

# Use of mass media campaigns to change health behaviour



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Mass media campaigns are widely used to expose high proportions of large populations to messages through routine uses of existing media, such as television, radio, and newspapers. Exposure to such messages is, therefore, generally passive. Such campaigns are frequently competing with factors, such as pervasive product marketing, powerful social norms, and behaviours driven by addiction or habit. In this Review we discuss the outcomes of mass media campaigns in the context of various health-risk behaviours (eg, use of tobacco, alcohol, and other drugs, heart disease risk factors, sex-related behaviours, road safety, cancer screening and prevention, child survival, and organ or blood donation). We conclude that mass media campaigns can produce positive changes or prevent negative changes in health-related behaviours across large populations. We assess what contributes to these outcomes, such as concurrent availability of required services and products, availability of community-based programmes, and policies that support behaviour change. Finally, we propose areas for improvement, such as investment in longer better-funded campaigns to achieve adequate population exposure to media messages.

## Introduction

Over the past few decades, media campaigns have been used in an attempt to affect various health behaviours in mass populations. Such campaigns have most notably been aimed at tobacco use and heart-disease prevention, but have also addressed alcohol and illicit drug use, cancer screening and prevention, sex-related behaviours, child survival, and many other health-related issues. Typical campaigns have placed messages in media that reach large audiences, most frequently via television or radio, but also outdoor media, such as billboards and posters, and print media, such as magazines and newspapers. Exposure to such messages is generally passive, resulting from an incidental effect of routine use of media. Some campaigns incorporate new technologies (eg, the internet, mobile phones and personal digital assistants), but recipients have so far generally been required to actively choose to seek information, for example by clicking on a web link, and discussion of these methods is not included in this Review.

Media campaigns can be of short duration or may extend over long periods. They may stand alone or be linked to other organised programme components, such as clinical or institutional outreach and easy access to newly available or existing products or services, or may complement policy changes. Multiple methods of dissemination might be used if health campaigns are part of broader social marketing programmes.<sup>1</sup>

The great promise of mass media campaigns lies in their ability to disseminate well defined behaviourally focused messages to large audiences repeatedly, over time, in an incidental manner, and at a low cost per head. As we discuss in this Review, however, that promise has been inconsistently realised: campaign messages can fall short and even backfire; exposure of audiences to the message might not meet expectations, hindered by inadequate funding, the increasingly fractured and cluttered media environment, use of inappropriate or poorly researched format (eg, boring factual messages or age-inappropriate content), or a

combination of these features; homogeneous messages might not be persuasive to heterogeneous audiences; and campaigns might address behaviours that audiences lack the resources to change.

## Search strategy and selection criteria

We searched Medline, PsychInfo, Embase, Soclit, Eric, and Communication and Mass Media Complete electronic databases to identify full-text review articles and non-reviewed notable studies published from 1998 onwards, in English, that we judged to represent advances in assessment methods or substantial increments in knowledge. We integrated review findings with evidence from robust and influential empirical studies that were published after the last review article identified.

Search terms included "review" and either "health promotion", "health education", "social marketing", "marketing of health services", "campaign\*", "mass media\*", "mass communication campaign\*", "publicity campaign\*", "information campaign\*", or "community intervention\*", along with and the individual health behaviours of interest, which we termed "tobacco or smoking", "alcohol", "marijuana", "street drugs", "crack cocaine", "heart health or heart disease prevention or physical activity or obesity or nutrition or high fat\* or high sodium\* or diet", "family planning or contraception or child spacing", "sex or sexual behaviour", "HIV or AIDS or HIV/AIDS or sexually transmitted disease or STD", "skin neoplasms or sunburn or suncreening agents", "uterine cervical neoplasms", "breast neoplasms", "colorectal neoplasms", "immunization or vaccination", "diarrhea or diarrhoea or oral rehydration therapy or ORT or oral rehydration", "breastfeed\*", "SIDS or sudden infant death syndrome or cot death", "Reye's syndrome", "organ donation", "blood donation", "domestic abuse or violence prevention or child abuse prevention", "mental health or youth suicide prevention or depression", or "seat belt use or road safety".

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### Direct and indirect methods to affect behaviour change

Mass media campaigns can work through direct and indirect pathways to change the behaviour of whole populations.<sup>2</sup> Many campaigns aim to directly affect individual recipients by invoking cognitive or emotional responses. Such programmes are intended to affect decision-making processes at the individual level. Anticipated outcomes include the removal or lowering of obstacles to change, helping people to adopt healthy or recognise unhealthy social norms, and to associate valued emotions with achieving change. These changes strengthen intentions to alter and increase the likelihood of achieving new behaviours.<sup>3</sup> For instance, an antismoking campaign might emphasise risks of smoking and benefits of quitting, provide a telephone number for a support line, remind smokers of positive social norms in relation to quitting, associate quitting with positive self-regard, or a combination of these features.

Behaviour change might also be achieved through indirect routes. First, mass media messages can set an agenda for and increase the frequency, depth, or both, of interpersonal discussion about a particular health issue within an individual's social network, which, in combination with individual exposure to messages, might reinforce (or undermine) specific changes in behaviour. Second, since mass media messages reach large audiences, changes in behaviour that become norms within an individual's social network might influence that person's decisions without them having been directly exposed to or initially persuaded by the campaign. For example, after viewing televised antismoking campaign messages, several members of a social group might be prompted to form a support group to help them stop smoking. Another individual who has not seen the television campaign could decide to join the support group and change his or her own behaviour. Finally, mass media campaigns can prompt public discussion of health issues and lead to changes in public policy, resulting in constraints on individuals' behaviour and thereby change. For example, a campaign discouraging smoking because of its second-hand effects on non-smokers might not persuade smokers to quit, but it might increase public support for a new policy that restricts smoking in specific places, which might have the secondary effect of persuading smokers to quit.

### Evidence for health behaviour change

We discuss a range of media campaigns, from constrained experimental programmes with complex research apparatus funded specifically to test the promise of public communication, such as the Stanford Heart Disease Prevention Program,<sup>4,5</sup> to campaigns mounted as large-scale interventions on a regional or national scale, not operationally constrained by the need for outcome assessment, but to which analysis was later applied, such as the US National Youth Antidrug Media Campaign.<sup>6</sup>

These distinctions matter because the strength of the claims of causality is affected by the campaign design. For example, campaigns designed to maximise scale and operational success but that do not carefully assess outcomes might be expected to make weak claims compared with those that include carefully planned experimental assessments. Large-scale media campaigns do, however, have higher population exposure and can exploit the indirect pathways that can increase overall population response to campaigns. Careful experimental designs are more often used to assess only the direct effects of small-scale campaigns, which might not provide the potential for maximum effectiveness.<sup>7</sup>

### Tobacco, alcohol, and illicit drugs

One in three long-term tobacco users die prematurely, largely from cardiovascular and respiratory diseases and cancer. Without intervention, 1 billion premature deaths globally are predicted to be related to tobacco by the end of this century.<sup>8</sup> Tobacco use is also a major contributor to social inequalities in mortality in many populations worldwide.<sup>9</sup> Far more studies have been done to assess the effects of media campaigns on tobacco use than on any other health-related issue and, consequently, the evidence for benefit is strong (table). Between the 1970s and mid-1990s, the studies were controlled field experiments forming part of research demonstration projects, whereas from the mid-1990s onwards, large-scale media campaigns have been assessed as key components of state and national tobacco control programmes.

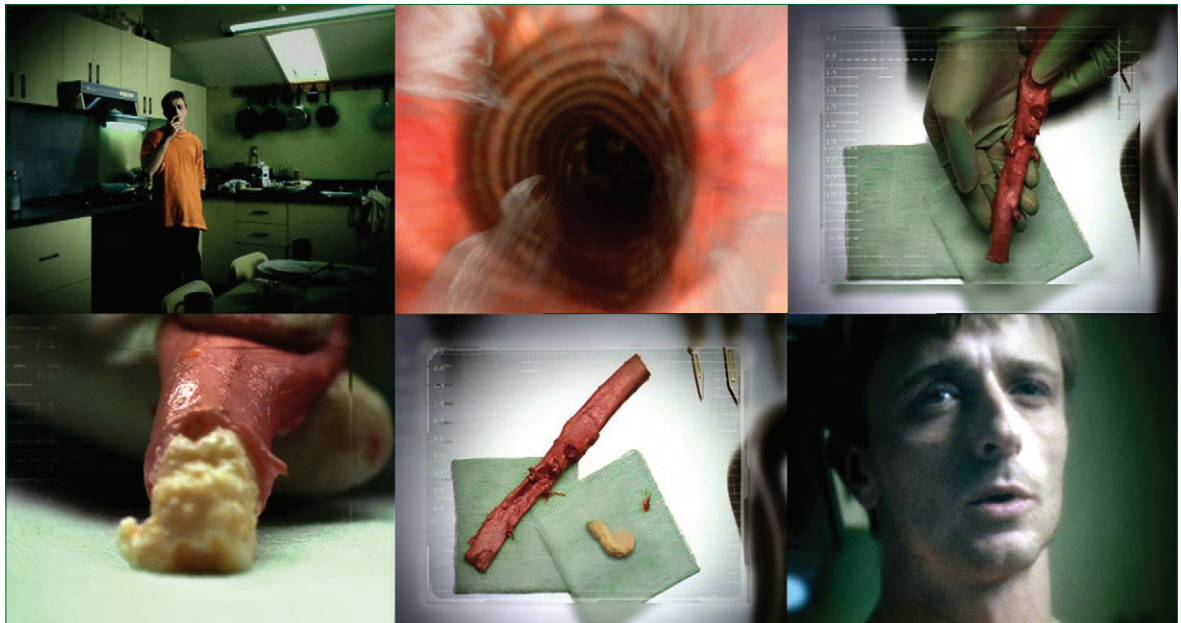
Comprehensive reviews of controlled field experiments and population studies show that mass media campaigns were associated with a decline in young people starting smoking<sup>10</sup> and with an increase in the number of adults stopping.<sup>10,11</sup> Smoking prevention in young people seems to have been more likely when mass media efforts were combined with programmes in schools, the community, or both.<sup>10</sup> Many population studies have documented reductions in adult smoking prevalence when mass media campaigns have been combined with other tobacco control strategies, such as increases in tobacco taxation or smoke-free policies.<sup>10,11</sup> In the absence of formal control groups not exposed to mass media campaigns, however, it is difficult to separate the effects of the different strategies. Some studies have used time series analyses<sup>12</sup> or natural experiment designs that exploit variation in degree of exposure to the media campaign and adjust for exposure to other tobacco control policies, and have found beneficial independent effects of campaigns.<sup>13,14</sup>

The achievement of adequate exposure to media campaigns seems important for reducing population tobacco use; withdrawal of media campaigns has been associated with a decline in beneficial effects.<sup>10,12,15,16</sup> This outcome is unsurprising while influences that promote tobacco use remain (eg, marketing and the addictive nature of tobacco).

	Type of behaviour	Competing influences	Numbers and characteristics of mass media campaigns in reviews	Summary conclusions
Tobacco	Ongoing	Addiction, tobacco marketing, pricing, social norms	<ul style="list-style-type: none"> <li>121: 25 controlled field experiments on youth and 40 on adults, and 57 population-based state/national mass media campaigns (NCI, 2008<sup>30</sup>)</li> <li>11 adult-focused with control groups/interrupted time series (Bala et al, 2008<sup>31</sup>)</li> </ul>	Strong evidence for benefit
Alcohol	Ongoing	Alcohol marketing, pricing and availability, social norms, addiction	<ul style="list-style-type: none"> <li>15: eight on safe drinking (seven with counter-advertising components to improve literacy about alcohol advertising; Babor et al, 2003<sup>32</sup>)</li> <li>0 that were mass media only (Spath et al, 2008<sup>24</sup>)</li> <li>17 (Anderson et al, 2009<sup>35</sup>)</li> <li>Two social norms media campaigns (Moreira et al, 2009<sup>35</sup>)</li> </ul>	Little evidence for benefit
Physical activity	Ongoing	Lack of environmental support (eg, walking paths), safety concerns, labour-saving products	<ul style="list-style-type: none"> <li>19: ten community-wide, three mass media only, six point-of-decision (Kahn et al, 2002<sup>37</sup>)</li> <li>15 mass media with community programmes (Cavill and Bauman, 2004<sup>45</sup>)</li> <li>17 mass media with community programmes (Finlay and Faulkner, 2005<sup>48</sup>)</li> <li>Four mass media with community programmes (Matson-Koffman et al, 2005<sup>35</sup>)</li> <li>Five point-of-decision (Williams et al, 2008<sup>49</sup>)</li> </ul>	Moderate evidence for benefit, especially in motivated individuals and with prompts at point of decision
Nutrition	Ongoing	Food marketing and pricing lack of access to fresh fruit and vegetables	<ul style="list-style-type: none"> <li>Eight (Pomerleau et al, 2005<sup>34</sup>)</li> <li>Three community and three labelling fruit and vegetables (Matson-Koffman et al, 2005<sup>35</sup>)</li> <li>29 point-of-purchase (Brownson et al, 2006<sup>43</sup>)</li> </ul>	Moderate evidence for benefit when specific healthy food choices promoted
CVD prevention	Ongoing	As for nutrition and physical activity	<ul style="list-style-type: none"> <li>Five (Shea and Basch, 1990<sup>39</sup>)</li> <li>Five (Atienza and King, 2002<sup>40</sup>)</li> <li>Seven community based (before 1998) with media components (Snyder et al, 2004<sup>42</sup>)</li> </ul>	Moderate evidence for benefit
Birth-rate reduction	Ongoing	Social norms for family size, lack of access to services	<ul style="list-style-type: none"> <li>15 (Hornik and McAnany, 2001<sup>57</sup>)</li> </ul>	Moderate evidence for benefit, especially among motivated individuals
HIV infection prevention	Ongoing	Sexual drive, cultural reinforcement of risky behaviour, lack of access to services	<ul style="list-style-type: none"> <li>Eight (Wellings 2002<sup>36</sup>)</li> <li>24 (Bertrand et al, 2006<sup>54</sup>)</li> <li>34 complementary to other interventions and routine media coverage of AIDS (Noar et al, 2009<sup>59</sup>)</li> </ul>	Moderate evidence for benefit on condom use; little evidence for benefit on number of sex partners
Cervical cancer screening	Episodic	Lack of access to screening services	<ul style="list-style-type: none"> <li>10: four mass media alone, six with other components (Black et al 2002<sup>63</sup>)</li> <li>Three mass media alone (Baron et al 2008<sup>61</sup>)</li> </ul>	Moderate evidence or benefit when used with other programmes
Breast cancer screening	Episodic	Lack of access to screening services	<ul style="list-style-type: none"> <li>Four with community programmes (Snyder et al, 2004<sup>42</sup>)</li> <li>0 that were mass media only (Baron et al, 2008<sup>61</sup>)</li> </ul>	Moderate evidence for benefit, but no findings for mass media only
Bowel cancer screening	Episodic	Lack of access to screening services	<ul style="list-style-type: none"> <li>0 that were mass media only (Baron et al, 2008<sup>61</sup>)</li> </ul>	No evidence for mass media only
Skin cancer prevention	Ongoing	Social norms for tanning	<ul style="list-style-type: none"> <li>47: 12 mass media only, 35 with community interventions (Saraiya et al, 2004<sup>67</sup>)</li> </ul>	Insufficient evidence for individual behaviour change
Immunisation	One-off or episodic	Lack of access to vaccines	<ul style="list-style-type: none"> <li>Seven complementing improved vaccination access (Hornik et al, 2002<sup>73</sup>)</li> <li>Four mass media (Pegurri et al, 2005<sup>76</sup>)</li> </ul>	Moderate evidence for benefit
Diarrhoeal disease	Episodic	Previous custom of withdrawing food and liquids	<ul style="list-style-type: none"> <li>Five with improved access to premixed rehydration solution and health-worker training (Hornik et al, 2002<sup>73</sup>)</li> </ul>	Moderate evidence for benefit
Breastfeeding	One-off or episodic	Cultural preferences, hospital practices	<ul style="list-style-type: none"> <li>Two with health-worker retraining (McDivitt et al, 1993<sup>79</sup>)</li> <li>Three with health-worker retraining or restricted marketing of infant formula (Wilmoth and Elder, 1995<sup>78</sup>)</li> </ul>	Weak evidence for benefit
Road safety	Ongoing	Alcohol marketing and pricing, drowsiness, road and vehicle design	<ul style="list-style-type: none"> <li>15 with enforcement campaigns (Dinh-Zarr et al, 2001<sup>86</sup>)</li> <li>87 and 35 with other campaigns for road safety and comparison groups (Morrison, et al, 2003<sup>83</sup>)</li> <li>Nine (Ditter et al, 2005<sup>85</sup>)</li> <li>Eight with campaigns for drink-driving (Elder et al, 2004<sup>84</sup>)</li> </ul>	Strong evidence for increased use of safety belts and decreased drink driving when enforcement campaigns used, mixed conclusions for designated driver campaigns
Organ donation	One-off	Cultural and religious beliefs, family relationships	<ul style="list-style-type: none"> <li>14 complementing World Transplant Games Federation events (Slapak, 2004<sup>89</sup>)</li> </ul>	Moderate evidence for benefit
Mental health, violence, and child maltreatment	Ongoing	Social norms, access to violent means of harm (weapons, drugs, etc)	<ul style="list-style-type: none"> <li>Five (Mikton and Butchert, 2009<sup>95</sup>)</li> <li>Five (Mann et al, 2005<sup>97</sup>)</li> </ul>	Inconclusive findings for child maltreatment; little evidence for benefit in suicide prevention
Prehospital response times for potential heart attack symptoms	Episodic	Rural location, failure to recognise severity	<ul style="list-style-type: none"> <li>16 with other components (Finn et al, 2007<sup>99</sup>)</li> </ul>	Moderate evidence for decreased delay and emergency calls

CVD=cardiovascular disease. \*No review of illicit drug use was identified. See text for summary of individual studies' findings.

**Table: Summary of reviews of mass media campaign features and effects on behaviour, by health topic\***



**Figure:** Images from a television advertisement in Australia's National Tobacco Campaign

Smoking is linked graphically to arterial damage and the caption "Every Cigarette Is Doing You Damage" was used. The campaign was associated with a decline in adult smoking rates.<sup>12</sup> Reproduced courtesy of the Department of Health and Ageing, National Tobacco Campaign.

Most evidence has been generated from studies in high-income countries because the highest number of campaigns have been done there and research capacity is substantial there. Evidence is mixed on the ability of mass media campaigns to redress the disparities in smoking prevalence between subgroups with high and low socioeconomic status.<sup>17</sup> One cohort study has suggested that high exposure to antitobacco campaigns that elicit negative emotions, such as fear, disgust, and sadness, promotes increased cessation rates in lower socioeconomic populations.<sup>14</sup> This finding is consistent with evidence in many population subgroups of the positive effects of antitobacco campaigns that use negatively emotive advertising messages.<sup>10</sup> For example, media campaigns that graphically link smoking to serious health damage to motivate adult smoking cessation (figure) have also been associated with prevention of smoking uptake among young people.<sup>10</sup> This outcome might be an indirect consequence of reductions in adult (eg, parental) smoking attributable to campaigns, which exerts a protective effect on youth uptake.<sup>18</sup> Direct effects of such campaigns on young people have, however, also been suggested.<sup>10,19</sup> A future challenge for media campaigns related to tobacco control is to ensure their evidence-based application in low-income and middle-income countries, which have infrequently received such programmes, and in groups with low socioeconomic status in high-income countries.

During the late 1990s, several tobacco companies began to broadcast mass media campaigns internationally to advocate that young people should not smoke. Studies of forced (non-incident) exposure, in which young people had to watch then recall and appraise advertisements,

have concluded that these messages were appraised poorly by the target audience.<sup>10</sup> The Philip Morris tobacco company in the USA also broadcast campaigns encouraging parents to talk with their children about tobacco use. Population-based studies found high exposure to the industry's youth-directed campaign was associated with strengthening intention to smoke in the future,<sup>20,21</sup> whereas high exposure to the parent-directed campaigns strengthened intentions to smoke in the future, lowered perception of harm from smoking, and increased the risk of current smoking behaviour.<sup>21</sup> A theory for these outcomes is that few reasons beyond simply being a teenager were offered as to why young people should not smoke. By giving a subtle message that smoking is an adult activity, tobacco can seem like a forbidden fruit and attractiveness can increase.

Misuse of alcohol contributes to around 4% of the global burden of ill health and premature death, principally from alcohol-use disorders, cancer, cardiovascular disease, liver cirrhosis, and injury.<sup>22</sup> With the exception of mass media campaigns to reduce drink driving, campaigns to lessen alcohol intake have had little success.<sup>23,24</sup> Most have been targeted towards young people,<sup>23,25,26</sup> but the potential effects have generally been overshadowed by widespread unrestricted alcohol marketing strategies and the view of drinking as a social norm. Safe drinking campaigns sponsored by alcohol companies have been ineffective in changing drinking behaviour, because the messages are viewed as ambiguous by recipients.<sup>27,28</sup> No assessments have been conducted of whether the publicising of alcohol drinking guidelines affects alcohol-related harm.<sup>25</sup>



Little peer-reviewed research is available on the effects of mass media campaigns to change behaviours related to illicit drug use; nearly all work has been undertaken in the USA. One study found positive effects of a campaign that ran from 1987 to 1990 and addressed use of marijuana and crack cocaine by young people.<sup>29</sup> By contrast, another study found the effects to be overstated for a campaign that ran in Montana, USA, against methamphetamine use.<sup>30</sup> Between 1998 and 2004, the US Congress spent nearly US\$1 billion on a national antidrug media campaign aimed at young people aged 9–18 years, their parents, and other influential adults. The campaign used television and radio advertising, accompanied by other media and community programmes, to provide education, with the goals of preventing initiation of marijuana use and persuading occasional users to stop. Messages directed at parents encouraged them to talk with their children about drugs and to closely supervise and monitor their behaviour. Although some localised time-limited studies showed positive effects among young people who require substantial novelty and stimulation (termed high-sensation young)<sup>31</sup> and those who also received school-based drug prevention information,<sup>32</sup> a comprehensive national assessment showed that the campaign did not positively affect attitudes towards or behaviour related to marijuana use among young people.<sup>5</sup> Indeed, some evidence suggested that greater exposure would have increased intention to use marijuana, possibly because the underlying message of the campaign was that marijuana use was commonplace and thus normal.<sup>5</sup> Among parents, the campaign had favourable effects in terms of their attitudes towards and behaviour in relation to talking with children about drugs. No improvement was reported, however, in attitudes towards or monitoring of their children's behaviour.<sup>33</sup> The evidence for the success of campaigns focusing on illicit drug use is inconsistent.

### Nutrition, activity, and prevention of heart disease

Cardiovascular disease is a leading cause of death worldwide and is a major contributor to health-care costs in developed countries. In addition to tobacco use, risk factors include high blood pressure, high blood cholesterol concentrations, poor nutrition, physical inactivity, and obesity.<sup>34,35</sup> Whereas rates of heart disease and stroke have lessened since the 1950s, those of obesity have increased strikingly among adults and particularly among children in high-income countries.<sup>35–38</sup>

In the 1970s and 1980s, large-scale community-based public communication interventions aimed at preventing cardiovascular disease, including the North Karelia Project in Finland, and the Stanford Heart Disease Prevention Program and the Minnesota Heart Health Program in the USA, were among the first to be formally assessed for effectiveness.<sup>39</sup> Smaller-scale cardiovascular disease prevention programmes followed in the mid-1980s and 1990s. In aggregate, these programmes yielded

high awareness and improvements in risk-reducing behaviours, such as changes to diet and increases in physical activity. Cross-sectional independent sample outcome effects, particularly on overall risk for cardiovascular disease, however, were short-term, small in size, and similar in magnitude to secular declines in communities not exposed to mass media campaigns.<sup>40</sup> Researchers have argued convincingly, though, that large-scale, uncontrolled, national campaigns with large mass media components, such as the National High Blood Pressure Education Program and the National Cholesterol Education Program in the USA, contributed to these substantial secular declines in blood pressure, blood cholesterol concentrations, or both.<sup>41</sup>

Since the mid-1980s, the scale of mass media campaigns related to heart health has decreased, whereas the size of those directed towards improving nutrition, increasing physical activity, or both, has increased. Before 1990, campaigns related to diet frequently focused on reducing fat intake, but the results in terms of improving food choices seem to have been mixed.<sup>35</sup> Later media campaigns focused on increasing consumption of fruit, vegetables and low-fat milk, and were deemed more successful, especially when people were provided with access to healthy foods or had health disorders for which changes in diet would be beneficial.<sup>34,35,42,43</sup> Campaigns aimed at increasing low-fat-milk consumption have also motivated governmental policy changes.<sup>44</sup> The introduction of signs and labels providing nutritional information at the point of purchase in restaurants, grocery stores, and vending machines, have also increased the likelihood of people selecting healthy food.<sup>35</sup>

Campaigns with mass media components aimed at changing physical activity behaviours have yielded short-term increases in physical activity, mainly in highly motivated individuals.<sup>45–47</sup> Success has been seen with community-wide walking campaigns targeting adults, especially older adults (eg, >50 years),<sup>48,49</sup> and the US Center for Disease Control and Prevention's VERB campaign, which targeted children aged 9–13 years.<sup>36,46</sup> The latter campaign used commercial marketing techniques and had achieved population-level changes at year 2, with evidence being reported for an exposure-response relation.<sup>36,46</sup> Small-scale interventions that have used motivational posters to encourage use of stairs instead of elevators have also changed behavior.<sup>35,47</sup> Mass media programmes for prevention of childhood obesity have shown encouraging results, with improvements in body-mass index Z scores being associated with the exposure to the campaigns.<sup>37,38</sup>

Assessment of campaigns to promote nutrition and physical activity, like those promoting tobacco control, shows that while short-term changes can be achieved, sustained effects are difficult to maintain after campaigns end.<sup>34,38,45,46,49,50</sup> Competing environmental factors, such as easy access to and marketing of energy-dense food,<sup>51</sup> the complexity of recommendations for nutritional and

physical activity behaviour in different population subgroups,<sup>50</sup> and changes over time in recommendations made by health educators are notable obstacles to achieving longer-term population-level changes.<sup>46</sup> Sufficient exposure to campaign messages,<sup>52</sup> including in high-risk and underserved populations,<sup>41,46,47</sup> is also a concern. Finally, almost all assessed mass media campaigns have included multiple programme components (eg, other community, school, and worksite interventions) and, therefore, the effects of mass media campaigns are difficult to isolate.<sup>41,45,47</sup>

#### Birth-rate reduction and prevention of HIV infection

Reductions in birth rates and prevention of HIV infection require changes in human behaviour on a large scale. Unsurprisingly, therefore, both these issues have been continuing focuses for mass media campaigns. Those intended to encourage family planning have been particularly important in low-income countries,<sup>53</sup> whereas those aimed at preventing HIV infection have been relevant in low-income and high-income countries.<sup>54,55</sup>

The transition from high to low birth rates has been argued to require a climate of opinion “supportive of modern contraceptive use and the idea of smaller family sizes”.<sup>56</sup> This opinion is supported by substantial evidence that the spread of information through mass media, along with efforts to promote family planning, is associated with adoption of contraception.<sup>57,58</sup> Positive outcomes can be shown whether comparisons are made across geographic areas, over time within geographic areas, or between individuals.<sup>57</sup> For example, Cleland and Ali<sup>58</sup> have noted a sharp growth in the use of condoms for protection against pregnancy among young women across Africa (from 5% to 18% between 1993 and 2001), which they attribute to HIV-related condom promotion campaigns. Although these temporal or cross-sectional associations are noteworthy and, in some cases, are independent of potential confounders, separation of the effects of exposure to modern values through ordinary media content from effects of exposure to specific procontraceptive campaign content is not always clear-cut.

Evidence from discrete projects complements that from population-level and aggregated studies. Effective family planning communication strategies have included the embedding of pro-family-planning messages in entertainment programmes, particularly in a soap opera format, social marketing with expanded distribution of family planning devices, and focused promotional advertising. The greatest short-term increases in demand have been reported for people who were exposed to campaign messages and were already considering use; the effects in people who were not previously committed to use are less convincing.<sup>57</sup>

Programmes for prevention of HIV infection have received substantial funding worldwide, and mass media campaigns have been major components of those

programmes. Behavioural targets have included uptake of HIV testing, use of condoms, and lowering the number of sex partners. Bertrand and colleagues<sup>54</sup> noted mixed results for mass media interventions in low-income countries: a few studies yielded small to moderate effects, but others achieved no change. Wellings<sup>55</sup> summarised a series of European AIDS campaigns with major mass media components run in the early 1990s. She found that campaign activity and trends in the proportions of people with casual sexual partners who used condoms increased linearly, especially in countries with more vigorous campaigns, but there was no effect on the number of sex partners. Noar and co-workers<sup>59</sup> built on an earlier review<sup>60</sup> and judged that only ten of 34 identified campaigns had robust quality assessment components, but of these eight showed significant effects on behaviour.

Of the campaigns aimed at reducing birth and HIV infection rates, reviews have shown consistently that discrete mass media programmes can affect behaviour.

#### Cancer screening and prevention

Screening of asymptomatic individuals for cervical, breast, and colorectal cancers is recommended for early detection.<sup>61</sup> Mass media campaigns to encourage women to have Papanicolaou (Pap) smears and undergo screening mammography have been run in many high-income nations since the early 1990s. Initial experience, predominantly from Australia and the USA, suggested that mass media campaigns supported by tailored reminder letters prompted short-term increases in Pap-smear uptake, especially when there was good availability of screening services.<sup>62,63</sup> Later research indicated that short-duration screening programmes that offered easy access to screening services, used reminder letters, and specifically included television broadcast components were associated with short-term population-wide increases in attendance for Pap smears,<sup>64</sup> including in ethnic minority populations<sup>65</sup> and those of low socioeconomic status.<sup>66</sup> Likewise in the case of mammography, use of mass media campaigns and reminder letters in areas where screening was already organised and available led to increases in uptake.<sup>65</sup> Snyder and colleagues<sup>62</sup> did a meta-analysis of US-based campaigns and the findings suggested a small but significant effect. Mass media campaigns without organised screening services, however, have produced little or no detectable increases in use of cervical cancer screening;<sup>61,62</sup> no such studies have been done for breast or colorectal cancer screening.<sup>61</sup>

Skin cancer is caused mainly by overexposure to ultraviolet radiation in sunlight.<sup>67,68</sup> Mass media campaigns aimed at prevention of skin cancer have concentrated on reducing patterns of sun exposure, mainly in fair-skinned populations. The types of behaviours most frequently recommended have been avoidance of direct exposure in high ultraviolet periods

and the wearing of protective clothing and sunscreen products. A systematic review showed insufficient evidence of an association between mass media campaigns—alone or accompanied by comprehensive community programmes—and changes in sun-exposure behaviours.<sup>67</sup> A study from Australia that assessed sun protection attitudes and behaviours for 15 years in the presence of variable amounts of media campaign exposure (SunSmart), however, has provided convincing evidence of improvements in attitudes and behaviour in the presence of skin cancer prevention media campaigns.<sup>69</sup> Furthermore, reductions in the incidence of melanoma have been observed, especially among young people, over the decades of this media campaign.<sup>70</sup> The researchers of this Australian study advocate as crucial the need for sustained community-wide organised efforts that include mass media to maintain the positive preventive effects and counter competing forces that promote sunbathing and tanning, such as fashion trends and solarium marketing.<sup>70</sup>

### Child survival

In many low-income countries, a substantial portion of premature mortality and associated morbidity occurs between birth and age 5 years. Major causes of poor child survival include inadequate treatment of dehydration resulting from diarrhoea, non-vaccination for preventable diseases, and failure to breastfeed exclusively and for sufficient time.<sup>71,72</sup> Each of these causes has been the target of mass media campaigns, with mixed evidence for success.

One review found four of six childhood vaccination programmes that used mass media achieved substantial improvements in vaccine use, and the effects were incremental with increasing exposure to the campaign.<sup>73,74</sup> One cost-effectiveness analysis in Bangladesh attributed increasing use of immunisation services to national campaign exposure.<sup>75</sup> A later review of vaccination interventions found no additional examples of mass media campaigns alone.<sup>76</sup> Rather, mass media was a strategy widely used in multicomponent vaccination campaigns worldwide, and substantial improvements in childhood vaccination were repeatedly recorded. As with other campaigns, effects cannot be specifically attributed to the mass media campaign component.<sup>77</sup>

In a review of five diarrhoea treatment programmes that used mass media to promote home-mixed or premixed rehydration solutions, three were associated with increased adoption of rehydration solution.<sup>73</sup>

Although mass media programmes to promote breastfeeding have been mounted, reviews from the 1990s onwards seem scarce or non-existent. Two studies—one from Jordan in the late 1980s<sup>78</sup> and one from Armenia<sup>79,80</sup>—show positive effects.

In countries where mortality from sudden infant death syndrome has been monitored, death rates have sharply declined, attributed mainly to a change in the position in

which infants are put down to sleep (on their backs). National campaigns with strong mass media components have been part of distribution of this message and have been aimed at members of the public and medical practitioners. Sharp reductions in prone sleeping have accompanied reductions in deaths from sudden infant death syndrome of well over 50%.<sup>81</sup>

A reduction in the use of children's aspirin, owing to this drug's association with Reye's syndrome, might partly indicate an indirect, non-campaign-led mass media effect. In the USA the media coverage of the public debate over risks of children's aspirin consumption was associated with an abrupt decline in use of and in incidence of the disease. The introduction of warnings on aspirin bottle labels was associated with a further smaller but still notable drop in the disease until it almost disappeared.<sup>82</sup>

### Other health behaviours

Road safety mass media campaigns have promoted reductions in the frequency of road accidents and deaths through increases in uses of seat belts, booster seats for children, and helmets for bicyclists, skateboarders, and motorcyclists, and reductions in speeding, driver fatigue, and drink driving. The average associated decline in vehicle crashes has been estimated to be at least 7%,<sup>83</sup> and of alcohol-impaired driving to be 13%.<sup>84</sup> Results of designated driver programmes have been less conclusive.<sup>85</sup> The most notable road safety campaigns have promoted seat belt use.<sup>86</sup> The Click It or Ticket programme in North Carolina, USA, was associated with an increase in seat belt use from 63% to 80% and lowered rates of highway deaths, and became a model for other state and national programmes.<sup>87</sup> A version in Washington state, USA, reported gains from 83% up to 95% of seat belt use.<sup>88</sup> Law enforcement and repeated cycles of short-term mass media exposure seem, therefore, to have been important components of road safety campaign effectiveness.<sup>83,84,87,88</sup>

The need for organ donation and transplantation is increasing worldwide.<sup>89,90</sup> Organ donation campaigns have been infrequent, and the few assessed have had mixed results. Public misconceptions and mistrust of physician's end-of-life decisions have been cited as key barriers to change.<sup>90</sup> News media surrounding the World Transplant Games Federation international events seems to be associated with increased organ donations in the cities where events were held, but increases were not sustained after media exposure dropped.<sup>89</sup>

Although few data for blood donation campaigns have been published, a few studies report sizeable increases in blood donors in association with mass media campaigns. For example, during China's national campaign to promote safe donation, which used celebrities and a patriotic message, the number of voluntary blood donors rose from 55 to 96 320 in one city between 1993 and 2001.<sup>91</sup> In Ghana, analysis of a low-cost radio campaign that promoted voluntary blood donation from 2003 to

**Panel: Policy recommendations for national governments, practitioners and professional bodies**

Mass media campaigns should be included as key components of comprehensive approaches to improving population health behaviours

Sufficient funding must be secured to enable frequent and widespread exposure to campaign messages continuously over time, especially for ongoing behaviours

Adequate access to promoted services and products must be ensured

Changes in health behaviour might be maximised by complementary policy decisions that support opportunities to change, provide disincentives for not changing, and challenge or restrict competing marketing

Campaign messages should be based on sound research of the target group and should be tested during campaign development

Outcomes should undergo rigorous independent assessment and peer-reviewed publication should be sought

2006 showed an associated high response from young male donors attending for repeat donation who had not previously done so.<sup>92</sup>

According to reports from the Centers for Disease Control and Prevention and WHO, youth violence, intimate partner violence, child maltreatment (sexual and physical abuse), and mental disorders are preventable behaviours that have negative effects on national rates of injuries and deaths, and on physical health conditions.<sup>93–95</sup> Researchers have begun to call for the abandonment of victim-perpetrator models and instead advocating mass media interventions to redress risk factors, such as skill deficits and parental dysfunctions.<sup>94,95</sup> As yet, campaign effectiveness is unclear.<sup>95</sup> Examples of promising programmes with mass media components include a campaign for professional training that lowered rates of child maltreatment outcomes,<sup>96</sup> an intimate partner violence programme for which increased reported bystander responses were reported,<sup>97</sup> and a campaign that was associated with reduced rates of bullying in schools among children aged 12–14 years.<sup>94</sup> A review of suicide prevention campaigns undertaken in several countries found improvements in attitudes about causes and treatment of depression, but outcomes, such as the rate of suicide acts, did not change.<sup>98</sup>

Mass media campaigns to reduce delays in prehospital response for heart attacks and other emergency health disorders have been related to increased understanding of symptoms but no sustained lowering of response times or mortality rates.<sup>99</sup> Researchers have called for extension of campaign duration to increase exposure, and strengthening of the messages by concurrently offering community programmes, targeting of high-risk and rural populations, and investigation of patients' barriers to action.<sup>99</sup>

## Conclusions

Mass media campaigns can directly and indirectly produce positive changes or prevent negative changes in health-related behaviours across large populations. Our careful reading of topic-specific individual studies and more-general mass media reviews,<sup>42,100,101</sup> and our collective experience in campaign research and evaluation across health behaviours has led us to the following conclusions about the conditions under which media campaigns work.

The likelihood of success is substantially increased by the application of multiple interventions<sup>102</sup> and when the target behaviour is one-off or episodic (eg, screening, vaccination, children's aspirin use) rather than habitual or ongoing (eg, food choices, sun exposure, physical activity). Concurrent availability of and access to key services and products are crucial to persuade individuals motivated by media messages to act on them. The creation of policies that support opportunities to change provides additional motivation for change, whereas policy enforcement can discourage unhealthy or unsafe behaviours. Public relations or media advocacy campaigns that shape the treatment of a public health issue by news and entertainment media also represent a promising complementary strategy to conventional media campaigns.<sup>103</sup>

Various hindrances to the success of mass media campaigns exist. Pervasive marketing for competing products or with opposing messages, the power of social norms, and the drive of addiction frequently mean that positive campaign outcomes are not sustained. Greater and longer-term investment will be required to extend effects. The increasingly fractured and cluttered media environment poses challenges to achieving adequate exposure to planned media messages, rather than making wide exposure easier. Careful planning and testing of campaign content and format with target audiences are, therefore, crucial (panel).<sup>98,102</sup>

For all the reasons described above, isolation of the independent effects of mass media campaigns is difficult. Substantial evidence has, however, been garnered from study designs that, in isolation, are less than classically excellent, but in aggregate yield a substantial body of support for the conclusion that mass media campaigns can change population health behaviours.

### Contributors

All authors participated in the preparation of this Review and have seen and approved the final version.

### Conflicts of interest

We declare that we have no conflicts of interest.

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