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Evaluating behaviour change communication campaigns in health and safety: A literature review

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Evaluating behaviour change communication campaigns in health and safety: A literature review

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ABSTRACT

This literature review examined selected international research, published from 2010 to the present, to investigate how six fields other than road safety (i.e. healthy eating/physical activity, smoking, alcohol and drug use, workplace health and safety, suicide and juvenile offending) evaluated their behaviour change communication campaigns. The review also considered best practice for providing evidence of the effectiveness of these campaigns and explored whether these practices could be translated to road safety. Overall, the health and safety literature indicate that there is no single model for best practice in evaluating communication campaigns but there are some general principles that are highly germane to road safety: using a recognised model/theory of behaviour change, multiple measurement methods, measuring target behaviours at each stage, using a control group not exposed to the campaign, and identifying factors that can influence the likelihood of the desired behaviour. While some direct and indirect objective measures of behaviour change were available, by far the most common measure was self-report surveys. This set of evaluation tools, and their limitations, are consistent with the road safety experience. In conclusion, given adequate resources, all health and safety domains, including road safety, might improve the quality of their evaluations with sound experimental designs and the increased use of objective forms of behaviour measurement, aided by advances in affordable technology.

KEYWORDS

Behaviour change, evaluation approaches, mass media campaigns, self-report

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Summary

Mass media campaigns essentially aim to change behaviours through improving knowledge, changing individual attitudes, or modifying degrees of social support for the behaviour, and have been proven successful in promoting healthy or safe behaviours as well as reducing unhealthy attitudes and behaviours. However, such campaigns are expensive to deliver so there is a strong need for quality data demonstrating its effectiveness.

This literature review critically examines the international literature to investigate how fields other than road safety have evaluated their behaviour change communication campaigns. In addition, the study examines best practice for providing evidence of the effectiveness of these campaigns and explores whether these practices could be translated to road safety. An earlier study examined best practice in mass media campaign evaluation for both road safety and other health related fields in 2010 (Wundersitz, Hutchinson & Woolley, 2010). Given the coverage of the previous review, this study is a selective review of published literature from 2010 to the present concerning evaluation approaches for communication campaigns. This review of research from six health and safety related fields found:

Promotion of healthy eating and physical activity (6 studies) These evaluations of campaign outcomes relied on self-reports of behaviour through interviews and questionnaires which, in one case elicited unexpected information that was useful in refining the campaign. Some evaluations used pedometers and physiologist observations to measure target fitness behaviours and it was acknowledged technology could assist in the future. Many studies used behaviour change theories or models to guide the campaign approach and evaluation.

Smoking cessation (6 studies) There was a mix of research/evaluation designs, including experimental, cross-sectional, and longitudinal/cohort. Outcome measures ranged from self-reported quit attempts and abstinence, to objectively measured calls to Quitline and blood tests. Most studies highlighted aspects of best practice, such as pre/post measurement, awareness of self-selection biases, sensitivity of the need to measure effects in hard to reach groups, and the value of control groups. However, many studies were unable to distinguish which elements of the campaign yielded the greatest influence due to confounding factors, such as concurrent campaigns.

Reducing alcohol and drug misuse (5 studies). Three studies involved cross-sectional surveys of community members of which two used multiple waves of surveys. One study reported a sample size too small to detect any small campaign effects (due to a limited budget). Evaluation of a national drug campaign used two different methods of self-report including in-depth interviews with a specific target group. One study noted that seasonal variation in behaviour (e.g. alcohol use) may influence findings, regardless of whether they are measured using subjective or objective means.

Workplace health and safety (1 review of 10 studies) The studies collectively stress the need to ground campaigns and their evaluations in theoretical behaviour change models, be aware of extraneous factors influencing campaign outcomes, have appropriate evaluation timelines, use control groups where possible, and obtain objective measurements of target behaviours. Several studies indicated positive changes in public attitudes but no changes in work-related outcomes or sickness outcomes, illustrating how changes in attitudes do not necessarily result in behaviour change.

Suicide prevention (1 review of 12 studies) The review indicated that ten studies used objective data sources, large sample sizes and adopted sound experimental designs. The review also emphasised the need for appropriate timelines to allow the desired behaviour change to occur, and evaluating not just the general effects of a whole campaign, but the effects of specific components of a campaign.

Some behaviours that are difficult to change may require several years of campaign implementation, requiring multi-faceted and developmentally sequenced campaign approaches.

Reducing juvenile offending (2 studies) While not involving mass media, these studies aptly illustrate the need to promote behaviour-based demonstrations of the ineffectiveness of a campaign, especially in the face of conflicting interpretations based on public opinion. In the USA based *Scared Straight* programs, young offenders attend a prison to receive fear-based talks from prisoners on the assumption that the youth will cease offending. All scientific evaluations of these programs indicate that they are ineffective and may increase the risk of future offending. Despite this evidence, programs remain in operation due to the popular belief that the programs must work, in some cases perpetuated by pseudo-scientific television programs.

Overall, the literature suggests that there is no single model for best practice in evaluating communication campaigns as the evaluation approach chosen will depend on a variety of factors, including the nature of the campaign, media used; and the intention of the evaluation, timelines and cost. General principles for behaviour change campaign evaluations in the public health related literature include: basing the campaign on a recognised model/theory of behaviour change, utilising multiple measurement methods, measuring target behaviours at each stage using a control group not exposed to the campaign, and identifying factors that can influence the likelihood of the desired behaviour, (e.g., enforcement, concurrent media messages, seasonal effects). These principles are all highly relevant to road safety.

In conclusion, the most common measure used in the evaluation of behaviour change campaigns is self-report surveys although in many fields indirect objective measures of behaviour were available. The use of technology to monitor behaviour was only mentioned within one area (as a measure of physical activity). The findings suggest the selection of measures available for evaluation in the health and safety fields is similar to that of road safety. Given adequate resources, all health and safety domains, including road safety, might improve the quality of their evaluations and bring them closer to best practice with sound experimental design and the increased use of objective forms of behaviour measurement, facilitated by advances in technology.

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1 Introduction

1.1 Background

The use of mass media campaigns is based on the premise that targeting a whole population has the advantage of potentially modifying knowledge or attitudes, thereby providing social support for behaviour change (Redman, Spencer & Sanson-Fisher, 1990). Therefore, rather than directly influencing behaviour, mass media campaigns aim to change behaviours through improving knowledge, changing individual attitudes, or modifying degrees of social support for the behaviour. There is some evidence that mass media campaigns have ultimately changed behaviours such as reducing exposure to the sun, increasing take-up of cancer screening tests, and reducing smoking, as well as discouraging ineffective, unhealthy or unsafe behaviours (Buchbinder, Gross, Werner & Hayden, 2008). However, communication campaigns require significant investment and quality evaluation data is needed to justify the continued investment.

To assist with preparing a business case for road safety behavioural change communication campaigns, the Motor Accident Commission of South Australia requested a review of literature into how health and safety fields other than road safety evaluate their behavioural change communications. This review does not attempt to assess the extent to which behaviour change campaigns are effective but to critically examine best practice for providing evidence of effectiveness for these campaigns in safety terms and to determine whether these practices can be translated to road safety.

CASR previously reviewed best practice for mass media campaigns for MAC in 2010 (Wundersitz, Hutchinson & Woolley, 2010). This earlier literature review examined best practice in both road safety and in fields outside of road safety, and its focus included, amongst other things, evaluation methodology and behaviour change outcomes. That review also specifically examined road safety mass media campaign evaluations from 2001 to 2009. In the present review, to provide some background context, findings from the previous report are summarised at the start of Section 2. Given the previous comprehensive coverage of literature prior to 2010, the present review covers international literature published from 2010 to the present.

1.2 Method

To conduct the literature search, the following sources were used: Google Scholar and the University of Adelaide library search engine, which has the capacity to search multiple online journals, ebook collections and databases simultaneously including Web of Science, ScienceDirect, PsychINFO, PubMed, Medline, Informit, EBSCOhost, Scopus. The search was conducted by examining literature (journal articles, conference papers, technical reports), in English, published from 2010 to January 2018, using these terms: review, health promotion, health education, safety promotion, behaviour change, safety education, campaign, mass media, mass communication campaign, publicity campaign, community intervention, together with smoking, alcohol, street drugs, youth crime, physical activity promotion, obesity, youth suicide prevention, workplace safety, work safety, occupational safety. The health and safety issues selected were those topics that featured most frequently in preliminary (scoping) searches.

The present study was not intended to be a systematic literature review but a selective review of literature concerning evaluation approaches for communication campaigns and community interventions, examining evidence from review findings as well as individual empirical studies. It was found that the literature included studies that expressly focussed on making *comparisons* of such

evaluation approaches, as well as reports of evaluations of *specific instances* of behaviour change initiatives in which pertinent information about the evaluation approach used was included in the study report. While some of the literature identified in the search consisted of evaluations of single campaigns, only in a fraction of those instances was useful commentary provided about the benefits or otherwise of the evaluation approaches employed so that others may learn from their efforts. (A similar observation was made by Wundersitz (2011)).

Studies relying on product marketing approaches and those not seeking behaviour change outcomes were excluded. Note that some textbooks on evaluating behaviour change campaigns were included for their in-depth perspectives even though they were published prior to the review time frame. Additionally, two papers were included in which the authors were writing from the perspective of lessons for road safety campaigns that can be learned from campaigns conducted in fields other than road safety.

The identified literature was summarised in tabular format (Sections 2.3 to 2.8), based on a range of behaviours targeted by mass media campaigns, together with the evaluation approaches employed and any commentary by study authors on those evaluation approaches. Note that, for many of the reviewed studies, few further details about the evaluation approaches used were mentioned. Also included in the tables are the authors' names, their institutions and in which country the campaigns were delivered.

2 Evaluation studies of behaviour change campaigns

2.1 Behaviour change

Developers of road safety campaigns would appreciate that behaviour change is a complex process, as readily indicated by the variety of theories that aim to account for it. For example, the World Road Association (PIARC, 2012) listed at least nine theories or models relevant to road safety that can be used to predict behaviour change, to persuade individuals or groups to change their behaviour, or simply to explain the nature of behaviour change *per se*. PIARC goes on to note that variables associated with the perceived threat or impact of a behaviour change, such as their likelihood or severity, are all influential on the extent of any ensuing behaviour change, assuming any occurs. Moreover, attitude change does not always lead to a related behaviour change, and vice versa. For example, someone who generally believes that speeding is unsafe may still engage in speeding behaviour as a result of other factors (such as time pressures).

The possibility of unintended outcomes of a campaign also need to be borne in mind, an aspect of particular salience when evaluating a campaign. PIARC gave such an example of risk compensation. It is known that campaigns to increase seatbelt wearing cannot only increase wearing rates and reduce injuries, but they can also lead to belted drivers becoming over-confident of their safety and in consequence engage in alternative risky driving behaviours leading to increased crashes involving vulnerable road users (PIARC, 2012).

Despite such cautions, there are a number of mechanisms by which behaviour change communication campaigns might work:

- An immediate effect on behaviour that decreases over time
- A cumulative long-term effect on attitudes and behaviour
- By raising general awareness of issues in the population and creating a willingness to consider changes in laws and enforcement activity, which can have an indirect effect in encouraging individuals to change their behaviours
- By influencing policy makers to push for better legislation and activities.

While reflecting this background context, Section 2.2 of this chapter recounts previous research by CASR into campaign evaluations. The remaining Sections (2.3 to 2.8) examine evaluations of campaigns on specific health or safety issues.

2.2 Road safety mass media campaign evaluation: Previous findings

The earlier review of mass media campaigns by Wundersitz, Hutchinson and Woolley (2010) specifically focused on:

- The latest theoretical models of behaviour change relevant to health advertising
- New issues associated with campaign development such as message content and style, target group, communication mode etc.
- The efficacy of fear-inducing or threat appeals and alternatives
- The effect of different levels of advertising exposure
- Evaluations of mass media campaigns, with an emphasis on behavioural change.

The first and last of these foci are still relevant to the present literature review. However, neither has seen any major developments over the past decade.

On using theoretical models of behaviour change when developing campaigns and their evaluation, Wundersitz, Hutchinson and Woolley (2010, p. iii) reported:

“There is general agreement that the most effective health-related mass media campaigns use well-researched psychological theories of behaviour change to develop the campaign. Theory can provide a conceptual foundation for a campaign, assist in determining where campaign messages might focus, and accommodate evaluation of the campaign. A number of psychological theories that concentrate on predicting behaviour change, explaining social persuasion and the process of behaviour change are described. Despite the known benefits, few campaigns use a theoretical framework when designing campaigns.”

In brief detail, the behaviour change theories or models they examined included (see report for full descriptions):

- *Theory of Reasoned Action (TRA)*. The TRA assumes that attitudes and social norms determine people’s intentions, in turn influencing their behaviour.
- *Theory of Planned Behaviour (TPB)*. The TPB adds an element of self-control to TRA such that the intentions that affect behaviour are determined by attitudes and beliefs, norms and the person’s belief in how much they can control their behaviour, such as speeding.
- *Theory of Interpersonal Behaviour (TIB)*. The TIB builds on TPB, but also considers the extent to which a behaviour is habitual, such that some habitual behaviours (e.g. speeding) may be resistant to change.
- *Health Belief Model (HBM)*. The HBM basically assumes that a person is motivated to take positive action to improve their health due to a desire to avoid negative health outcomes, such as for seatbelt wearing.
- *Theory of Self-Regulation (TSR)*. The TSR is based on individuals changing their behaviour in response to negative feedback.
- *Transtheoretical Model of Change (TMC)*. The TMC considers the readiness of a person to change their behaviour through a 6-step model.

In relation to evaluation, the authors examined 14 studies of road safety mass media campaigns and concluded (p.41):

“The review of evaluated road safety mass media campaigns was unable to make any definitive conclusions about what works and what does not. This was partly due to few mass media campaigns being subjected to rigorous scientific evaluation. The evaluations were typically based on self-reported attitudes and behaviours or message awareness/recall rather than outcome measures that directly related to the behaviour of interest. Many studies also used very simple before and after analyses that did not take into account other factors that might influence behaviour (i.e. no control group). In addition, a number of mass media campaigns were integrated with other activities such as enforcement so it was very difficult to isolate the effects of mass media from these confounding factors. Another factor was the lack of documentation of details about the intensity, duration and content of the media campaign and any associated activities.”

In relation to best practice for conducting campaign evaluations, the authors made the following conclusions (p.41):

- Conducting an evaluation of a mass media campaign is costly but its importance should not be undervalued.
- The variability in crash data means that it is not an optimal outcome measure for mass media campaigns.
- The ideal evaluation methodology is not always feasible or practical. 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.
- The systematic on-going measurement of safety-related behaviours allows baseline measures to be easily obtained before campaigns are implemented.
- South Australia now has useful on-going surveys of vehicle speeds and recent observational measures of other driver behaviours (i.e. seat belt surveys). There is scope to collect data on other easily observed objective measures to assess campaign effectiveness, should mass media campaigns focus on these issues (i.e. observations of mobile phone use, pedestrian behaviour).

The remainder of this chapter covers literature from 2010 to the present, to investigate how fields other than road safety evaluate behaviour change campaigns.

2.3 Promoting healthy eating behaviours/reduction in obesity/increased physical activity

The six studies summarised in Table 2.1 relied on self-reports of behaviour through interviews and questionnaires to evaluate campaign outcomes. In the case of Dale and Hanbury (2010), these approaches elicited unexpected information that was useful in refining the campaign. Some evaluations used pedometers and physiologist observations to measure target fitness behaviours but use of such objective measures was not common. However, it would be expected that the use of objective measures would increase as technology develops and becomes more affordable. For example, personal activity trackers (e.g. Fitbit) are an objective means of recording physical exercise and new features also allow the entry of food and water consumption or calculation of Body Mass Index (BMI) on phone or computer interfaces.

One review of campaigns to increase physical activity (Leavy et al., 2011) found all studies reviewed used behaviour change theories or models to guide the campaign approach and evaluation and that, overall, evaluation methods had improved. Nevertheless, few campaigns used strong experimental designs (i.e. randomised control trials).

Table 2.1

Summary of studies evaluating behaviour change campaigns targeting healthy eating behaviours/increased physical activity

Authors & study location	Type of communication	Evaluation approaches and measures
King et al., 2013 (La Trobe University & University of Melbourne); NSW	TV, print, radio, outdoor advertising, local community activities	<i>Obesity risk reduction campaign 'Measure Up'</i> Cross-sectional telephone surveys (pre & post campaign, n=1006) seeking self-reports of diet, physical activity, campaign awareness, knowledge about waist circumference, personal relevance of the message, perceived confidence to make lifestyle changes and waist-measuring behaviours. The campaign resulted in increases in knowledge, personal relevance, and waist measuring behaviour but

		no significant change in diet or physical activity.
Boles, et al., 2014, (Oregon Health Authority); USA	TV, billboards, public transport, web	<i>Mass media education campaign: Sugary drinks and link to obesity</i> Post-campaign telephone surveys ($n=402$) and questionnaires seeking self-reports of campaign awareness, attitudes towards obesity, knowledge of health problems of excessive sugar intake, behavioural intentions and self-reports of actual behaviours around sugary drink consumption (frequency, amount drunk, product brand names). Only self-reported soft drink consumption was reported before and after the campaign and there was no significant change. While the results were interpreted as indicating media campaigns may be effective for raising awareness, increasing knowledge and prompting behavioural intentions to reduce sugary drink consumption, the authors acknowledged that a longer follow-up is required to determine if there are lasting effects.
Dale & Hanbury, 2010, (Universities of Sheffield & York); UK	Development of TV program	<i>Pilot study of behaviour change techniques in mass media campaign to increase healthy eating</i> In face to face interviews ($n=6$), participants discussed perceived disjunctures between TV program content and their own dietary choices. They also volunteered perceived barriers to healthy eating not addressed in the TV program. However, participants wanted more assistance to plot their weekly food intake in food diaries (the diaries were part of the campaign itself, not the evaluation), and in personal goal setting. They further wanted a greater variety of role models in the TV program to better reflect public diversity and improve participant identification with role models. These evaluation findings enabled substantial revision of the TV program prior to wider broadcasting.
Leavy et al., 2011 (Heart Foundation, WA Division) International	Various media	<i>Review of 18 campaigns to increase adult physical activity</i> Authors noted all 18 studies adopted behaviour change theories and/or models to underpin the campaign approach and guide the evaluation (e.g. theory of reasoned action and planned behaviour, theory of planned behaviour, health belief model). The review found changes in outcomes other than awareness raising were measured but reported in varying ways. Most campaigns used self-report measures of message recall, intention to change behaviour, changes in walking activity and intense physical activity. The authors concluded that there were improvements in evaluation methods but limited evidence of campaign effects. They also noted that recently, researchers are using more objective measures (e.g. pedometers and accelerometers) to quantify the amount and intensity of physical activity as such measuring devices become more affordable. There were five suggestions for optimal evaluation design: 1) formative research to inform theories/framework, campaign content and evaluation design, 2) cohort studies design with multiple data collection points, 3) sufficient duration, 4) use of validated measures, 5) sufficient evaluation resources.
Brown et al., 2012, National Center for Chronic Disease Prevention and Health Promotion); USA	Various mass media (Stand-alone campaigns)	<i>Review of 16 stand-alone mass media campaigns to increase physical activity</i> The review found that all studies used self-report measures of physical activity, and that campaign effects were modest and inconsistent. Measures of physical activity across the studies ranged through self-reported activity session frequency, duration, and type. The authors noted that in many studies there was no evidence that it was a valid or reliable measure of physical activity and that future research should ideally include "...more objective measures of physical activity if feasible and appropriate for the research questions being asked." The findings led a taskforce to conclude there was "insufficient evidence to determine the effectiveness of stand-alone

		mass media campaigns to increase physical activity". NB: Six of the studies reviewed were included in the Leavy et al., 2011 review.
Leavy et al., 2012 (University of Western Australia)	TV commercials, radio, print, billboards, online, and other activities targeting communities and the workplace.	<i>Effects of the 'Find Thirty Every Day' mass media campaign to increase physical activity</i> Cross-sectional surveys conducted pre- and post-campaign (baseline $n=972$; first follow-up $n=938$, second follow-up $n=937$). Randomly selected from the telephone directory, adults from each household were aged between 20-54 years. Equal proportions of men and women and 25% were from regional WA. Self-report data for: campaign awareness (recall), and physical behaviour. Objective data included body-mass index (BMI), which is derived from self-reported height and weight. The campaign resulted in an increase in awareness, intention, and increased physical activity. The campaign message was similar to a previous campaign which may have resulted in an artificial increase in awareness. If this is the case, then this would suggest that carefully planning a mass media strategy to build on and develop desired messages through a series of campaigns may have some benefit. The authors noted campaign effects should be examined by subgroups to identify the most receptive population segments and suggested new technologies and social media tools become an integral part of future physical activity campaign design and delivery.

2.4 Smoking cessation

Throughout the research presented in Table 2.2, a mix of research/evaluation designs, including experimental, cross-sectional, and longitudinal/cohort, were identified. Outcome measures ranged from the subjective, such as self-reported quit attempts and abstinence, to the objective, such as calls to Quitline, physical examinations, and blood tests. Most of the studies below highlighted one or more aspects of best practice in campaign evaluation, which ranged through pre/post measurement, awareness of self-selection biases, sensitivity of the need to measure effects in hard to reach groups, and the value of control groups.

Most of the campaigns reviewed appear to be fear based, many of which highlighted the links between smoking and negative health outcomes. Evidence from this research shows that anti-smoking campaigns are successful, particularly when combined with other measures (e.g., school-based programs, government policies, etc.). It is noted, however, that many studies were unable to distinguish which elements of the campaign yielded the greatest influence due to confounding factors, such as concurrent campaigns or news coverage on the same topic. One review also commented that mass media campaigns are inherently difficult to evaluate, since large samples are needed to detect relatively small effects on individual members of the target group. However, even small changes may deliver significant benefits at the population level (Bala et al., 2013).

In terms of the type of campaign, there are generally three types: those intended to discourage smoking, those that encourage quitting, and those that advertise pharmacological quitting aids (e.g., nicotine patches or gum). The latter have generally been found to have little impact on smoking, while the other types have been found to be effective in terms of increased knowledge and, in some cases, quit attempts.

Table 2.2
Summary of studies evaluating behaviour change campaigns targeting smoking cessation

Authors & study location	Type of communication	Evaluation approaches and measures
Allen et al., 2015 (US Department of Health & Human Services) USA	Mass media	<i>Review of 34 mass media campaigns to reduce youth tobacco use</i> Studies were categorised according to the study design, measure of exposure, and outcomes (cognitions or behaviour), including for subgroups (i.e. race, gender, SES, population density). Studies employed experimental ($n=13$), cross sectional ($n=18$) and longitudinal ($n=7$) designs. In the majority of studies media exposure was based on subjective self-report ($n=18$). Little information was provided regarding the nature of evaluation data beyond whether studies measured attitudes, behaviour, or both. Given this, it is likely that those assessing attitudes employed self-report of some type. The authors noted that, while mass media anti-smoking campaigns can be effective across racial/ethnic groups, the effects for particular groups may differ from those of the general population as well as between those groups. To a lesser extent, this was also true when evaluating campaign effects by gender, socio-economic status and population density (i.e., urban/rural). Evaluation design should be sufficiently robust to detect these changes, particularly for racial/ethnic minority groups. However, designing robust campaign evaluations with sufficient statistical power to detect effects on minority groups tends to be particularly expensive.
Bala et al., 2013 (Cochrane Reviews) International	Mass media including TV, radio, print, billboards, posters, and leaflets or booklets.	<i>Cochrane review of 11 studies of the effectiveness of mass media interventions in reducing smoking for young adults</i> Cochrane reviews employ strict selection criteria to ensure only the most reliable evidence is included. For this review, studies using randomised and non-randomised trials, and interrupted time series methods were included. Study design included cross-sectional surveys ($n=5$), cohort follow-up ($n=2$), or both ($n=4$). Data included subjective self-report collected by interviews in person ($n=6$), by phone ($n=4$), or both ($n=1$). Objective data were collected by physical examination and blood tests in three studies. Five of the studies found some positive changes in smoking behaviours (as measured by prevalence/frequency of smoking). Three studies found positive reductions (as measured by the quantity of tobacco smoked). The remainder generally found improved quit rates (but dependent on different definitions of smoking and quitting). Authors noted the difficulties interpreting results due to confounding factors such as concurrent events. For example, in one study, the base survey findings in one study directly contributed to the establishment of the Heart Foundation of Southern Africa, which set up a number of tobacco control initiatives.
Halkjelsvik, et al., 2013 (Norwegian Institute for Alcohol & Drug Research) Norway	TV commercials adapted from Australian anti-smoking ads, also aired on social media and online newspapers/magazines	<i>Use of fear appeals in mass media campaigns to change smoking behaviour</i> Online surveys ($N=2,543$) were conducted pre and post campaign on people exposed to the campaign and those not exposed (did not recall seeing the videos). Online survey respondents were recruited from databases of previous respondents to telephone and postal survey of TV campaigns on smoking, and hence may have been subject to self-selection bias. Sampling also tended to favour those with higher education and smokers already motivated to change their behaviours. Also, those who change their smoking behaviour may be more likely to

		recall the ads, while those deemed 'unexposed' may have actually seen the ad but failed to recall it. "Comparing exposed with unexposed respondents is therefore not the optimal evaluation design for a mass media campaign" (p. 895) but, given that the campaign was delivered through national TV and social media, and that vivid campaigns are more likely to be remembered, the approach was deemed defensible, in conjunction with pre- and post-campaign changes.
Durkin et al., 2012 (Cancer Council Victoria); Australia	Mass media included media where exposure was involuntary such as: TV, radio, print, and outdoor advertising.	<p><i>Impact of mass media campaigns on promoting quitting among adult smokers</i></p> <p>The paper reviewed 26 studies assessing the effectiveness of mass media on smoking cessation from several perspectives, including: measuring effect on smoking cessation, population-level studies, comparison of media channels, effectiveness of message type, and studies examining sub-group differences. The studies employed cross-sectional ($n=4$), cohort ($n=7$), and time series analysis ($n=1$). Evaluation data included subjective, self-report measures (e.g., knowledge, consumption, quit attempts, recall of campaign messages), and objective measures such as the number of calls to Quitline. Gross Rating Points were used as a measure of campaign intensity.</p> <p>The quality of anti-smoking campaign evaluations is heavily dependent on campaign exposure. The authors suggest at least 1200 Gross Ratings Points (GRP) per quarter for a total 4800 GRPs per year is necessary. GRP are an objective measure that estimates the average <i>potential</i> exposure based on television ratings derived from television-monitoring devices (objective) and self-report viewing diaries (subjective). Increased campaign exposure allows more thorough evaluations to be conducted. This is particularly the case where it was intended to measure campaign success among harder to reach populations such as low-socioeconomic status. It was found that media messages focussing on the negative health effects of smoking tended to perform well, compared with messages without such features, and were more effective on low socio-economic groups than medium/high socio-economic groups.</p> <p>Using mass media to ensure the bulk of smokers are exposed is critical but using mass media to target small population subgroups using a mass reach strategy is less efficient.</p>
Wakefield et al., 2011 (Cancer Council Victoria); Australia	TV commercials: government tobacco control advertising and direct to consumer advertising of Nicotine Replacement Therapy (NRT) by pharmaceutical companies.	<p><i>Effects of mass media campaign exposure intensity and durability on quit attempts in a population-based cohort study</i></p> <p>This study appears to use a time series analysis based on cohort data from the first five waves of a national (Australian) longitudinal survey of tobacco control. Attempts to quit were based on early waves with follow-up data obtained from later waves. Quit attempts were subjectively assessed using self-report data obtained via phone interviews. Campaign exposure was based on Gross Rating Points.</p> <p>Differences were observed in the type of advertising with tobacco control having a positive effect while Nicotine Replacement Therapy (NRT) did not. The design of the study did not allow any investigation of why. Furthermore, the authors also noted that a more fine-grained analysis was not possible because it was necessary to aggregate GRP data to three month periods to fit with the self-report quitting data (which referred to quit attempts in the past three months). Aggregations at the monthly or weekly level (sample size permitting) would enable a better investigation of campaign decay effects.</p>

Vallone et al., 2011 (Legacy, Washington DC.)	Cable TV advertisements	<i>Examines the effect of a mass media smoking cessation campaign and cessation outcomes</i>
USA		Longitudinal study of a cohort with surveys of adult smokers ($n=5,616$ at baseline; $n=4,067$ for follow-up) conducted before the campaign and six months later. List-assisted random digit dialling was used for recruitment. Up to two smokers from each household were randomly selected and completed the survey in English or Spanish. Self-report data were obtained for: campaign exposure (recall), motivation to quit, quit attempts in the past 6 months, number of cigarettes smoked per day, nicotine dependence, use of pharmacotherapy, and cessation-related cognitions. Authors note a number of limitations, including that the sample may not be nationally representative (of the USA) and that lack of randomisation made it difficult to rule out the influence of some unknown factors. They also noted that the small sample of people who attempted to quit did not yield enough statistical power to demonstrate a significant effect of the campaign and smoking cessation.

2.5 Reducing misuse of alcohol and drugs

Three of the individual studies from Table 2.3 involved cross-sectional surveys of community members (self-reported) of which two used multiple waves of surveys. One study (Dixon et al., 2015) reported a sample size too small to detect any small campaign effects (due to a limited budget). Measures used for evaluation were predominantly based on self-report although the review identified the use of some objective measures including new referrals and calls to health lines. Of interest, the review (Young et al., 2018) listed some self-report measures that were considered valid and reliable in the studies rated as 'strong' in terms of quality.

The evaluation of the national 'Ice' drug campaign used two different methods of self-report to investigate the impact of the campaign (Douglass et al., 2017). Initially a community survey found the fear based campaign promoted negative attitudes in the community which may ultimately produce barriers to treatment among users. To gain further insights, in-depth interviews were held with drug injectors, which indicated that the campaign had no effect on their behaviour. One study noted that seasonal variation in behaviour (e.g. alcohol use) may influence findings, regardless of whether they are measured using subjective or objective means (Martin et al., 2018).

Table 2.3
Summary of studies evaluating behaviour change campaigns targeting alcohol and drug use

Authors & study location	Type of communication	Evaluation approaches and measures
Martin et al., 2018 (The North East Alcohol Office)	Mass media TV campaign	<i>Evaluation of the effect of a TV mass media campaign on links between alcohol consumption and cancer</i>
UK		Self-report data were collected by three cross sectional surveys: one pre-campaign ($n=572$), and two immediately following two waves of the campaign (Wave 1, $n=576$; Wave 2, $n=552$). Sampling was designed to obtain a representative sample based on age, sex, and SES of the area. Interview conducted on-street and face-to-face. These surveys measured: campaign exposure, awareness of link between alcohol and different types of cancer, intention to change consumption, and support for alcohol related policies. The authors note limitations regarding the lack of resources to utilise a control group (i.e., participants from outside the area), which limits the ability to determine population level changes. It is also noted that seasonal

<p>Young et al., 2018 (Division of Epidemiology and Public Health, University of Nottingham; UK Centre of Tobacco and Alcohol studies)</p>	<p>TV, radio, print (newspapers, posters), signs on buses, billboards, cinema advertising, websites.</p>	<p>variation may influence participants' self-reported data such that changes in alcohol consumption may be based on levels that occur during times of greater consumption (e.g., Christmas); it is difficult to avoid these confounding factors. It was also not possible to control for the effects of other news and media that may influence the outcomes.</p>
<p>UK</p>		<p><i>A systematic review of 24 studies of the effectiveness of mass media campaigns to reduce alcohol consumption and harm</i></p> <p>Quality of studies was based on the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies. This assesses quality in six domains: selection bias, study design, confounders, blinding, data collection methods, and participant retention (in repeated measures designs). In this review, 18 studies were rated as weak, four as moderate, and two as strong. Strong studies use collection tools that have been shown to be valid and reliable (which potentially includes self-report measures). In terms of design, strong studies use randomised controlled trials or controlled clinical trials. In terms of participants, strong studies use samples that are very likely to be representative of the target population and achieve a level of 80% participation. In terms of retention, strong studies have a follow-up rate of at least 80%. Some of the measures in the studies include self-reported attitudes, self-efficacy, emotional response, recall, intentions, and some objective measures of treatment-seeking (e.g., new referrals, calls to a health line).</p> <p>The authors note that the quality of most studies "was generally weak, most outcomes were self-reported and evidence in high risk sub-groups was not reported consistently enough" (p. 13). They also note that there is a need for high quality evaluations that demonstrate valid and reliable measure of outcomes. They identify a number of barriers to conducting high quality evaluations of population-level interventions (such as mass media) including the issue that randomised controlled evaluations are often not feasible or not appropriate and that high response rates can be difficult to achieve.</p>
<p>Douglass et al., 2017 (Burnet Institute; Monash University)</p>	<p>TV advertisements, website</p>	<p><i>Two studies investigating the effects of the 'Ice Destroys Lives' drug campaign</i></p> <p>The first study involved an online questionnaire with young Victorians aged 15-29 ($n=1,029$). Questions about the campaign were included as part of an annual cross-sectional survey. Perceptions were based on self-reported agreement with a number of statements about the campaign. Results suggested the campaign delivered a prevention message but also contributed to negative stereotypes which may reduce help seeking among ice users. However, the small number of ice users identified in the survey did not allow investigation of perceptions among this group.</p> <p>The second study involved in-depth interviews with adult ice users (n was not provided) drawn from the Melbourne injecting drug user cohort study. All data were self-reported. Those who had used ice did not generally identify with the violent behaviours portrayed in the campaign. The campaign did not encourage them to seek help nor would it prevent them from using ice in the future. Fear-based campaigns can evoke fear in communities and lead to negative attitudes towards a group. The use of stigmatising language is also problematic. These factors can act as a barrier to treatment and increase stress and isolation among ice users.</p> <p>Among the adult user group, personal circumstances and past history of marginalisation may have contributed to negative perceptions. Participants in this study were also significantly older than the target audience and had a history of injecting drugs; results from this group may not be applicable to young recreational users.</p>

Dixon et al., 2015 (Centre for Behavioural Research in Cancer, Cancer Council Victoria)	TV advertisements	<i>An evaluation of the effectiveness of a mass media campaign to raise women's awareness of the link between alcohol and cancer</i>
Western Australia		Cross sectional online surveys of a representative sample of Western Australian women aged 25-54 conducted pre-intervention ($n=136$) and post waves 1 ($n=206$) and 3 ($n=155$) of the media campaign. Participants drawn from a marketing database. All outcomes measured using self-report data, including drinking behaviour (consumption, concerns about consumption, intentions to change behaviour), and recall (unprompted and prompted). Limitations identified by the authors included the absence of a control group and the sample being too small to detect small effects. These limitations were linked with the budget for the study and the costs of conducting a cohort study. Survey questions were also restricted by budget and to minimise the response burden to participants.
Cohn et al., 2011 (University of South Florida)	Viability of using phone apps related to alcohol use behaviour	<i>Promoting behaviour change from alcohol use through mobile technology: the future of ecological momentary assessment</i>
USA		The study essentially gauged the viability of using daily self-monitoring phone apps in evaluating alcohol misuse campaigns; nevertheless, some general comments were offered. Apps were identified and qualitatively reviewed for content to identify categories and identification of principles relevant to the study. Using mobile apps for data collection can improve the ecological validity of the data for use in interventions (and also evaluation). Other advantages include repeated behaviour sampling over real time; natural settings for the participant; ability to capture rare events; minimisation of memory recall biases and errors; and a behaviour at a particular time can be recorded relative to another behaviour (useful for determining behavioural antecedents, consequences and mediating factors surrounding the target behaviour). No description of the potential data to be derived from these was provided.
		Mobile technology also enables a professional or other intervention to be delivered in a timely manner in response to a specific behavioural record. Disadvantages include expense, high time/labour-intensity, and complexity. It is possible that data regarding consumption (e.g., time spent drinking and number of drinks consumed) could be obtained.

2.6 Improving workplace health and safety

The studies reviewed in Table 2.4 stress the importance of grounding campaigns and their evaluations in theoretical behaviour change models, the need for awareness of extraneous factors influencing campaign outcomes, appropriate evaluation timelines, use of control groups where possible, and objective measurements of target behaviours. Several of the reviewed studies, particularly in relation to back pain, indicated positive changes in public attitudes but no changes in work-related outcomes (Waddell et al., 2007) or sickness outcomes (i.e. absences, surgery, scans) (Werner et al., 2008b). This illustrates how changes in attitudes do not necessarily result in behaviour change. Consequently, evaluations not using objective measures of behavioural outcomes may draw incorrect conclusions about the campaign's effect on the desired behaviour.

Table 2.4
Summary of studies evaluating behaviour change campaigns targeting workplace health and safety

Authors & study location	Type of communication	Evaluation approach and measures
Wundersitz, 2011; (University of Adelaide) Australia	Various mass media	<i>Review of 10 workplace safety mass media campaigns, 2001-2010</i> The mass media campaigns mainly targeted back pain and the prevention of falls. Most campaign evaluations involved quasi or non-experimental designs, with measurements taken before and after the campaign; only three used a control group. The review noted that control groups are not always feasible, such as when entire populations are targeted. Effective campaigns were underpinned by theoretical models of behaviour change which can help identify key campaign messages and ensure that an evaluation targets relevant knowledge, attitudinal and behaviour outcomes. Only five studies reported objective behavioural outcomes (sickness absences, social security benefits paid, indicators of healthcare utilisation, surgery rates and trends in work injury claims data); the remainder reported attitudes and/or self-reported behavioural intentions (through interviews, phone and postal surveys, focus groups), which may lead to incorrect inferences about a campaign's impact. While media campaigns are often integrated with other activities such as education and inspectorial initiatives, this can make it difficult to attribute positive campaign outcomes to specific components of a campaign. Tracking long term effects of campaigns is important because the desired outcomes might take years to emerge.

2.7 Suicide prevention

The review of 12 suicide prevention studies, summarised in Table 2.5, indicated that many used objective data sources ($n=10$), large sample sizes and adopted sound experimental designs. The review also emphasised the need for appropriate timelines to allow the desired behaviour change to occur, and evaluating not just the general effects of a whole campaign, but the effects of specific components of a campaign. The review commented that some behaviours that are difficult to change may require a lengthy period of campaign implementation (e.g. 2+ years), requiring multi-faceted and developmentally sequenced campaign approaches. Consequently, allowing time for evidence of behaviour change is likely to require a campaign evaluation timeline of several more years, and in which each campaign component is evaluated independently of the other components. However, in practice this may not always be feasible.

Table 2.5
Summary of review of studies evaluating behaviour change campaigns targeting suicide prevention

Authors & study location	Type of communication	Evaluation approaches and measures
Torok et al., 2016 (University of NSW) Australia	Mass media (various) TV, print, bus, radio, billboards, website, cinema Stand alone and multi-component interventions	<i>Systematic review of 12 mass media campaigns for suicide prevention</i> This recent international review was the first systematic one focused on mass media campaigns for suicide prevention. Study designs included randomised controlled trials, time series analyses, cross sectional studies. To measure outcomes, some studies used a combination of objective and subjective data while others used only one source of data. Objective measures included national suicide mortality data, calls to crisis services, hospital admissions data, and website visits. Self-report survey data (subjective) was also common. The level of exposure, repeated exposure and community engagement appeared to be important to the success of campaigns

but few studies reported or measured this.

An interesting finding is that stand alone campaigns were moderately good for improving suicide literacy; mass media appears most effective when part of a multicomponent prevention strategy. “There was marked between-study measurement of suicide deaths and attempts, as well as suicide literacy, which was partly, but not wholly, attributable to differences in objectives. Some studies employed one-item self-report measures of suicide, while others used national death data, crisis call data, or collected hospital attendance data. Instruments used to assess the general public’s suicide literacy and stigmatic attitudes were rarely reported. Where they were reported, they appeared to be *ad hoc*, despite validated tools being available (e.g., Stigma of Suicide Scale). As a result, the quality of data is likely to vary between studies.” (p. 14).

2.8 Reducing juvenile offending

While these campaigns did not involve mass media, the evaluation of these interventions provide some important lessons. The two studies in Table 2.6 aptly illustrate the need to champion behaviour-based demonstrations of an intervention’s effectiveness (in this case ineffectiveness) on the target participants, especially in the face of conflicting interpretations based on public opinion feedback. The research addressed USA based *Scared Straight* programs in which young offenders attend a prison where they receive fear-based talks from prisoners with the assumption that the offending youth will become so scared of going to jail that they will stop offending. All scientific evaluations of these programs indicate that they are ineffective and may increase the risk of future offending. Despite this evidence, programs remain in operation due to the popular belief that the programs must work. In some cases, this belief is perpetuated by pseudo-scientific television programs (which show participants before and shortly after attendance). The programs are highly edited and some participants are prompted to claim the program has had a profound effect on them. This serves to both highlight the effectiveness of some media and warn against their misuse.

Table 2.6
Summary of studies evaluating behaviour change campaigns targeting juvenile offending

Authors & study location	Type of communication	Evaluation approaches and measures
Petrosino et al., 2003; (various US universities and Departments of Justice) USA	Community intervention	<i>A systematic review of 9 studies evaluating programs comprising organised visits to prisons for juvenile delinquents</i> ‘Scared Straight’ programs involve short visits by members of the target population to adult detention/correctional facilities to ‘taste’ prison life and receive (usually fear-based) talks from adult prisoners, with the intention of reducing juvenile offending. The authors selected nine evaluations of such programs that used experimental or quasi-experimental designs and included at least one measure of post-visit criminal behaviour. Outcomes were measured objectively using police data, new offences, violation of probation, mean days in detention, arrests, and court records. Self-reported offending was used in some studies ($n=2$) but the authors noted “some who were officially charged did not self-report the offense and vice versa” (p. 53) highlighting the importance of objective sources. Additionally, some of the studies found that parents and children reported positive experiences from the program while the evidence suggested that the programs <i>increased</i> delinquency rates relative to doing nothing at all to similar youths (control group). This is why rigorous evaluation is important. The authors noted with regard to one such study that when the negative results for the program were revealed the response was to end evaluation, not the program.

Maahs & Pratt,
2017 (University
of Minnesota);

TV series

An investigation of public perceptions of the effectiveness of 'Scared Straight' programs

USA

Despite scientific evidence demonstrating the failure of Scared Straight (SS) in remediating youth delinquency, the notion remains intensely popular as people tend to believe they must have some effect on the participants. These beliefs can be precipitated by popular TV shows such as the *Beyond Scared Straight* television series (which televises juveniles attending a SS program). Shows can be highly edited with outcomes open to influence from producers. To investigate this phenomenon the authors analysed 141 Netflix member reviews of the *Beyond Scared Straight* television series. Additional data includes the star ratings given by each reviewer and the number of other members that found the review "helpful".

The authors of this study noted that SS programs maintain enduring popularity not just because they are often financed by wealthy business concerns, but more because the member reviews show a high proportion of Netflix members simply *believe* the program must be effective (or that it can't not have an effect) based on what they have seen. In their analyses of how the televised SS programs are received by the public, the authors took pains to point out the importance of emphasising the fact that because such community interventions have high intuitive appeal does not automatically mean they will be successful when measured objectively.

The authors noted that member reviews may not be representative as only those who take the time and effort to provide written comments may feel strongly about the subject, perhaps more so than those who do not provide comments.

With regard to the methodology, the authors noted that "qualitative methods are particularly useful when studying complex phenomena that cannot be easily captured by a limited set of survey items from large publicly available datasets" (p.49). This would suggest that while objective measures are the best evidence, other sources can also be useful.

3 Summary of principles in evaluating behaviour change communication campaigns

3.1 Behaviour change campaign evaluation measures

Based on the international literature reviewed in Section 2, a summary of the types of measures in evaluations of behaviour change campaigns are presented in Table 3.1 by each behaviour targeted. It is evident that, in each of these public health fields, a variety of measures may be used to assess a campaign's effect on behaviour. There are some direct means of measuring actual behaviours in most fields varying from physiological measures (e.g. blood tests to determine quitting of smoking) to injury/death rates although they are not without some limitations (e.g. small numbers).

Table 3.1
Summary of measures used in evaluations of behaviour change campaigns by type of behaviour

Behaviour	Number/description of studies	Measures			
		Direct (actual behaviour)	Indirect (other related/objective behaviour)	Self-report surveys	Use of technology
Nutrition/physical activity	3 single studies 2 reviews (N=18, N=16)	Walking activity	Step counts	Phone surveys, interviews	Pedometers, activity trackers
Smoking	3 single studies 3 reviews (N=11, N=26, N=34)	Blood tests, physical examinations	Calls to Quitline	Phone interviews, online surveys	-
Alcohol & drug use	4 single studies (3 alcohol, 1 drugs) 1 review (N=24)	-	New referrals, calls to health line.	Online surveys, interviews	Possibly phone apps
Work health and safety	1 review (N=10)	-	Worker injury claims, sickness absences, social security benefits, surgery rates, health care utilisation indicators.	Phone and postal surveys, interviews, focus groups	-
Suicide prevention	1 review (N=13)	Suicide deaths and attempt rates	Hospital admissions, calls to crisis services, review of clinical records.	Phone surveys	-
Juvenile offending	1 review (N=9) 1 single study	Police data, new offences, violation of probation, mean days in detention, arrests, court records	-	Phone surveys, online reviews	-

For most (but not all) behaviours, indirect objective measures were used, most of which relied on existing data sources rather than observational studies. For example, worker back injuries are the most direct measure to assess behaviour change for a campaign targeting back pain. However, worker injury claims are used as an indirect outcome measure because there is no complete register for all worker injuries incurred. Nonetheless, worker injury claims also have limitations as a data source. They do not include all injuries at work (only those for people who make a claim or are insured) and they do not provide data on actual clinical management or occupational outcomes in the

general population (see Waddell et al., 2007). Other examples of indirect measures include number of hospital admissions, records of health care utilisation, recorded sick absences from work, number of phone call to help lines etc. These measures appeared to be used more frequently within work health and safety, suicide prevention and alcohol and drug use.

The one measure that is common to all fields is self-reported surveys, which may be administered by phone, online, personal interviews or focus groups. In one case, face-to-face interviews revealed important information for modifying a mass media campaign (Dale & Hanbury, 2010). One review noted discrepancies between studies in the measurement of a specific behaviour and commented that, where available, standardised and validated (self-report) instruments should be used to measure behaviour (Torok et al., 2016).

The use of technology to measure behaviours is not widespread and appears to be limited to assessment of physical activity. However, as technology develops and becomes more affordable, it is expected to become more widely used in evaluations. In particular, phone applications might provide a means of monitoring behaviours although they may rely on user input in some cases.

3.2 Principles for behaviour change campaign evaluation

The literature suggests that there is no single model for best practice in evaluating communication campaigns as the evaluation approach chosen will depend on a variety of factors, including the nature of the campaign, media used; and the intention of the evaluation, timelines and cost. Rather, the tabled examination of the literature does identify several worthy components of sound evaluation practice deserving to be borne in mind when campaign evaluations are planned.

Behaviour change campaign evaluations should:

- Be conducted on campaigns that are underpinned by a recognised model/theory of behaviour change, as this (among other things) will assist in identifying and in subsequently measuring the target knowledge and attitudes that shape the intended behaviour, as well as the behaviour itself;
- Identify the target behaviour(s) sought and determine how they will be measured, preferably including through randomly-selected samples of the target population;
- Measure the target behaviour(s) preferably more than once at each of the stages: (i) pre-campaign, (ii) during campaign, and (iii) post-campaign;
- If feasible, also measure target behaviours at each stage using a control group not exposed to the campaign. Furthermore, if possible, switch the control group and exposed group in a second campaign (e.g. run campaign in State 1 with State 2 as a control, then run campaign in State 2 with State 1 as a control);
- Identify factors that can influence the likelihood of the desired behaviour being displayed, whether positively or negatively (e.g., enforcement activities, similar concurrent media messages, etc.). Note that, to some extent these other influences can be minimised if the evaluation design employs a control group;
- Ensure that the sample size is large enough to be able to measure any behavioural change effects (statistical power); this is critically important if high-risk subgroups (e.g., low socio-economic) are to be measured discretely;

- Ensure that both the campaign intensity and the post-campaign period are of sufficient duration to allow the target change in behaviour to occur and also to be measured and monitored over the long term;
- Utilise multiple measurement methods including self-reports (e.g., surveys, interviews, focus groups) to supplement objectively obtained behavioural data (e.g., observational studies, technological logging);
- Appreciate that self-reports can reveal much about how a campaign is received/interpreted by the target group along with facilitators/barriers to behaviour change, when juxtaposed with objective behavioural measures of the campaign's overall and ultimate success (or failure);
- Note that obtaining such subjective feedback as self-reports at the *mid*-campaign stage (alongside ongoing objective behavioural monitoring) can permit refinement of a complex campaign to better target the desired behaviour;
- Encourage participants' full completion in a self-report approach (e.g., survey) and minimise opt-in/opt-out responses of dropouts; this is particularly important in the case of online approaches;
- If using self-reported measures of behaviour, where possible use standardised and validated measures;
- Minimise the risk of observer bias, in the case of direct observation of behaviours, by employing more than one observer and comparing their observations/ratings.

4 Implications for evaluating road safety campaigns

This review examined evaluation studies of behaviour change campaigns across a wide range of public health issues, some occupational health and safety issues, and one community intervention program. The campaigns and the intervention sought to foster desired behaviours or discourage undesired behaviours largely through three approaches: providing appropriate knowledge, appealing to attitudes, and reinforcing social support towards behaviour change. These evaluations were presented in tabulated format. When conducted, they ranged through single campaigns focussing on one health or safety issue to collective reviews of multiple campaigns on a single issue. There were also collective reviews across a broad range of health and safety issues. These have been placed in Appendix A.

For now, it is worth considering what the reviewed studies offer by key implications to bear in mind when evaluating campaigns.

4.1 Obtaining data from more than one source

The most common evaluation approach in the studies relied heavily on participant self-reporting (e.g. surveys, interviews) to provide indicators of any changes in the target behaviour. Encouragingly, many of those studies (e.g. Torok et al., 2016; Wundersitz, 2011) also emphasised the need to supplement, where possible, such subjective data with objective evidence of behaviour change (e.g. independent observation, clinical records, technological logging). Using data from more than one source is particularly important for campaigns with the aim of changing behaviour as one measure may not capture all of the desired outcomes and each measure will be associated with some limitations. A good example comes from the workplace, health and safety campaigns targeting back pain where subjective data concerning public attitudes and beliefs suggested the campaign had a positive effect but additional objective data indicated there was no actual behaviour change in terms of work-related or health-related outcomes. Wherever possible, evidence should be combined from different sources that do not share the same limitations.

Within the reviewed literature, in some instances objectively measured behavioural change indicators were fairly easy to come by: physical activity promotion campaigns can use technological monitoring of an individual's physical activity (e.g. Brown et al., 2012; Leavy et al., 2011). In other reviewed campaigns, objective behavioural data were harder to obtain if the most serious consequences of ignoring the message occurred only relatively rarely or only in the longer term. For example, it would be problematic to measure success in a cancer screening promotion solely in terms of changes in rates of diagnosed cancer. Not only may such consequences of ignoring the campaign messages be evidenced only in the longer term, but it would be harder to attribute such effects solely to the campaign among the wide range of other influences over that time. Instead, success of cancer screening promotions was more often objectively (and directly) measured through rates of participation in screening programs. Doing this afforded not only larger sample sizes of those exhibiting the desired behaviour but reduced the likelihood of intervening factors affecting the desired behaviour.

Obtaining objective measures of behaviour in road safety is perhaps easier than in many of the public health fields. While not a direct measure of a campaign's effect in reducing crashes, such measures assess aspects of driver behaviour that might be influenced by road safety campaigns and might also be expected to be related to crash occurrence. Behaviours such as restraint use, mobile phone use, rest stop use, choice of vehicle speed and bicycle and motorcycle safety equipment use can be observed, recorded and analysed. Official records of traffic offences are another objective measure

although their usefulness is limited due to the strong association with prevalence and strength of enforcement activities (for a detailed discussion see Wundersitz & Kloeden, 2017).

While observations of behaviour are generally a more reliable source of measuring behaviour than self-reports, they are expensive to conduct. Cost is likely to be one of the main barriers as to why objective measures are not used more frequently in evaluations both in public health and road safety. New developments in affordable technology that can record behaviours may assist in increasing the use of objective measures in the future.

4.2 Use of digital technology (and how it is evaluated)

Digital communications, including social media, are becoming an increasingly popular element in behaviour change campaigns but most platforms are not designed with evaluation in mind (Korda & Itani, 2013). Still, Google Analytics and other such free to the public sites can provide information on websites and users such as number of website hits, time spent on a page and audience location, though such measures may not evaluate what it is intended to evaluate. Korda and Itani (2013) suggest suitable criteria to evaluate social media include degree of interactivity, platforms/portability, and users' e-health literacy, although none of these would measure behavioural outcomes. Sentiment analysis is another means of analysing social media content which is gaining popularity. Other points about social media and other online approaches made by Wimmer and Dominick (2014) are:

- they allow coverage across wide geographical areas
- online behaviour of large and diverse groups can be monitored (e.g. their Facebook use)
- responses may be more thoughtful and informative as surveys can be completed at respondent's convenience and in their own time
- expenses are often substantially lower than with other approaches
- participation is often on a self-selected basis so the participant has little opportunity to ask questions about what to do and drop-out rate may be high.

A systematic review of a variety of health behaviour change interventions using online social media networks found that there was modest evidence of their effectiveness in term of behaviour change with 9 out of 10 studies reporting significant but small improvements (Mahar et al., 2014). However, only four studies measured behavioural outcomes (e.g. physical activity, eating behaviour). The authors acknowledged this research was still in the early stages of development and there was still much to be learnt such as whether social networking interventions work best for some behaviours and not others and how to maximise engagement and achieve mass dissemination. They also emphasised the importance of using high quality evaluation methods conducted in real world settings (i.e. high external validity). These issues surrounding the use of social media and its evaluation are all highly germane to road safety. Digital media platforms shape how we communicate and are constantly evolving, and so this is an area to monitor closely into the future for both health and road safety.

4.3 Identifying and, where possible, controlling for other variables

In road safety, the traditional objective measures of behaviour change have been changes in death and injury rates. However, crashes are relatively rare events for individuals within the general population, they can fluctuate considerably from year to year, and the causes of those deaths and injuries may well include factors quite independent of any campaign effects. Instead, intermediary or indirect measures of road safety interventions are often used, such as vehicle speeds and police drink

drive detections. Such behavioural consequences are more frequent than deaths and injuries and this will yield an increased target behaviour sample size. Even so, evaluating an anti-speeding campaign for example, by predominantly relying on vehicle speed data, does not account for factors beside the campaign that may have influenced vehicle speeds, as discussed below.

There is an important difference here between evaluation approaches in health-related campaigns and road safety behaviour change campaigns. Most of the health-related behaviours in the reviewed campaigns largely incur only health consequences for the individual concerned. For example, a person who is not motivated by a campaign to undergo a cancer screening check could be at greater risk of undiagnosed cancer, just as someone who fails to cut or reduce smoking becomes at greater risk of smoking related illnesses. As well, of course, there are societal consequences in increased government expenditure on public health and medical services but no personal legal penalties. By contrast, in road safety campaigns, not only is a driver who continues to undertake unsafe driving behaviour (e.g. speeding) at greater risk of causing death and injury to themselves *as well as others*, but they are also liable to incur significant personal financial and licence penalties. In fact, many road safety campaigns valuably exploit both trauma and legal penalty consequences of inappropriate road user behaviours.

It is on this issue that the caution in the reviewed evaluation studies to consider the effect of other factors on the target behaviour(s) becomes highly salient (see especially Elliott, 2012; Jepson et al., 2010). Evaluations need to not just identify and measure behaviour change, but identify militating factors affecting the behaviours. Even if an evaluation study of a road safety campaign finds consistent subjective and objective evidence of the desired behaviour change, the contribution of other factors of influence such as police enforcement activity, and other messages that happen to support the campaign, must be duly acknowledged if they cannot be controlled for. Note that randomised and controlled experimental trials are considered the best scientific approaches for evaluating campaigns, but they are not always practical or feasible, mainly due to the difficulty in arranging a control group not exposed to the mass media campaign.

Elliott (2011, p. 12) provides a pertinent example stating that, appreciating the role of other potential influences on the target behaviour is crucial:

“A campaign about drink-drive enforcement may inadvertently encourage greater levels of random breath testing (RBT)... because the police now see RBT enforcement as accepted by the community and in turn influencing drivers to moderate their drinking.”

Indeed, as Wakefield et al. (2012) concluded:

“The increasingly fractured and cluttered media environment poses challenges to achieving adequate exposure to planned media messages, rather than making wide exposure easier. [Consequently]... isolation of the independent effects of mass media campaigns is difficult.” (p. 1268) (see also Bala et al., 2013)

Hoekstar and Wegman (2011) suggested that one way to control for intervening effects on target behaviours is to employ a controlled experimental approach in a pre-test phase of a planned campaign, before it is fully launched. Doing this can help determine the effect of intervening variables *early on*:

“Pre-testing can take various forms depending on the specific characteristics of the intended campaign, but in general it refers to a small-scale study where the campaign concept or individual aspects of it are tested experimentally (i.e. comparing the behaviour or behavioural intentions of people who were presented with the campaign to the behaviour of people who

have not yet been presented with the campaign; comparing the behaviour of people who have been presented with different concepts of the same campaign) to determine if the campaign strategy has any hope of influencing people's behaviour." (p.81)

4.4 Conclusions

Communication campaigns can be expensive to deliver so there is strong demand for quality data demonstrating its effectiveness. This review critically examined the international literature to determine how six fields other than road safety evaluate their behaviour change communication campaigns. Examination of the different evaluation measures used in the reviewed studies indicated that some direct measures of actual behaviours were employed but these were not used very frequently and were subject to limitations. In addition, within most (but not all) health and safety fields, some indirect objective measures of behaviour were used, most of which relied on existing data sources rather than observational studies. However, overwhelmingly, the most common measure used in the evaluation of behaviour change campaigns was self-report surveys. The use of technology to monitor behaviour was only mentioned within one area (measurement of physical activity). These findings suggest the selection of tools available for evaluation in the health and safety fields is similar to that of road safety. Given adequate resources, all domains might improve the quality of their evaluations with increased use of objective measures, aided by advances in affordable technology.

Based on the literature reviewed, some key best practice principles for providing evidence of effectiveness for these campaigns have been established. Importantly, while not new, these general principles for the evaluation of behaviour change are highly relevant and applicable to road safety. The key principles are:

- Ground the whole campaign, including the evaluation, in an established theoretical model of behaviour change;
- Measure behaviours at multiple points before during and after the campaign;
- Use a sample size and timespan sufficient to be able to measure any behaviour change, particularly for high-risk subgroups;
- Use complimentary multiple measures of behaviour including objectively obtained behavioural data (use technology where feasible) and self-reports;
- Identify factors that can influence the likelihood of the desired behaviour being displayed (e.g., enforcement activities, other media messages, seasonal effects). To some extent other influences can be minimised by incorporating a control group in the evaluation design.

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Appendix A

Some studies were identified that examined evaluation approaches employed across a range of health behaviour issues (e.g. smoking, alcohol, physical activity, diet).

Table A1
Summary of studies evaluating behaviour change campaigns targeting a range of health behaviours

Authors & study location	Type of communication	Evaluation approaches and measures
Mosdøl et al., 2017 International	Various mass media	<i>Cochrane review of targeted mass media interventions promoting healthy behaviours in adult ethnic minorities</i> A review of six studies of US campaigns targeting health issues for African, Spanish and Chinese immigrants. Campaigns adopted culturally sensitive images and were in the relevant language. The data sought on healthy behaviour changes were mainly self-report (body-mass measurements, food habits and leisure activity surveys), but two studies sought objective data on smoking cessation (calls to quit lines), although this is not a true indicator of actual behaviour change. Authors concluded the evidence is inadequate as to whether campaigns targeting ethnic minority groups are more effective than those targeting the population generally. They called for more studies that directly compare the effects of targeted campaigns with general mass media interventions.
Chaintarli et al., 2016 (Public Health England) UK	On-line pledge system	<i>A review of a national campaign to increase knowledge and change behaviour regarding antimicrobial resistance (AMR)</i> People could go to a website and make a pledge to engage in specific behaviours regarding infections. Evaluation was conducted via on-line surveys. The authors found that a campaign of this type improved AMR related knowledge and behaviour among health care professionals and the general public, particularly those who had prior awareness. They do, however, note that sample participants were mainly females aged 44-54, which have been shown to have better AMR related knowledge and behaviour anyway.
Maher et al., 2014, (University of SA) International	On-line social media campaigns	<i>A review of 10 evaluations of campaigns conducted via social media and online networks</i> Most of the reviewed online surveys compared campaign participants with randomised control groups with respect to campaign outcomes such as health behaviour change (e.g. weight change, level of physical activity and eating behaviours) and change in related variables/mediators (e.g. self-efficacy, weight-loss knowledge and social support.) Only 4 of the 10 studies adopted a pre/post campaign survey design. Nine of the 10 included studies reported significant improvements in health behaviour change or outcomes related to behaviour change but the effect sizes were small. The authors concluded there is very modest evidence that interventions incorporating online social networks may be effective but noted the field of research is in its infancy. They make numerous recommendations for future research.

Wimmer & Dominick, 2014, (University of Georgia, Florida)	Textbook/manual for mass media research	<i>A textbook/manual of how to conduct mass media research</i>
International		<p>The following points are made relating to different approaches for mass media evaluation:</p> <p>Field observations:</p> <ul style="list-style-type: none"> • allow collection of information on contexts of target behaviour (e.g. facilitators/barriers to the behaviour) • are often suited to pilot/preliminary studies • can provide access to difficult to access subgroups • can be compromised through poor representativeness of the sample of behaviour collected • can be influenced by subjective biases of the observer, requiring cross-checking across 2 or 3 observers • can also be compromised if the participant's behaviour is influenced by knowing their behaviour is being observed. <p>Focus groups:</p> <ul style="list-style-type: none"> • are often suited to pilot/preliminary studies • can be conducted relatively quickly, with relatively low cost; can even be conducted online • allow flexibility/tailoring in question design and follow up to clarify responses or to seek further detail • can involve completion of questionnaires pre & post the focus group to obtain minority views • responses may be more thoughtful and informative as participants become stimulated by responses of others • may yield discussion dominated by 1 or 2 individuals, relying on the skills of the facilitator • are not suited to gathering quantitative data or information • may not be representative of the target group. <p>Surveys & questionnaires:</p> <ul style="list-style-type: none"> • allow data collection from many people across varied backgrounds & circumstances • can collect both qualitative and quantitative information • are cost-effective, given the amount of information obtained • are not able to establish causality effects of any intervening variables, merely that a behaviour and its antecedents may be related • can be compromised if the survey wording or question design is faulty • can be compromised if the respondent gives incorrect background information (e.g. their age) • often have poor response rates. <p>Field experiments:</p> <ul style="list-style-type: none"> • experiments are conducted in natural settings and in doing so allow multiple audiences to be studied • however, the ability to control variables may be limited • access to multiple data sources is facilitated
Korda & Itani, 2013 (Altarum Institute, USA)	Social media	<i>A commentary on the use of social media to achieve health behaviour changes</i>
USA		<p>Authors note that most forms of social media are not designed with evaluation in mind. However, Google Analytics and other such free to the public sites can provide information such as number of site hits, time spent on a page and audience location, though such measures may not evaluate what it is intended to evaluate. Suitable criteria to evaluate social media sites include degree of interactivity, platforms/portability, and users' e-</p>

		health literacy, although none of these would measure behavioural outcomes. Other problem areas include how to recruit and randomise evaluation participants, how to control for the effects of other interventions (seeing social media may be just one in a suite of campaign approaches), and attrition when participants pull out of the study.
Elliott, 2011, (Australian consultant psychologist)	Various media	<p><i>Lessons for road safety campaigns from campaigns in other health/safety fields</i></p> <p>The author noted almost all reviewers of campaign evaluations state that, while scientific evaluations are highly desirable, they rarely happen, partly because of cost and the mistaken belief among road safety professionals that only crash-based evaluations matter. Even with rigorous scientific evaluations, conflicting findings in campaign evaluations are common.</p>
Hoekstra & Wegman, 2011 (Dutch Institute for Road Safety Research)	Various media	<p><i>Lessons road safety campaigns can learn from campaigns in other health/safety fields</i></p> <p>The authors suggested that one way to control for intervening effects on target behaviours is to employ a controlled experimental approach in a pre-test phase of a planned campaign, before it is fully launched. Doing this can help determine the effect of such intervening variables early on: "Pre-testing can take various forms depending on the specific characteristics of the intended campaign, but in general it refers to a small-scale study where the campaign concept or individual aspects of it are tested experimentally (i.e., comparing the behaviour or behavioural intentions of people who were presented with the campaign to the behaviour of people who have not yet been presented with the campaign; comparing the behaviour of people who have been presented with different concepts of the same campaign) to determine if the campaign strategy has any hope of influencing people's behaviour." (p.81)</p>
Jepson et al., 2010 (University of Stirling, Scotland)	Various media	<p><i>A review of reviews examining the effectiveness of six health interventions</i></p> <p>A review of the evaluations of 103 campaigns targeting smoking, alcohol misuse, healthy eating, exercise promotion, youth sexual risk taking and illicit drug use. Authors noted that evaluations should cover not just measures of behaviour changes, but also factors that work against desired behaviour change, (such as low cost of cigarettes). Most of the reviewed studies did not examine mitigating issues. Evaluations should also measure outcomes for different socio-economic groups. Long-term behaviour changes should also be measured, including to gain a deeper understanding of factors assisting and hindering the intervention.</p>
International		
Wakefield et al., 2010, (Cancer Council Victoria)	Various mass media	<p><i>A review of mass media campaigns to change health behaviour</i></p> <p>Review of nearly 600 campaigns in fields ranging through smoking, alcohol abuse, physical activity and nutrition promotion, birth rate reduction, HIV prevention, cancer screening, immunisation, breastfeeding promotion, organ donation and domestic violence. The study concluded that isolation of the independent effects of mass media campaigns is difficult. To facilitate changes in health behaviour, it was recommended that sufficient funding is secured to enable longer term campaigns to achieve widespread population exposure to campaign messages, particularly for ongoing behaviours, and that policy decisions support the desired behaviour change.</p>
International		

Hornik, 2002 (University of Pennsylvania);	Various media	<i>A review of 16 case studies of behaviour change campaigns addressing a range of health issues</i>
International		Health issues covered in this review are high blood pressure, childhood vaccination, teenage anti-smoking, HIV/AIDS prevention, breastfeeding, and SunSmart. The review suggested best practice in evaluation comprises: use of control groups; an appropriate time lag between running the campaign and evaluating its impact; sufficient sample size; conducting multiple measurements before, during and after the campaign; use of more than one approach (e.g. surveys/interviews and independent observations of behaviour); recognise that some groups in the target audience may be more (or less) vulnerable to the effects than others; and recognition of rival communications/events that help explain the behaviour change found.
