in a way that was more likely to resonate with this group.

To achieve this goal, three specific objectives were set. These were for *CityGT* to:

1. make users think about the dangers of using their mobile phone while driving
2. achieve at least 20,000 downloads
3. be listed in the 'Top 25' free Apps list on the iTunes store.

Method

In 2006, the Victorian Parliamentary Road Safety Committee conducted an *Inquiry into driver distraction*. One of the recommendations from the Committee was for the relevant state government agencies to implement targeted publicity campaigns warning drivers of the dangers of mobile phone distraction [8].

The first step in developing a communications strategy to target the use of mobile phones was to conduct various forms of research to help:

- define the problem
- identify the target audience for the campaign
- test the communications concept with the target audience.

This was achieved by:

- reviewing existing literature outlining the problem and prevalence of mobile phone use by 18-25 year olds
- commissioning audience research
- conducting end user and acceptance testing of the communications concept.

Target audience

The target audience identified for this campaign was young drivers aged 18 to 25 years. Background research showed that not only are young drivers over-represented in road crashes, but they also have grown up with mobile phone technology and have become more reliant on it [10, 11]. Therefore, to break the habit of using a phone while driving would be difficult for this group.

There are many effective methods used to communicate road safety messages to road users. However, traditional channels were becoming less effective in communicating with younger audiences. These audiences are consuming less traditional media such as commercial television, radio and newspapers, and relying more on digital channels to filter and access information [12-14]. The research identified that to implement a successful campaign, VicRoads needed to take a new approach to communicate with its target audience, one that was new, alternative and relevant. It was considered highly relevant to explore ways to use a mobile phone itself to communicate the dangers of their use while driving.

The take up of iPhone technology, in particular, is growing rapidly. Approximately 50 per cent of all new SmartPhone handsets currently bought in Australia are iPhones [15]. Market research commissioned by VicRoads also confirmed that there is a level of excitement and buzz around iPhones generally. All iPhone owners in the research sample said they exchanged, recommended and showed Apps to their friends or family [16].

To maximise the delivery of the message, it was important that advantage was taken of this 'social nature' of iPhone use. In doing so, a communications initiative could be more successful, because more people could be exposed to a campaign message than just those who downloaded the App. VicRoads decided to use the mobile phone itself to deliver the safe driving message. It developed a new and interactive way to educate drivers about the dangers of using a mobile phone while driving - the iPhone App, *CityGT*.

CityGT

Critical for its success, *CityGT* was developed to look, play, and be promoted as if it were an actual driving game. Furthermore, the *CityGT* application needed to be void of any VicRoads or government branding (Figure 1).

To play *CityGT*, players used the iPhone's in-built motion sensor. Players moved the iPhone like a steering wheel. The car in the game responded accordingly, allowing it to be steered around the track.

From a user's perspective, *CityGT* was just another driving game, until the user was presented with a surprise twist - a hidden safe driving message. Under the guise of the iPhone's functionality as a phone, the game is interrupted by an unexpected phone call which is programmed as part of the game software. If the player answers the call while driving the virtual car, the player receives a voice message explaining the hazards of driving while using a phone. While the player is engaged in this phone call, the virtual car crashes. If the player refuses to answer the call, he or she is rewarded with a congratulatory message from VicRoads at the end of the game. The player can also enter his or her score into the leader board and challenge friends.

Figure 1. Image of the start screen on *CityGT* iPhone App

Communications strategy

Prior to the game's launch, gaming and social media websites were used to seed information about *CityGT's* release. Outdoor billposters (Figure 2) and SmartCars (Figure 3) were deployed around Melbourne to promote its launch, and *CityGT* branded key tags (Figure 4) were left in cafes and social hubs around the city. The key tags included the game's website address and carried the message 'If found please return to Federation Square on 6 September 2009'.

Figure 2. Image of outdoor billposters

Figure 3. Image of a branded SmartCar

Figure 4. Image of *CityGT* branded key tag

CityGT was released on the Apple iTunes store and launched on 6 September 2009 at Melbourne's Federation Square. At this high profile event, people could wirelessly download *CityGT* straight to their iPhones. They could then connect and 'drive' using their iPhone handsets as a wireless steering wheel on the many *CityGT* screens (Figure 5).

In a world first, players could also use their phones to connect wirelessly and play *CityGT* on the big screen at Federation Square as shown in Figure 6.

Figure 5. Image of *CityGT* game screens at Federation Square

Figure 6. Images of an iPhone being used as a wireless controller on the Federation Square screen

In regional areas of Victoria, specially equipped SmartCars could be found at local youth hotspots where players could experience the game on larger screens.Prior to the launch, a *CityGT* game website (www.cityGT.com) went live giving audiences a 'sneak-peek' of the game and promoting its launch. Following the launch, the *CityGT* game website published a video of the launch and provided visitors with information about where the SmartCars would be parked so they could go and play *CityGT* wirelessly on their mobile screens. This website did not carry any VicRoads branding.

A VicRoads branded *CityGT* website (www.cityGT.vicroads.vic.gov.au) went live post-launch. It included a case study of the campaign and information about the dangers of using a mobile phone while driving. (Figure 7).

Figure 7. Images of the homepages from the *CityGT* game and corporate websites

A public relations company which specialised in promoting consumer products was engaged to promote *CityGT* prior to and after the launch. This company was independent of VicRoads to ensure the real message behind *CityGT* was not revealed before the launch. The company was engaged to prepare an event and manage media liaison pre- and post-launch.

The communications challenges

With so many Apps on the market, the respondents to the research said they went to the 'Top 25' games section first when looking for new games. The task was, therefore, to promote *CityGT* to a level that drove sufficient traffic and downloads of *CityGT* to ensure that it appeared in the 'Top 25' free Apps list.To do this, social media was used to promote the launch of *CityGT*.

This presented a further challenge. VicRoads knew that online communities were very savvy, could easily detect spam, and would be suspicious of newcomers to their communities. For this reason all promotion was done by the external public relations company and this company along with the advertising agency, promoted *CityGT* only through online communities and forums of which their employees were already members. This would help to prevent arousing suspicion that *CityGT* was anything other than a normal driving game.

Another challenge with *CityGT* was that the message was being delivered to an unsuspecting audience. There was a risk that this may cause a negative response. The independent market research of the concept undertaken before the launch explored this possibility. Results showed that the intended audience was positive towards *CityGT* and while a small minority did express some annoyance, they agreed it was a worthy message, and it was acceptable to deliver the message in this way.

Results

To evaluate the *CityGT* campaign, independent qualitative consumer research, iPhone App usage and web statistics, and independent media analysis of television, print, web and blog items, were used.

Consumer research

Qualitative consumer research was undertaken to test the *CityGT* concept and prototype. A series of paired interviews was undertaken. The members of each pair of participants were friends and were licensed drivers. One member of each pair was an iPhone owner while the other was not. The purpose of the research was to obtain reactions to *CityGT* from its target audience to assist with developing messages for the campaign.

The primary objectives of this research were to identify and explore:

- reactions to the game, including positives and improvement suggestions
- unprompted message take-out and prompted reactions to the message
- reactions to VicRoads as the sponsor of the game
- reactions to using an iPhone App as a way of talking to a younger audience
- the extent to which the App would motivate users to share it with peers.

Reactions to playing *CityGT* were positive and the majority enjoyed the game. The research results showed that respondents (18-25 year olds) felt:

- The message was serious and important.
- The game was a good way of showing the consequences of talking on the phone while driving.
- It would be fun to use the game to 'trick' their friends, thus creating a campaign that was viral in nature. This was positive as users of the game would effectively be spreading our safety messages amongst their peers.
- Communicating in this way to young people was valid and a positive initiative for VicRoads.
- Most importantly, *CityGT* would bring the safety issue to mind while they were driving, and may make them think about safer ways of using a phone.

Usage statistics

Statistics about how many times *CityGT* was downloaded and other statistics which helped to measure the success of *CityGT* as an App, relative to other Apps on the iTunes Store, were available to VicRoads through Apple.

Usage and download statistics showed *CityGT* was:

- downloaded more than 30,000 times
- ranked in the top three hottest Apps on iTunes
- featured for six weeks on iTunes as one of the hottest Apps
- ranked as the second top free racing App
- rated by over 2,200 users.

CityGT was labelled as one of 2009's most popular free Apps on the Australian iTunes store.

Media analysis

Media monitoring was undertaken to keep track of how often and where *CityGT* was reported in the various forms of media. *CityGT* made headlines on major television networks, online newspapers (nationally and internationally) and thousands of social media sites.

The coverage had an estimated circulation of over 22.5 million people, far exceeding what would have been expected using traditional media with a similar budget. Further independent media analysis showed that *CityGT* did not receive any negative coverage. The initiative attracted wholly favourable comment. This independent analysis also showed that the VicRoads spokesperson had a very strong presence, promoting the benefits of the new technology, as well as emphasising the dangers of mobile phone use while driving.

Discussion

One of VicRoads strategic directions is to improve road safety. This is done by undertaking initiatives to improve the safety of roads, improve the safety of vehicles and to improve the safety of road users through a host of measures including communications campaigns.

Public education regarding the dangers of mobile phone use, in combination with other initiatives such as police enforcement and the development of technologies to minimise phone use, are expected to reduce the number of people injured and killed in certain types of crashes. However, road safety initiatives can take several years before their effect on road trauma can be measured. In the meantime social marketing and communications campaigns which support road safety policies and programs will maximise the effects of these initiatives.

Unless road users are aware of their obligations, obey road laws and moderate their behaviours, these other road safety initiatives may not be as effective as they could be. It is the role of effective communications and marketing campaigns to make sure road users are aware and are motivated to change their behaviours. For these reasons the success of social marketing and communications campaigns are not measured by their effect on road trauma. Instead metrics such as message take-out and recall, levels of engagement, self-reported effects on behaviour, and how widely the messages are communicated, are among many methods used to measure the success of these campaigns.

As outlined in the introduction, there were three objectives set for the *CityGT* campaign which were subsequently evaluated. The first objective was for *CityGT* to make users think about the dangers of using their mobile phone while driving. Through self-reported responses, the consumer research undertaken showed that this objective was achieved. The second objective was for *CityGT* to be downloaded more than 20,000 times. This objective was met, and exceeded, with download statistics showing more than 30,000 downloads were achieved.

The third objective was for *CityGT* to be listed in the 'Top 25' free Apps list on the iTunes store. The reason this was so critical to the campaign was that with so many Apps on the market, the respondents to our research said they went to the 'Top 25' games section first when looking for new games. Therefore, to maximise the success of this communications project *CityGT* needed to be ranked highly, to ensure more people would download it. This objective was achieved and exceeded. *CityGT* was ranked in the top three hottest Apps on iTunes and was ranked as the second top free racing App.

Conclusion

The primary goal of *CityGT* was to reach a young audience (18-25 year olds) and communicate the dangers of using a mobile phone while driving in a way that is more likely to resonate with this group. *CityGT* was successful in delivering this important safe driving message to the target audience in a new way and through a medium that research showed the audience understood and enjoyed. VicRoads capitalised on this and used the iPhone technology to deliver a message, in an unexpected way, to an audience which is increasingly resistant to road safety messages and one which is hard to reach through traditional communications channels.

In answer to the question posed in the title of this paper : yes, VicRoads was successful in using gaming and SmartPhone technology to target the driver distraction issue of mobile phone use while driving.

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The importance of fear reduction in fear-based road safety advertising appeals

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Abstract

Road safety advertisers need to include fear reduction in fear-based advertisements to improve road safety behavioural outcomes. When designing advertisements containing relief components to reinforce safe driving attitudes and practices, there should be greater emphasis on formative research, such as pre-testing advertising concepts to ensure the correct advertising execution is achieved. Defining and selecting target audiences on current attitudes and behaviours, such as offenders (brand loyals), conformers (other brand loyals) and vacillators (switchers), is recommended. Finally, moving beyond the simplistic categorization of fear-based advertising according to 'levels' of fear to a new focus on 'patterns' of fear , which requires the inclusion of a 'fear reduction' mechanism, should increase the effectiveness of road safety advertising.

Keywords

Fear-based appeals, Fear pattern, Fear reduction, Road safety advertising, Road safety campaigns

Introduction

This article moves away from the traditional notion of 'levels' of fear and instead advocates a focus on 'patterns' of fear within fear-based advertising appeals. A pattern of fear is the sequence of fear arousal and 'fear reduction', if any, that is felt by the viewing audience when exposed to a fear-based advertisement. This new focus allows the importance of fear reduction[1] when designing fear-based road safety advertising appeals to be emphasised.

There is contention in both academic and practitioner fields on the appropriate way to design fear-based appeals to dissuade drivers from dangerous driving behaviours such as speeding, drink-driving and driving while fatigued. Academic literature, which is not limited to the area of road safety but includes other social or health behaviours, has mainly discussed research on levels of fear or threat [3-5].There has also been a tendency to simplistically categorise fear-based advertising appeals into either fear (shock) or non-fear based appeals. These could be major reasons for the lack of advancement in theories in this field.

A comprehensive review of previous research in this domain has been undertaken by Lewis, Watson, Tay and White and the main conclusion drawn from this evaluation was that 'further research is required to determine the optimum way to utilise fear in road safety advertising' [6]. This observation is used as the starting point of the discussion presented in this article. A new way of thinking when designing an effective fear-based road safety advertising appeal is now put forward.

Fear patterning theory

The fear patterning theory suggests that it is not the absolute amount of fear (fear arousal only) that drives attitude change and/or behaviour change, but the pattern of fear and then relief (fear reduction) felt by the audience that will determine the effectiveness of an advertisement. The fear pattern theory builds on the fear-as-acquired-drive (drive reduction) model [7] that was one of the earlier major theories of how fear appeals work, based on the assumption that it is fear reduction that makes such an appeal effective.

A discussion of the mechanism of fear reduction within road safety advertising can be found in Rossiter and Thornton's [8] and Algie and Rossiter's [9] papers. These articles explain that the overwhelming majority of previous studies have focused upon the effect of fear 'arousal', but do not properly investigate the effect of fear 'reduction'.The effect of 'fear-relief' patterns advertisements versus 'fear-only' patterns has been tested [10]. The relief messages used in the advertisements investigated in Thornton's research produced fear reduction that was associated with lower (improved) speed-choice scores measured by a simulation of actual driving behaviour [11].

Fear arousal versus fear reduction

Figure 1 provides a description of what could typically be included in a fear-only pattern or fear arousal advertisement.

Fear	The advertisement would show a driver who was speeding, and as a result lost control of his car, drove off the road and smashed his car into a light-pole and killing himself, with viewers being shown the graphic image of a dead body.

Figure 1. Example of a fear-only pattern anti-speeding advertisement

Figure 2 provides a description of what could be included in a fear-relief pattern or fear reduction advertisement.

Fear	The advertisement would show a driver who was speeding, and as a result lost control of his car, drove off the road and smashed his car into a light-pole and killing himself, with viewers being shown the graphic image of a dead body.
Relief	The advertisement then showed a rewind of the situation presented in the first part of the advertisement, followed by visuals of the same driver alive again and driving along the same stretch of road, not speeding, and then arriving safely at his destination, perhaps joyously greeted by a loved one.

Figure 2. Example of a fear-relief pattern anti-speeding advertisement

If you are designing a fear-based road safety advertisement you must consider the mechanism of fear reduction to optimise positive behaviour change. The new approach put forward here is to think in terms of reinforcement strategies, as shown in Figure 3, when designing road safety advertising appeals.

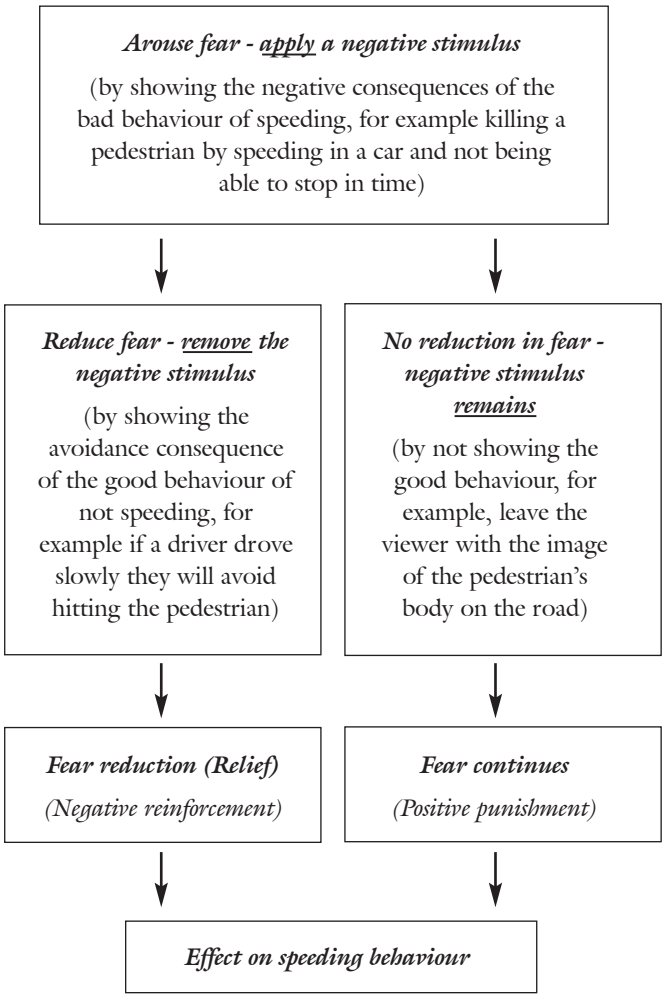

Figure 3. Flowchart of instrumental conditioning processes caused by anti-speeding advertising

The processes of positive punishment and negative reinforcement applied to road safety advertising are depicted in Figure 3. The flow-diagram process demonstrates that an advertisement that arouses fear by scaring the viewer (that is, a negative stimulus is applied), and then provides relief by explaining or showing the correct behaviour and its harm-avoiding consequences (such as, 'if you drive slowly you will be safe') thus reducing the viewer's fear (ie 'removes' the negative stimulus), would be considered a negative reinforcement approach in contrast to positive punishment. Drive theory assumes that 'the reduction of emotional tension operates as a reinforcement of the reassuring recommendation' [12]. The relationship between instrumental conditioning and the drive-reduction model is evident in Job's recommendation that 'if fear must be used, it should be used in a manner that allows fear - offset reinforcement to follow an appropriate response' [13].

Loss of licence (negative punishment, or 'non-reward') or bonus licence points (positive reinforcement or 'reward') are legislative methods for changing behaviour, requiring detection and intervention by government authorities.

Table 1. Applying Rossiter and Bellman's Brand Loyalty Segmentation to Behavioural and Attitudinal Segmentation in Road Safety Advertising or Social MARCOMs Campaigns

Commercial marketing application	*Brand Loyals*	*Other-Brand Loyals*	*Favourable Brand Switchers*
(segmentation by brand loyalty)	(consumers loyal to your brand and currently purchasers of your brand)	(consumers loyal to a competitor's brand and not currently purchasers of your brand)	(consumers who like your brand and occasionally purchase your brand)
Social marketing application	*Offenders*	*Conformers*	*Vacillators*
(segmentation by attitude and behaviour)	(citizens loyal to the 'bad' behaviour)	(citizens already doing the 'good' behaviour)	(citizens who engage in the 'bad' behaviour occasionally or are contemplating the 'bad' behaviour)

Road safety advertising attempts to encourage behaviour change voluntarily without the need for government intervention. Therefore, only two of the possible four approaches to encouraging safe driving behaviour can be accomplished by advertising alone— fear-only (positive punishment or 'punishment') and fear-relief (negative reinforcement or 'escape/avoidance'). Note also that both approaches aim to reduce speeding behaviour rather than to positively reinforce the good behaviour of driving safely, given that most target audiences for road safety practitioners are at-risk segments, that is, drivers who are regular speeders, such as young male drivers. Rossiter and Bellman use the terminology 'offenders', 'vacillators' and 'conformers' to describe potential target audiences for social marketing campaigns [14]. Most road safety campaigns are targeted towards 'offenders'.

Target audience classification

Defining and selecting target audiences based on their attitudes and behaviours towards the particular driving practice (such as mobile phone use, drink driving or speeding) is considered to be more relevant (and far preferable) than relying on demographics and psychographics to guide campaign choices. Table 1 applies the Rossiter and Bellman Brand Loyalty [14] perspective to target audiences in social marketing.

Recommended sequence of fear and relief

In the fear appeal literature there has been minimal attention given to the specific issue of fear reduction; however, there has been agreement on the optimal sequence of fear and relief stimuli that should be used in fear appeal communications [15-16]. Job [13], for example, stipulated similar points to other researchers in regard to certain conditions to increase the effectiveness of a fear appeal. First, fear should be evoked before the desired behaviour is offered. Second, the event should be likely (relevance). Third, the desired behaviour should be offered. Fourth, the level of fear should be in line with the capacity of the desired behaviour to reduce the fear. Fifth, the fear offset should occur as a reinforcer for the desired behaviour.

The fear-as-acquired drive model posits that the fear-arousing component of the message should precede the recommendation that produces fear reduction. For example, Hovland et al. [7] denote the following rules when designing fear-arousing appeals (and for the purpose of this article the elements that should be considered when designing fear-based road safety advertisements). First, are content cues (C) that are the threat stimulus or stimuli intended to evoke perceptions of susceptibility and severity; second is the emotional reaction (E), that is the experienced emotion of fear if the threat is successful; and third is the reassuring recommendation (R) to adopt the desired attitude or behaviour.

Content cues ➔	Emotional reaction ➔	Recommendation
(threat stimuli)	(fear)	

Figure 4. Hovland et al.'s recommended sequence

There is also considerable agreement among previous researchers who have investigated fear appeals on the need for reassuring messages to overcome the threat [17-19]. Witte and Allen undertook a meta-analysis of fear appeal research, analysing over 100 studies; they concluded that, on average, more fear is better but only given that efficacious messages are matched to the level of threat used in the message.For example, when using a high threat appeal, a high efficacy message will produce the greatest behavioural change [20]. Witte believed that 'a failure to account for efficacy appears to have contributed to diverse fear appeal findings'. It is also possible that a failure to measure fear reduction within studies is a reason for contradictory findings in this field. Efficacy components within a fear-based appeal produce relief; however the mechanism underpinning the fear pattern theory is a behavioural learning theory of instrumental conditioning, whereas the models that include efficacy are based on cognitive learning. Tay believes that anti-speeding campaigns 'suffer from low response efficacy' as the 'only coping strategy available calls for the viewers not to speed' [21]. Whereas another road safety problem-behaviour such as drink driving has several coping strategies, such as not drinking, catching a taxi or nominating a designated driver. Thus if anti-speeding campaigners are designing an advertisement and attempting to adhere to Witte's recommendation of the need for high efficacy in high threat

Table 2. The steps involved when designing fear-relief communications

Author	Job [13]	La Tour and Zahra [22]	Rogers [2]
Step 1	Evoke fear	Create a fearful situation	Increase magnitude of noxiousness (severity) and the conditional probability (susceptibility) of the event occurring if there is no behaviour change
Step 2	Offer desired behaviour	Solution is provided as a means of fear reduction	The availability and effectivenes of coping responses, s to reduce or eliminate the noxious stimuli
Conditions	Event should be likely; level of fear should be matched by desired behaviour to reduce fear	Danger is depicted as serious enough to warrant attention	-

communications, they would be deterred from using a fear-based appeal. However, the fear pattern theory relies upon the mechanism of fear reduction (relief) which is not entirely dependent on efficacy messages or extensive coping strategies.

The suggested format of stimuli to be used in a fear-based appeal is: first, the 'creation of a fearful situation, that activates risk and vulnerability'; second, the 'danger is depicted as serious enough to warrant attention'; and finally 'a solution is provided as a means of fear reduction' [22]. Table 2 summarises a sample of researchers' opinions of the general guidelines and considerations required when designing fear appeal messages.

Despite this recommended formula, many road safety advertisers do not develop advertisements that produce fear reduction, but rather leave the viewer feeling extremely tense at the end of the advertisement.

Reviewing past anti-speeding advertising

Road safety behaviours for many drivers are based on the negative motivation of avoiding a potential problem (for further information see Rossiter and Percy's motivations named 'problem avoidance' and 'problem solution'[23]). For example, in regard to speeding and drink driving, drivers want to avoid the problem of penalties, physical injuries and/or social disapproval. This is one of the reasons why much of the road safety advertising in Australia and New Zealand uses fear-based advertising appeals. For example, cars are shown careering off roads and smashing into trees or light poles and killing drivers and passengers.

There is a large selection of fear-based anti-speeding advertisements in Australia available for analysis because fear appeals have been the dominant approach in this country [24]. Advertisements from road safety authorities were content analysed [10] and from this sample of advertisements the following results were determined. In the year 2000, Western Australia had 31 different executions of road safety advertisements, 25 of which were fear appeals, that is, 80% of the road safety advertisements contained some degree of threat to the viewing audience. Similarly, at the same time, the state of Victoria produced 44 road safety advertisements, 32 of which were fear appeals (73%). New South Wales aired 11 advertisements, nine of which were fear appeals (81%). Queensland had eight advertisements, seven of which were fear appeals (88%). Tasmania had only five advertising executions, but four of these were fear appeals (80%) and South Australia had 16 advertisements, 11 of which were fear appeals (69%). Additionally, many of the advertisements that were aired at the time of the legislative change in residential speed zones (from 60km/h to 50km/h) were also fear based. The majority of this entire set of ads was fear-only advertisements.

While there may have been a diminution in the percentage of fear-based appeals in road safety advertising over the past ten years, there is still a tendency to use this type of appeal due to the attention-getting ability that this appeal delivers. The recent New South Wales Roads and Traffic Authority 'Pinkie' campaign was considered a novel approach to persuading the high-risk segment of young male drivers, but it is still based on a social threat, that of social disapproval (versus the typical physical threat used in road safety advertising).

Increasing formative research in campaign development

At present a significant percentage of research dollars is devoted to post-campaign tracking surveys. An increased allocation of research resources and expenditure to the pre-test stage is recommended. First, undertaking research to thoroughly identify and understand the target audience for the campaign (refer to Table 1), and then developing several concepts for pre-testing. Kotler and Lee [25] recommend testing concept statements that describe the theme of an advertisement (instead of using story boards) as respondents can use the quality of the visual stimuli (which are typically in the initial stages of production) to assess likely effectiveness of the ad versus providing opinions on the underlying message of the ad and whether or not they would be

receptive to the appeal. Kotler and Lee provide a guide for pre-testing concepts (shown in Table 3).A key point from this list of questions is that the researcher never asks whether the respondent simply likes or dislikes the ad, as likeability of the ad should not be used to gauge what is or is not a potentially effective road safety campaign.

Table 3. Recommended Pre-testing Questions [25]

What is the main message you get from this ad?
What else are they trying to say?
What do you think they want you to know?
What do you think they want you to believe or think?
What action do you think they want you to take? Note: If the respondent doesn't mention the desired action say, 'Actually, the main purpose of this ad is to persuade you and people like you to….'
How likely do you think it is this ad will influence you to take this action?
What about this ad works well for that purpose?
What doesn't work well for that purpose?
How does the ad make you feel about (doing this behaviour)?
Where is the place to reach you with this message/ad? Where would you most likely notice it and pay attention to it? Where are you when you make decisions about (this behaviour)?

Hoekstra and Wegman [26] reinforce Kotler and Lee's position that pre-testing of campaign messages should be focused on what the campaign is trying to accomplish in regard to behavioural change versus only determining the emotions aroused by a proposed ad ('careful pre-testing is in order, not just in terms of how people experienced the imagery, but rather of what most road safety campaigns are actually trying to accomplish, namely, a change for the better in terms of behaviour or behavioural intentions') [26]. However, the research findings in Dillard et al.'s [27] study whereby the affects of surprise, fear and sadness encouraged message acceptance, and puzzlement and anger discouraged message acceptance, would also suggest that evoking the right emotion is also critical to the effect of an advertisement. Thus, when pre-testing an advertising concept containing fear and relief components, further pre-testing questions should be included to determine how the respondent will feel at the end of the ad. Creating an advertisement that has viewers feeling relief at the end of the ad should be a key consideration when designing a fear-relief advertisement.

Other research which reinforces the importance of devoting greater research (and production) expenditure on testing concepts in the early stages of campaign development is Donovan, Jalleh and Henley's examination of whether expensive advertisements were more or less effective than ads with smaller budgets. It was determined that while big production budget ads produced good results, less expensive ads with the right message could be equally effective [28].

One further research issue concerns *how* to determine the pattern of fear within an advertisement. Thornton's research [10] which specifically examined the effect of fear arousal and reduction used both continuous response measurement (an electronic dial – similar to the 'worm' used during political debates but with tense and relief anchors) and psychophysiological recording of viewers' skin conductance responses during the entire advertisement. Continuous response measurement (CRM) overcomes previous static measurement issues, such as those identified by Tay and Watson [29] in their study on the effect of a threat-only message versus threat plus strategies (coping strategies) to reduce the intention of driving when fatigued. The researchers undertaking this study concluded their static survey instrument 'was not able to differentiate between the levels of fear aroused and reduced, and most likely, measured mainly the level fear aroused'.

Ethical considerations when developing mass media campaigns

Hastings, Stead and Webb raise concerns regarding the ethical implications and negative by-products or unintended outcomes of fear-based appeals [30]. Many of the criticisms directed at the use of fear in social marketing campaigns could be linked to the use of unresolved fear in many campaigns. Therefore, while Hastings et al have some valid arguments in their discussion of this topic, the use of fear-based advertising, if constructed and tested correctly can result in positive outcomes on behaviour change, and therefore fear-based ads that include fear reduction should not be avoided.

Zillmann and Weaver believe that high fear imagery may actually increase the undesirable behaviour [31]. The arousal in fear-only advertisements could, in the short term, carry over and exacerbate an unsafe behaviour, such as speeding. For example, habitual speeders may see high fear advertisements and actually amplify their behaviour, just as Hull's learning theory [32] says that a drive, such as fear, will amplify the dominant response and will actually increase the tendency to speed if the target audience already have the habit of speeding. This again points to the need to carefully design road safety advertisements that end with relief messages that reduce any fear arousal created in the first section of the ad.

Research efforts need to be directed towards addressing newly emerging unsafe driving behaviours, such as the effect of GPS on driving attention and reaction times [33], and how to best position this behaviour in regard to other risky driving behaviours. For example, many people in the driving population have negative attitudes towards the behaviour of driving under the influence (DUI) of alcohol, yet they do not hold the same views towards other risky driving behaviours, such as speeding and mobile phone use when driving, which can equally increase the risk of road crashes [34-35]. How best

to use research findings such as 'the impairments associated with cell (mobile) phone drivers may be as great as those commonly observed with intoxicated drivers'[35] has major ethical implications. By drawing such parallels in mass media campaigns, there may be gains in attitudes and behaviour for reductions in speed and mobile phone use but this may be to the detriment of the DUI cause.

Drivers who regularly speed or use their mobile phone when driving, and who have not experienced a road crash as a result of these behaviours, could then discredit the risks presented in DUI campaigns. For example, a driver may think 'I can "safely" speed or "safely" use my phone when driving, so if the risks are the same, perhaps I can "safely" drive after a few (too many) drinks'. Elder et al's [36] systematic review of mass media campaigns concluded that mass media campaigns are effective in reducing alcohol-impaired driving and alcohol-related crashes, and have a greater effect when given the condition of high visibility enforcement. However, Tay finds that alcohol ads alone can change road safety behaviour [21], yet anti-speeding campaigns do require enforcement support for there to be an effect. This distinction lends support to there being a difference in the perceptions of drivers regarding these risky driving behaviours.

Areas for further research

A potential unintended effect of the use of mass media to address risky driving behaviours that only represent a small percentage of road safety crashes - such as drug-driving or driver fatigue - needs empirical investigation.Mass media campaigns could possibly have the effect of creating a perception that the risky behaviour is widespread. For example, if a television campaign is aired highlighting the risks of drug-driving it may lead viewers to feel that many people in the community must be drug-driving as the road safety authority has chosen to address the problem on such a large scale. This can make the behaviour seem more 'normal' and therefore acceptable, which a citizen may then use to justify engagement in the behaviour. Attempts at the prevention of such behaviours are still required but ways to minimise this potential effect needs further investigation.

Hastings et al suggest that other emotions (than fear) should be explored [30]. This call for widening the scope of appeals in social marketing has been addressed by some authors. For example, Lewis et al [37] undertook qualitative research in the form of focus groups to examine positive appeals in road safety advertising, such as humour. Stead et al applied the Theory of Planned Behaviour in the development of 'Foolsspeed', a Scottish road safety campaign, and found through their formative research that credibility represented by 'the depiction of realistic, non-extreme driving events and empathy with the daily pressures experienced by drivers, such as congestion and hassle' was perceived as an effective appeal [38].

Phillips, Ulleberg and Vaa recently reported the findings of their meta-analysis, comprising 67 road safety campaigns from 12 different countries, and found a weighted average effect of a 9% reduction in road crashes (and this reduction was greater for campaigns with a drink-driving theme = 18%) [39]. Similar to other studies, these researchers note that enforcement is beneficial to the outcome of a campaign. Phillips, Ulleberg and Vaa also mention that roadside media (billboards and variable/fixed message signs) improve road crash reduction statistics. Roadside safety reminders could be equated to point-of-sale material in a supermarket. Commercial marketers heavily rely upon these reminders to influence sales as 'being there at the point of decision making' is critical to brand choice. Greater use of campaign messages more proximal to the target behaviour (for example, to influence a driver's speed choice) could be more widely adopted and should be further investigated.

Hoekstra and Wegman's [26] article containing advice on improving road safety campaigns, recommends that mass media campaigns need enforcement and education to have an effect on reducing road crashes. They also tentatively state that local individualised campaigns have the greatest effect on reducing road crashes, but the meta-analysis findings on which they base this conclusion only contained a few campaigns of this type and therefore there is some uncertainty to this piece of advice. However, the potential of these 'local, personally directed' campaigns represents another area for further research.

Conclusion

It is advised that road safety authorities should avoid using fear-only pattern advertisements and start to include more effective relief (fear-reducing) components in their advertisements by making fear-relief pattern advertisements. For example, rather than creating an advertisement that ends with visuals of a car smashing into a telegraph pole, shocking the viewer and leaving them feeling tense (fear-only), the advertisement should end with viewers feeling relieved that the driver has avoided hitting the telegraph pole because the driver was not speeding. The fear pattern theory suggests that a sequence of fear then relief stimuli will be optimal in causing attitude and/or behaviour change.

Notes

[1]It is important to clarify that Tay's [1] reference to 'fear reduction strategies' is entirely different to the use of the term 'fear reduction' in this article. Tay equates the term 'fear reduction strategies' to what is typically known as 'fear control'. [2]

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Literature Review

Recent reports reviewed by Road Safety Literature Editor, Andrew Scarce

South Australian report reinforces Safe System approach

A report released in August 2011 by the Centre for Automotive Safety Research at The University of Adelaide (CASR) has found that normal road errors or 'system failures' caused many fatal crashes, and most non-fatal crashes, in South Australia. Data sources for the report, *The relative contribution of system failures and extreme behaviour in South Australian crashes*, were the SA Coroner's Court (2008) and CASR's own data for rural crashes (from 1998-2000) and metropolitan crashes (from 2002-2005).

CASR's finding that many crashes in South Australia result from compliant road users making errors adds weight to the Safe System approach, which includes a better road system.

While extreme behaviour - resulting mainly from high levels of alcohol and speeding - contributed to 43% of fatal crashes, 57% of fatalities resulted from 'system failures'. 'These crashes are theoretically preventable given improvement to the road system,' CASR said.

The report found that very few non-fatal crashes involved 'extreme behaviour'. It found that 75% of system failures and 74% of illegal system failures occurred in rural areas. This suggests that simple errors made by drivers in rural environments can more easily result in fatal injuries.

Extreme behaviour only constitutes a small proportion of non-fatal crashes, both for rural and particularly metropolitan crashes. 'Road use behaviour that was illegal, but not classified as extreme, was evident in 17% of rural crashes investigated and approximately 10% of metropolitan crashes' the report found. 'This leaves around three quarters of rural crashes and over 85% of metropolitan crashes that were system failures, that is, crashes theoretically preventable by a Safe System approach.'

The data found that 'system failures' mostly occurred in rural areas, while extreme behaviour crashes mainly took place in the city. 'Almost half (46 %) of the fatal crashes attributable to system failures occurred on roads with a 110 km/h speed limit and a further 25% were on roads with a 100 km/h speed limit,' CASR found. 'In contrast to crashes caused by system failures, fatal crashes involving extreme behaviours occurred predominantly in metropolitan areas (61%), at night (83%) and on weekends (61%).'

The CASR report concluded that developing forgiving road and roadside infrastructure, setting appropriate speed limits and improving safe vehicle design could potentially cut the severity of injuries resulting from system failures and, to a lesser extent, extreme behaviours.

Centre for Automotive Safety Research Report CASR092: The relative contribution of system failures and extreme behaviour in South Australian crashes is available at http://casr.adelaide.edu.au/publications/list/?id=1231

Texas study highlights driver texting risk

A breakthrough experiment in Texas has found that reading or writing texts while driving poses a far greater risk than previously thought. The research found that when reading or writing texts, reaction times were almost twice as impaired as previous driver simulator studies had found. The experiment, completed in August 2011, was the first of its kind to investigate the effects of texting using an actual driving environment instead of driver simulators. It aimed to better understand the problem of texting in the 'real world'. The Texas Transportation Institute (TTI) experiment also found almost identical driver impairment between reading and writing texts.

The TTI enlisted 42 participants (aged from 16-24) for the experiment, conducted in a closed driving environment at a 797 hectare site owned by the Institute. Three primary questions were posed:

- How well do texting while driving results obtained using an actual vehicle compare to those using a driving simulator?
- Do drivers change the way they interact with non-driving tasks as the driving task becomes more demanding?
- When texting while driving, does driving impairment from reading differ from writing?

An experimental research vehicle collected data from drivers principally using a Dewetron DEWE5000 data acquisition integration system. Light responses were monitored using a green LED attached to the hood of the instrumented vehicle within eye-line of the driver. To assess how the drivers changed their interaction when driving becomes more demanding, a course evenly divided drivers between an open and unrestricted lane and one bordered by lane-restricting construction barrels.

To evaluate the effects of reading and writing texts on driving, three separate driving segments were completed:

- control (no text messages were sent or received)
- writing (driver composed a story on their mobile phone)
- reading (driver read a story on their mobile devise).

The year-long research project found that reading and writing text messages while driving

- significantly delayed response times
- increased the number of missed response events
- caused an overall speed reduction
- caused an increase in the standard deviation of speed and lane position in the open roadway sections
- reduced writing and reading rates
- reduced number of glances to the forward roadway.

One of the TTI recommendations from the research was that more research is needed to better understand when drivers are likely to engage in texting in the real world. 'Government estimates in the US suggest around 25% of all crashes are directly related to driver distraction,' the TTI said. 'When used to text, mobile phones are thought to increase fatal crash risk by 6-23 times over baseline. . . In 2009 an estimated 6 billion text messages were sent-received per day in the US and 20% of all US drivers have admitted to texting while driving'.

An investigation of the effects of reading and writing text-based messages while driving, Texas Transportation Institute, Texas A&M University System, is available at http://tti.tamu.edu/group/cts/texting-and-driving/.


How safe is your van?
MERCEDES VITO#
★★★★★
HYUNDAI iLOAD
★★★★
VW CADDY
★★★★
VW TRANSPORTER
★★★★
TOYOTA HIACE
★★★
FORD TRANSIT
★★★
MITSUBISHI EXPRESS
★
These are some of the best-selling vans on the market^. But as their ANCAP safety ratings show, best-selling doesn't always mean safest. So before you buy your next van, check out its rating at howsafeisyourcar.com.au
^2010 Black and White Data Book, Glasses Guide.
#5 star rating refers to model with curtain airbags.
howsafeisyourcar.com.au
TAC
Victoria


I wish I wasn't in this ad.
I wish I hadn't put my family through this.
I wish I had both legs.
I wish I wasn't in pain all day. And night.
I wish I could sleep.
I wish I wasn't going to end up in a wheelchair.
I wish I hadn't been going so fast.
James Archer, speed crash survivor, May 1996.
Two months in hospital, three months in
physical rehab, a lifetime of pain.
We wish we didn't
have to show these ads.
Don't rush.
NSW
GOVERNMENT
AMA

ANCAP
Crash testing for safety
AUSTRALASIAN
NEW CAR ASSESSMENT
PROGRAM

As Australasia's leading independent vehicle safety advocate, ANCAP provides consumers with transparent advice on vehicle safety through its star rating program.

Safer Drivers in Safer Cars on Safer Roads.

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