Using mass media and social media for the prevention of non-communicable diseases

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This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy (PhD)

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Statement of Authenticity

This thesis is submitted to the University of Sydney in fulfilment of the requirement for the degree of Doctor of Philosophy (PhD). The work presented in this thesis is, to the best of my knowledge and belief, original, except where acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or at any other institution. I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

I further declare that I have been the lead author on the conceptual work underpinning this thesis and its implementation and have led the analysis and writing of all publications included herein. Author contributions are outlined in Appendix 3.

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At least not for the next year or so.
Abstract

Non-communicable diseases (NCDs) such as diabetes, cancers, and cardiovascular disease, share modifiable risk factors, with overweight and obesity, physical inactivity, and poor nutrition being among the most important of these. One public health strategy that has been widely employed to address these risk factors and reduce the burden of NCDs is mass media campaigns (MMCs). These campaigns use multiple channels – including television, radio, billboards, online, and increasingly social media – to communicate messages about the promotion of health and the prevention of the disease. The aim is to reach as many people in the target population as possible, with the expectation that doing so will maximise the campaign’s impact on the population's health.

However, gaps in the scientific literature are such that knowledge about what works in NCD-related MMCs is limited. First, those campaigns that have been evaluated have consistently shown positive impacts on awareness, knowledge, and other intermediate outcomes, but it is rare for a campaign to demonstrate behaviour change. Second, the existing evidence is ageing quickly due to the rapid change in media consumption habits over the last decade, including the rapid uptake of Facebook and other social media. Finally, while there are theories, such as the Hierarchy of Effects model, that purport to explain how campaigns influence behaviour change, these have rarely been tested, meaning that their accuracy and usefulness is unknown. Collectively, these gaps make it difficult to identify effective components of MMCs, which is problematic given that governments use these types of campaigns often and that they are usually expensive to design and implement.

In this thesis, I present research that addresses these gaps. My research provides insight into the impact of MMCs on health-related outcomes and furthers our understanding of best practice in the planning, implementation, and evaluation of mass media and social media campaigns. Specifically, my research aims to identify and critique current practice within overweight and obesity prevention campaigns, identify the strengths and limitations of current practices on Facebook as a component of campaigns, and determine the impact of the recent New South Wales (NSW) Government’s Make Healthy Normal (MHN) overweight and obesity prevention campaign.

To address these aims, I conducted seven studies, using both quantitative and qualitative methods. These studies provide new and valuable insights into improving campaigns and creating engaging content on Facebook. Collectively, the findings indicate that, while campaigns can be effective in increasing knowledge about a health issue, the role of MMCs must change as targeting knowledge alone is insufficient for bringing about behaviour change. The research also suggests that while there is real potential to use Facebook as an effective component of campaigns, more consideration should be given to exactly what role Facebook (or other social media) should play within a broader campaign. Additionally, the increased use of social media in campaigns requires new evaluation methods to be able to adequately capture campaign effects and illuminate how effective campaigns work. Finally, it is important that the theories that underpin campaigns be tested and refined. Doing so will mean that effective features of communications campaigns can be identified and increase the likelihood that future campaigns will contribute to solving complex prevention problems.
Publications arising from this thesis


Abbreviations and glossary of terms

ARIA  Accessibility/Remoteness Index of Australia  
AIHW  Australian Institute of Health and Welfare  
AOR  Adjusted odds ratio  
BMI  Body mass index  
BP3D  *Brooklyn Partnership to Drive Down Diabetes* campaign  
C4L  *Change4Life* campaign  
CI  Confidence interval  
CL  Confidence limit  
FFFF  *Fighting fat, Fighting Fit* campaign  
HEAL  Healthy eating and active living  
HOEM  Hierarchy of effects model  
A model that positions distal outcomes (e.g. behaviour change) as causally linked to proximal variables (e.g. awareness) through a series of intermediate variables (e.g. attitudes)  
IRR  Incident rate ratio  
ITS  Interrupted time series  
MHN  The NSW *Make Healthy Normal* mass media campaign  
MJND  *Maak je niet dik (Don’t get fat)* campaign  
MMC  Mass media campaign(s)  
MOH  The NSW Ministry of Health  
NA  Not applicable  
NCD  Non-communicable disease(s)  
NS  Non-significant  
NSW  New South Wales, Australia  
OECD  Organisation for Economic Cooperation and Development  
PA  Physical activity  
PCA  Principal component analyses  
PoS  *Piece of String* campaign  
SEIFA  Socio-Economic Indexes for Areas  
SSB  Sugar-sweetened beverage  
Steps  *Steps to a Healthier New Orleans* campaign  
TARPs  Target audience rating points  
An estimation of the proportion of a given audience that has been exposed to a campaign and how frequently they have been exposed  
TS  Time series  
TVC  Television commercial  
WHO  World Health Organization  
WoN  *Weight of the Nation* campaign
Chapter 1: Introduction

1.1 Background
In the modern world, advertising and promotion are pervasive. We are exposed to advertising virtually from the moment we wake to the moment we go to sleep – on television and radio, in newspapers and magazines, on buses, trains, taxis, and billboards, in apps, online, and throughout social media. While much of this advertising encourages us to spend money on products and services, some of it is socially motivated. This type of advertising applies the techniques of commercial marketing to bring about a social benefit. Public health issues, including prevention of non-communicable diseases (NCDs), are among the most common targets of these socially-motivated mass media campaigns (MMCs). These campaigns are the focus of this thesis.

NCDs are chronic diseases such as cancer, diabetes, stroke, and heart disease. They are not transmissible from person-to-person, have a long duration, and generally progress slowly. According to the World Health Organization (WHO), the four major categories of NCDs are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. Collectively, they are responsible for the overwhelming majority of morbidity and mortality in developed nations, including Australia, with their burden increasing rapidly in developing nations. In countries with an ageing population, such as Australia, the burden is only likely to increase in the foreseeable future.

Tobacco and alcohol consumption, overweight and obesity, physical inactivity, and poor nutrition are key modifiable risk factors for many NCDs. The Australian Burden of Disease Study estimated that these five risk factors combined account for nearly a third of the total burden of disease. In addition, the estimated direct and indirect costs attributable to these risk factors are in the billions of dollars per year. Overweight and obesity, for example, is responsible for 1% to 3% of total health expenditure in most countries, according to the Organisation for Economic Cooperation and Development (OECD). In Australia, the total direct and indirect costs of overweight and obesity are estimated to reach $88 billion in the period 2015-2025 if no action is taken. As a result, these lifestyle risk factors are a major focus of health promotion and disease prevention efforts in Australia and around the world.

MMCs are one strategy that has been widely used to address NCDs, especially in the past few decades. However, the WHO laments that there remains significant gaps in our knowledge regarding optimal design, evaluation, and effects of MMCs. This is despite having over a hundred years of practice in developing and implementing many different campaigns, addressing a range of issues in a myriad of ways and settings. WHO challenges those who work in campaign development, implementation, and evaluation to think critically about MMCs and to conduct rigorous evaluations.

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1 It is important to note that the term ‘mass media campaign’ as used in this thesis is not equivalent to ‘social marketing campaign’. My focus is on campaigns that use mass media to communicate persuasive messages, whereas true social marketing campaigns involve more than just the use of persuasive communication; they also include other elements of the marketing mix, such as policy and environmental changes, and do not necessarily include the use of mass media. Some of the campaigns I review may have labelled themselves ‘social marketing’ or made use of some social marketing principles but my focus is on MMCs, regardless of whether they were part of broader social marketing campaigns.
to learn from past efforts and improve the effectiveness of future campaigns. This thesis will identify and address some of the most pressing gaps in the evidence.

In this chapter, I first outline the history and role of MMCs in public health and explain how MMCs are theorised to work. I then describe how the change in the media landscape and the rise of social media has created new opportunities for campaigns, before exploring the available evidence on the use of social media for public health purposes. Next, I explain the importance of and inherent challenges associated with the evaluation of MMCs. Finally, I set out the aims of this research and outline the structure of the thesis.

1.2 Mass media campaigns in public health
The role of MMCs in the prevention of NCDs is to disseminate messages that aim to increase knowledge, change beliefs or attitudes, and/or build skills to empower people to make healthier lifestyle choices. Globally, campaigns have been used to target a range of public health issues, including tobacco and alcohol consumption, cancer prevention, sexual health, and road safety. Overweight and obesity, physical activity, and nutrition have also been the subject of a smaller number of recent MMCs, including Australia’s Measure Up, Swap it, LiveLighter, and Go for 2&5, the United Kingdom’s Change4Life, the United States’ VERB, and Canada’s ParticipACTION.

Campaigns have been a feature of public health action for well over a century, with notable shifts in targeted issues and messaging and creative style (Figure 1). From the early 1900s up to the end of the Second World War, they often focussed on preventing the spread of infectious diseases such as tuberculosis and sexually transmitted diseases. Campaigns on the nutritional value of different foods were also common when food shortages necessitated rationing in many countries. Alcoholism was another common target in these early campaigns but this was often delivered from a moral standpoint, rather than a health one. Such messages were usually factual in style and delivered with a distinctly aristocratic and paternalistic tone. There was also a strong focus on disease, rather than positive health.

By the late 1960s, advances in living conditions, sanitation, and vaccination had led to a rapid decline in the burden of infectious disease, particularly in developed countries. At this time, governments began to focus more on NCD prevention, especially through anti-smoking and alcohol prevention campaigns. Concurrently, public health campaigns embraced more sophisticated and professional advertising techniques, including emotional appeals, persuasion, humour, shock tactics, and celebrity endorsement. These campaigns also adopted a stronger focus on prevention and risk management. This reflected an increasing international acceptance that the declining mortality rates during the 20th Century were largely due to improvements in living standards and nutrition and not to medical advances; that is, these gains were achieved through prevention, rather than treatment. 

Figure 1 Examples of mass media campaigns from the last 100 years

Topic: Influenza and tuberculosis
Country: USA
Date: c. 1925
Reproduced with permission of American Lung Association

Topic: Venereal disease
Country: USA
Date: c. 1942
This item is in the public domain

Topic: Safe sex
Country: United Kingdom
Date: c. 1969
ID Victoria and Albert Museum, London

Topic: Physical activity
Country: Canada
Date: c. 1975
Reproduced with permission of ParticipACTION, Canada

Topic: Tobacco smoking
Country: Russia
Translation: "Even the best cigarettes can be your tomb"
Date: c. 1985
© World Health Organization

Topic: Nutrition
Country: Australia
Date: c. 2006
Reproduced with permission of the Department of Health Western Australia and Cancer Council WA

Topic: Skin cancer prevention
Country: Australia
© State of New South Wales (Cancer Institute NSW). For current information go to www.cancerinstitute.org.au.

Topic: Overweight & obesity prevention
Country: Australia
© Department of Health Western Australia

Topic: Physical activity
Country: England
Date: c. 2015
Reproduced with permission of Sport England
It was at this point that evidence supporting the use of mass media as component of an integrated NCD prevention strategy began to emerge. The first major study occurred in North Karelia, Finland, commencing in 1972. This 10-year program targeted cardiovascular disease risk factors through a community-wide education program that included mass media-disseminated messages. The program was found to have effectively reduced major risk factors for cardiovascular disease, including cholesterol, blood pressure, and smoking prevalence, with the effects maintained or increasing over the 10-year period. Following closely behind the North Karelia Program were the Stanford Three Community and Stanford Five City Studies, conducted in California, United States, in the late 1970s and throughout the 1980s. These programs involved the implementation of education campaigns targeting stroke and coronary heart disease and using mass media, including television, radio, and print, complemented with other education channels, such as school-based programs and face-to-face classes. Both studies found significantly reduced weight gain as well as declines in other risk factors, such as cholesterol, blood pressure, saturated fat, and smoking prevalence in the treatment communities. There was also some evidence that these effects would be maintained even with reduced campaign effort. However, the Stanford Five City study noted inconsistent evidence of an effect on physical activity knowledge, attitudes, and self-efficacy.

Similarly, the Pawtucket Heart Health Program and Minnesota Heart Health Program used mass media to address cardiovascular risk factors, albeit not to the same extent as the Stanford programs. Nonetheless, both the Pawtucket and Minnesota Programs provided further support for the use of mass media as part of NCD prevention strategies. However, the evidence suggested that the changes were short-term and unlikely to be maintained in the absence of campaigns. There was also some doubt as to whether the effects of the programs were strong enough to outpace secular trends in some risk factors, such as declines in smoking prevalence in men and improvements in blood pressure observed in the Minnesota Heart Health Program.

Overall, these studies demonstrated the potential effectiveness of health programs that used mass media for NCD prevention and subsequently led to an increase in the use of MMCs for this purpose.

It was at this point that fear appeals, or campaigns that aimed to shock or scare the audience into action, became increasingly popular, with the first quit smoking campaigns adopting this approach in the 1980s. The 1987 Grim Reaper AIDS campaign and the 1997 National Tobacco Campaign exemplified this approach in Australia. Fear appeals have also been extensively used in alcohol- and drug-related campaigns and road safety campaigns. This approach assumes that the audience will be motivated to change behaviour if they are shown, often in graphic or disgust-inducing form, the potential negative consequences of those behaviours. To have an effect, fear appeals rely on the target audience being convinced that the depicted negative consequences are relevant to them and that the recommended response is feasible. Despite their popularity, the evidence relating to their effectiveness is mixed. Further, the approach has also been regularly criticised as unethical, with the argument being that the use of fear can be stigmatising, demotivating and disempowering. For this reason, fear appeals have been less common in overweight and obesity campaigns.

Most recently, the rise of the internet has created new opportunities to reach audiences and to engage them in different ways. As Smith and colleagues have argued, this shift in the media landscape has resulted in three major changes: (1) increased speed and dynamism of message diffusion; (2) greater public participation in the creation, curation, and transfer of media content;
and (3) increased opportunity for audiences to be highly selective on what sources they access and a corresponding opportunity for sources to create content to target highly specialised audience groups (known as ‘narrowcasting’). Consequently, MMCs now often seek direct audience participation in dissemination of key messages and other aspects of campaign implementation. The potential of digital media, such as websites, email, and social media, lies in its unique ability to reach large numbers of people and disseminate messages rapidly. Moreover, the widespread and expanding access to digital media has been touted as a way of reaching traditionally hard-to-reach populations like young people and marginalised groups. Despite this potential, many campaigns continue to adopt a focus on individual behaviour change through the passive reception of messages. Similarly, access and ethical concerns have been raised, with calls for greater consideration of the role of digital media in health communication.

One area where MMCs have been implemented consistently for several decades and where the evidence base is compelling is tobacco control. These campaigns have been shown to be effective in encouraging quit attempts, and are cost-effective, thus they are widely considered a critical part of a comprehensive tobacco control strategy. Their importance is underscored by two studies conducted in England that showed what happened when tobacco control MMCs were suspended: use of smoking cessation support such as quittings and websites declined dramatically and long-term declines in smoking prevalence stalled. Outside of tobacco control, there is little doubt that MMCs are effective in influencing non-behavioural outcomes (e.g. awareness, knowledge, and beliefs) but the evidence of their influence on behaviour change is mixed. Alcohol-related campaigns have, for example, been found to reduce alcohol-impaired driving, provided they are implemented along with regulations, enforcement, and other supporting strategies, but have yet to show consistent results in their ability to reduce other risky drinking behaviours. It therefore appears that it is the supporting strategies, especially regulation and enforcement, that leads to behaviour change in alcohol-related campaigns. In this context, MMCs would function only as a reminder for people of the need to change, as opposed to directly prompting behaviour change.

In addition, a comprehensive review of prevention campaigns and their impact on desired behavioural change uncovered problems in design and implementation of some campaigns that resulted in these campaigns often failing to realise their potential. This included unclear or inappropriate campaign messages, lack of adequate investment, inappropriate or inadequate dissemination methods, a lack of integration within comprehensive health promotion and disease prevention strategies, and an increasingly fractured and cluttered media environment. Some campaigns have also demonstrated unintended consequences, such as anti-smoking campaigns that make adolescents more likely to smoke. This means that it is important to understand whether campaigns work, in what context, and why or why not, especially in light of their enduring popularity with governments.

Campaigns of any nature, be they socially-motivated or otherwise, operate with the basic assumption that awareness of the campaign will lead to a feeling or interest that, in turn, will lead to an action or behaviour (e.g. purchase, usage, or change in habit or practice). Such a process is commonly known as a hierarchy of effects model (HOEM). While there are many variations of HOEM, all models assume that the audience will move in a linear, sequential fashion through a series of steps when making decisions (see, for example, Figure 2). In theory, this hierarchical approach allows the marketer to identify how audiences change over time and to tailor their advertising and
evaluation accordingly. The first formal model of this type was most likely “AIDA” (Attention, Interest, Desire, Action), which has been in use in commercial advertising and marketing for over a century, with many variants emerging over the years.\textsuperscript{76, 78, 79}

![Hierarchy of Effects Diagram](image)

**Figure 2 Basic advertising hierarchy of effects model**

*Source: Lavidge and Steiner\textsuperscript{78}*

Although the basic principles of a hierarchy of effects have always been present in public health MMCs, there was no formal recognition of this until Yale University social psychologist, William McGuire reflected on the mechanisms through which MMCs exerted public health effects in the 1980s.\textsuperscript{80} McGuire described a series of sequential ‘mediating processes’, linking exposure to a campaign with behaviour change through intermediate steps like attitude change – a classic hierarchy of effects, although he did not use that term himself. He argued that campaign planners must consider which of these processes they intend to target and tailor their campaigns accordingly. He also argued that they need to be wary of unintended consequences that might result from their design and implementation choices; for example, graphic depictions of health consequences might be more likely to bring about attitude change but make it less likely that someone will pay attention to the campaign in the first place.

Others have since described public health HOEMs more explicitly, outlining how distal outcomes (e.g. increased physical activity or smoking cessation) are causally linked to proximal variables (e.g. awareness of the health campaign and its messages) through a series of intermediate variables (e.g. knowledge of consequences, self-efficacy, and intention to change behaviour).\textsuperscript{59, 72} Conventional understandings of HOEM also theorise that the proportion of target audience change diminishes as one progresses through the hierarchy.\textsuperscript{81, 82} This means that the final proportion of the population who engage in the desired behaviour change is relatively small – typically less than 10%.
Despite its widespread use, empirical evidence validating the assumptions of HOEMs is very limited. Bauman and colleagues were among the first researchers to test the model explicitly in public health, using data from the adolescent-focused VERB campaign. These researchers found some support for a hierarchy of effects, with awareness and understanding of the campaign’s messages (proximal variables) predicting behaviour change in children aged 9-13 years. However, attitudes and expectations (both intermediate variables) were not mediators of behaviour change, which would be expected based on a classical understanding of HOEM. The model has also been tested in an adult population using data from Canada’s ParticipACTION campaign, with findings again lending some support to the validity of HOEM. While these results are promising for elucidating the validity of this model, further testing is warranted.

Many have argued that the use of theory and frameworks like HOEM in planning and evaluation of campaigns increases the likelihood of success. However, very few MMCs formally test their underpinning theory or framework. In fact, little evidence exists to support many theories and frameworks that commonly inform campaign development or evaluation, with a recent meta-analysis finding larger effect sizes for behaviour and knowledge for non-theory-based campaigns. While this meta-analysis had its limitations, including potential confounding and reliance on incomplete reporting in the primary studies, it nevertheless underscores the need to explicitly test theories and frameworks if we are to understand their value to campaigns and gain insights into how campaigns work.

Beyond the HOEM, leading experts and agencies have identified other principles that are expected to increase the chance of a campaign being successful. These principles include sustaining campaigns over a reasonable duration, investing sufficient resources to ensure the maximum possible reach, adopting a staged approach to behaviour change, designing and targeting messages appropriately for the target audience, and setting appropriate, measurable objectives, among other things. In addition, integrating the campaign with broader strategies that include legislative and advocacy action and support services or products is highly recommended; running MMCs on their own is unlikely to be effective if the social and physical environments do not support healthy behaviour change. For this reason, many have argued that MMCs should be just one part of a comprehensive social marketing strategy, which includes complementary policy and environmental changes. Such an approach is supported by evidence showing that MMCs work best when part of broader public health strategies. Further, MMCs have a reciprocal relationship with complementary programs and policies; the existence of a supportive environment is critical if individuals are to make the changes prompted by the campaign but, at the same time, the campaign can help to make such an environment possible by building support for environmental and policy changes. Furthermore, one-off, short campaigns have little chance of success because they do not reach enough people sufficiently frequently to have a meaningful impact on population health. Instead, it is essential for campaigns to achieve high exposure to the campaign messages across as much of the target population as possible. For this reason, a wide variety of mass communication channels is often used, increasingly including social media.

1.3 Mass media campaigns and social media
Traditional MMCs have largely been based around one-way communication; that is, the target audience is exposed to a message via routine use of media and is expected to “absorb” the message and individually decide whether to act. However, the media environment has changed dramatically
in the last decade, with new media channels emerging. In response to this shift, campaigns are making increasing use of social media to communicate messages, either in conjunction with, or instead of, traditional channels like television and radio.

Social media includes platforms such as Facebook, Twitter, YouTube, and Instagram. These platforms enable users to share knowledge, information, digital content, and opinions quickly and easily. Their use has expanded rapidly over the past decade, with Facebook by far the most widely used social media platform internationally. In Australia, nearly two-thirds of adults maintain an active Facebook profile, with that proportion increasing to approximately 80 per cent of adolescents and young adults. Recent evidence suggests that the platform may be becoming less popular with young people but high proportions still maintain a Facebook presence and use it regularly. Facebook is by far the platform most commonly used by older adults and this number is growing. It is also the most intensely used platform, with research from the United States showing that over 70% of users log in at least once a day and 45% several times a day.

The appeal of using social media for communication of health messages is that it presents an opportunity to reach audiences rapidly and comparatively cheaply, and to change the nature of campaigns from one of unidirectional communication to one of conversation and interaction. Tools such as live streaming present opportunities for public health that simply have not been available on other media as they allow direct and live interaction with audiences. As such, content on social media is more readily available and can more easily be tailored to the needs of the target audience. In addition, it provides an opportunity for peer, social, and emotional support. Advertising campaigns on social media can efficiently reach large populations and messages can also ‘go viral’, spreading rapidly and reaching many more people than would ordinarily be expected through traditional media channels and often for comparatively little financial investment. Moreover, it appears that the public are receptive to health messages on social media, although motivations for engaging with content and the intensity of that engagement vary depending on the audience, the source of the content, and the topic being addressed. While there are inherent risks and challenges in using social media, such as loss of message control and privacy concerns, there is a significant opportunity for word-of-mouth marketing, or marketing between consumers. This has been shown to be among the most trusted forms of marketing. It is this opportunity, already recognised by public health organisations, that sets social media apart from traditional media channels.

Consequently, it is no longer sufficient to focus on television advertising as the primary channel for dissemination in MMCs, from both an implementation and evaluation standpoint. However, there is very little evidence available to guide the use of social media as a communication channel, especially at a population level. Given their ubiquity, the use of social media channels as part of MMCs is only likely to increase, but the lack of evidence may mean that social media platforms will not be used appropriately or to their full potential. From the limited evidence available, it does appear that social media campaigns can be effective in generating engagement and motivating small, measurable actions in response such as ‘liking’ the campaign, sharing content, or making a donation. However, evidence from intervention studies has shown mixed results regarding longer-term outcomes, with generally low participation and limited, if any, change in behaviour. Further, while not specific to social media, there is some evidence that online advertising can help to build awareness within a broader MMC, especially when used in conjunction with television and
other mainstream advertising; exposure to such advertising can lead to increased information-seeking behaviour, with the impact lasting for several weeks at least, and is cost effective in comparison to television advertising. Overall, it is clear that social media has potential as a communication channel within public health. At the same time, there is limited information about who engages with different content and why and what the effect of that engagement is.

The assumed mechanism of effect for social media in campaigns is that it functions as part of an iterative process, illustrated in Figure 3. Awareness of a brand or a campaign, through either exposure to advertising or an interest in the relevant issue, leads to engagement on social media. This in turn leads to a direct impact on the target audience and indirect effects via word-of-mouth and sharing of content. Sharing content also generates additional awareness of the campaign, continuing the cycle. In essence, this places ‘engagement’, or having users ‘like’, share, comment on, or otherwise click on any content, as an essential step in the success of any campaign.

Understanding what drives engagement with social media campaigns is therefore important and has been examined in several studies. An evaluation of an adolescent dating violence campaign found Facebook was the most effective social media platform for generating views and engagement with the campaign. However, this study took place in 2012, making the relevance of this evidence to current practice questionable given the dynamic nature of social media preferences and platforms, especially among younger people. Other evidence highlights the need to tailor content for different social media in order to increase engagement. Factors such as messaging type and style have also been examined, with the use of imagery repeatedly shown to increase engagement, especially on Facebook, and positive messaging likewise often found to increase engagement. However, there is much left to explore if MMCs are to make best use of social media to amplify messages and maximise the impact of a campaign. This is especially important given there is evidence that social media is not being used to its full potential. That is, the focus has

Figure 3 A conceptual model of social media campaign effects

Source: Original work
remained on dissemination of information, a practice typical of traditional MMCs, rather than genuine interaction with the target audience. As Noar and Head have noted, practice has leapt ahead of the evidence when it comes to using social media for NCD prevention and evaluation must catch-up and determine what works and why.

1.4 Evaluation of MMCs

Given the gaps in the evidence base, evaluation is critical to continuing improvement in the design and implementation of MMCs within public health. Ideally, evaluation should be funded, addressed, and infused throughout campaign design and implementation, rather than considered as a separate process. However, evaluating MMCs is inherently difficult because their effects may be difficult to separate from the effects of supporting programs and strategies. Opposing factors, such as exposure to competing advertising, counterproductive social norms, and urban design, further complicate evaluation. As mentioned above, the evidence for the effectiveness of MMCs is very well established for anti-tobacco campaigns but this evidence has largely been generated in an environment with total or near total bans on tobacco advertising. On the other hand, using MMCs to address other health issues, such as overweight and obesity, has previously been acknowledged as more difficult. This is partly because of the complex causal pathway for obesity and partly because of the barriers presented by entrenched social norms and ubiquitous competing or opposing marketing from industry.

It is essential that campaigns are thoroughly evaluated and the results made publicly available so that knowledge can be shared and campaigns improved. However, the available evidence on MMCs is limited because the evaluation of such campaigns has varied in quality of design and reporting, and many have no publicly available evaluation results. Low quality designs and limited reporting may in part be due to recognised barriers to evaluation of health policies and programs, including MMCs. For example, political pressure to not evaluate or suppress unfavourable results, limited resources, time constraints, and lack of skill with evaluation. This underlines the need for better collaboration between policymakers and researchers and the implementation and reporting of rigorous campaign evaluations, including formative and process evaluation.

Further complicating evaluation of MMCs is the explosion of digital channels, including social media, which has meant that the evidence we do have may be losing relevance. While total screen time has increased over the last decade, the amount of time spent watching television has declined. This makes it important for those who run MMCs to think strategically about the role of different communication channels and how these channels can work together to increase reach and amplify campaign effects. It also necessitates a reconsideration of traditional evaluation methods and an expansion of research designs to address this changed (and changing) environment. However, the evaluation of social media components of campaigns specifically has not been discussed extensively in the literature, despite their frequent deployment in MMCs. Consequently, there are many gaps in our understanding of how best to evaluate these components.

One review of evaluations of the use of social networking sites, including Facebook, found that evaluations tended to fall into two main evaluation approaches: closed and open. Closed approaches used more rigorous research designs from an effectiveness perspective, such as randomised controlled trials, but were unable to assess reach and engagement outside of their research samples. Open approaches, on the other hand, used non-experimental study designs that
were less rigorous and had low response rates but provided useful estimates of population-level reach and engagement. Additionally, qualitative research methods were used infrequently, meaning that understanding of why users engage and in what context has not been thoroughly explored. The authors argue that better evaluations are possible and emphasise the need to balance scientific rigour and practical application. The lack of thorough evaluations is problematic as many non-profit organisations in the health sector appear to be using social media in their campaigns without the necessary knowledge of how best to use it to achieve their aims. \cite{126, 151, 152} The potential of social media in public health strategies is clear, but to make best use of these platforms social marketers must evaluate and disseminate their findings. \cite{125} To quote Korda and Itani, “social media has proven potential for health promotion and behavior change. Now we need to know more of what, for whom, how much, and at what price.” \cite{149}

1.5 Research aims
This research aims to provide evidence of the impact of MMCs on the prevention of NCDs and to further our understanding of best practice in the planning, implementation, and evaluation of mass media and social media strategies for the prevention of NCDs, particularly in relation to overweight and obesity prevention. Specifically, the broad research aims are to:

1. Identify and critique current practice in the design, implementation, and evaluation of overweight and obesity MMCs;
2. Determine the impact of the NSW Government’s Make Healthy Normal overweight and obesity MMC on knowledge, attitudes, and behaviours; and
3. Identify the strengths and limitations of current practices on Facebook as a component of public health MMCs.

1.6 Thesis outline
This section provides an outline of this thesis and describes the relationship between the chapters and how they link to the research aims described above. Each chapter builds on the background information provided in this chapter, addressing gaps in knowledge and understanding of best practice in using MMCs for the prevention of NCDs, particularly in relation to overweight and obesity and the use of Facebook as a communication channel.

Chapter 2 addresses the first aim and is a systematic search and review of adult-targeted overweight and obesity MMCs and their evaluations, based on campaigns published in the peer-reviewed literature between 2000 and 2017. This review sets out how the design and implementation of overweight and obesity MMCs have been reported, identifying a number of issues that should be addressed in order to improve knowledge dissemination. It also makes recommendations on improving the evaluation of MMCs in order to strengthen the quality of available evidence.

Chapter 3 is an evaluation of the first and second phases of the NSW Government’s Make Healthy Normal (MHN) overweight and obesity prevention MMC, addressing aim two. The chapter provides details of the campaign, the evaluation methodology, and the results of the Phase One and Phase Two evaluations. It also discusses the implications of the results for policy and research.

Chapter 4 uses the data from the evaluation of the MHN campaign to test the HOEM, a model that underpinned the design and evaluation of MHN, as well as many other MMCs. This study, which addresses aim one and two, employs quantitative modelling to explore the extent to which
campaign effects follow the HOEM, discussing the strengths and limitations of this model and its use in the design and evaluation of MMCs.

The thesis then narrows its focus to Facebook, the world’s largest social media platform, and its role in public health MMCs.

Chapter 5 addresses aim three by reviewing current practices by Australian-based organisations managing public health-related Facebook pages. In particular, it focuses on the associations between the type and style of content employed by these pages and indicators of user engagement. This study provides public health organisations with important information to help decide on the level of resources they need to invest in maintaining a Facebook presence, and what sort of content will be more likely to build user engagement.

Chapter 6 reports on the evaluation of the MHN Facebook page, using the results described in Chapters 2 and 5 to inform analysis and interpretation. The evaluation study, which addresses aims one and three, used mixed methods to explore the demographic characteristics of users, how these users interacted with the page, their experience and satisfaction with the page, the characteristics of content that attracted more engagement from users, why this content was more engaging than other content, and the relationship between engagement with the MHN page and the broader MHN campaign.

Finally, Chapter 7 discusses the findings of the research described in this thesis and what they collectively mean for MMCs in public health. It also considers the implications of the research for policy and practice in MMCs and provides recommendations for future research.

Supplementary material from all published papers is included in Appendix 1 and all of the data collection instruments used in this research are contained in Appendix 2. Appendix 3 outlines the author contributions. Finally, Appendix 4 lists other publications relating to this thesis but not forming part of it.
References


125. Freeman, B., et al., Social media campaigns that make a difference: what can public health learn from the corporate sector and other social change marketers? Public Health Research & Practice.


Chapter 2: A systematic search and review of adult-targeted overweight and obesity mass media campaigns and their evaluation: 2000-2017

2.1 Introduction
This chapter reviews overweight and obesity MMCs and their evaluations, published in the literature between 2000 and 2017, specifically addressing the first research aim set out in Chapter 1: to identify and critique current practice in the design, implementation, and evaluation of overweight and obesity MMCs. The review considers all aspects of MMCs for overweight and obesity prevention, including the use and reporting of digital media as a communication channel. The findings inform the reporting of the MHN evaluation described in Chapters 3, 4, and 6.

2.2 A systematic search and review of adult-targeted overweight and obesity mass media campaigns and their evaluation: 2000-2016 (published paper)


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3 Carroll Communications, Coogee, NSW, Australia

Mass media campaigns are a commonly used strategy in public health. However, no review has assessed whether the design and evaluation of overweight and obesity campaigns meets best practice recommendations. This study aimed to fill this gap. We systematically searched five databases for peer-reviewed articles describing adult-targeted obesity mass media campaigns published between 2000 and 2017, complemented by reference list searches and contact with authors and agencies responsible for the campaigns. We extracted data on campaign design, implementation, and evaluation from eligible publications and conducted a qualitative review of 29 publications reporting on 14 campaigns. We found a need for formative research with target audiences to ensure campaigns focus on the most salient issues. Further, we noted that most campaigns targeted individual behaviors, despite calls for campaigns to also focus upstream and to address social determinants of obesity. Television was the dominant communication channel but, with the rapid advance of digital media, evaluation of other channels, such as social media, is increasingly important. Finally, although evaluation methods varied in quality, the evidence suggests that campaigns can have an impact on intermediate outcomes, such as knowledge and attitudes. However, evidence is still limited as to whether campaigns can influence behavior change.

Overweight and obesity are well-recognized as major contributors to the global burden of chronic disease (Seidell & Halberstadt, 2015). Consequently, considerable investment of resources is devoted to addressing this issue (Kite et al., 2015), including the use of mass media campaigns (MMC) to motivate behavior change (Cismaru & Lavack, 2007; Kornfield, Szczypka, Powell, & Emery, 2014; Wakefield, Loken, & Hornik, 2010). Campaigns use mass-reach communication channels, such as television, radio, billboards, online advertising, and social media, to reach large proportions of populations. Their ultimate goal is usually to encourage behavior changes that reduce the burden of overweight and obesity. These campaigns are often publicly funded, highlighting the need for comprehensive evaluation and for evaluation results to be available to inform future obesity prevention campaigns.

Comparing different campaigns is problematic because of substantial variation in design, implementation, and evaluation, making identification of effective and ineffective features of campaigns a challenge. Noar (2006) concluded that there was evidence that well-designed and executed MMCs could have moderate effects on knowledge, beliefs, attitudes, and behaviors, but only if best practice principles of campaign design are followed. Additionally, both Abroms and Maibach (2008) and Wakefield et al. (2010) highlight the importance of moving beyond simply targeting individual-level change to incorporate elements that address socio-environmental factors, but lament the very limited evidence base for such campaigns. Similarly, while Leavy, Bull, Rosenberg, and Bauman (2011) found that the evaluation of physical activity MMCs had improved over time, specifically through increased use of theory and formative evaluation, evaluation designs remained weak and were constrained by limited resources, uncontrolled observations, and single time-point follow-up measures.

To date, no study has systematically examined the design, implementation, or evaluations of overweight and obesity campaigns against best practice guidelines. However, there is research that has examined the content of campaign materials. Cismaru and Lavack (2007), for instance, undertook a content analysis of campaign materials available on the internet, concluding that campaign materials available on the internet, concluding that campaigns should be part of an integrated strategy for addressing overweight and obesity and make better use of theory. A similar content analysis was conducted by Dixon, Scully, Cotter, Maloney, and Wakefield (2015) who found that the style of messages varied depending on the topic being addressed, with weight messages more likely to evoke negative emotions and feature potentially stigmatizing content. They also...
examined how adults react to a range of healthy weight, physical activity, and healthy eating television messages, finding that those closest to achieving public health recommendations were motivated by messages addressing why obesity is a problem, while those furthest from achieving the recommendations were motivated by messages explaining what changes they should make and how they could make them (Dixon, Murphy, Scully, Rose, & Cotter, 2016). Another study found that messages focusing on the negative health consequences of obesity elicited the strongest emotional response but that caution was needed with such messages to avoid stigmatization (Dixon et al., 2015). Collectively, this suggests that careful planning and pre-testing of the messages and executional style of campaign materials against communication objectives is essential for an effective campaign.

This study aimed to review the strengths and limitations of overweight and obesity prevention campaigns and their evaluations available in the peer-reviewed literature. Specifically, we asked: 1) what is the nature of the campaigns?; 2) to what extent are campaigns following best practice principles?; and 3) is adherence to best practice principles associated with campaign success?

**Methods**

We conducted a systematic search for peer-reviewed articles on adult-targeted, population-level overweight and obesity MMCs, published between January 2000 and April 2017. This timeframe was chosen as it was in the year 2000 that obesity was acknowledged as a public health crisis with the publication of the World Health Organization’s report *Obesity: preventing and managing the global epidemic. Report of a WHO consultation* (World Health Organization, 2000). A complete description of the search strategy may be found in supplementary material. In brief, to be eligible, articles had to describe the evaluation methodology for the campaign, using a post-campaign evaluation design as a minimum. Articles were excluded if they reported campaigns that focused exclusively on children, adolescents, or clinical populations, or focused exclusively on improving physical activity or nutrition. We scrutinized the reference lists of articles for additional studies not identified through the systematic search and all authors checked their personal collections for any eligible articles that had not otherwise been identified. We also contacted corresponding authors and the agencies responsible for implementing the campaigns to request further publications on the campaigns, including unpublished or grey literature. We did not conduct a systematic search of the grey literature because of the general lack of standard indexing and archiving, particularly for government reports (Godin, Stapleton, Kirkpatrick, Hanning, & Leatherdale, 2015).

One author (EBG) conducted all searches, removed duplicates, and performed an initial cull by searching titles and abstracts for irrelevant terms (see supplementary material). The remaining articles were then reviewed independently by two authors (JK and AG), with discrepancies resolved by discussion or through referral to a third reviewer (AB).

**Analysis**

We analyzed the campaigns against best practice principles, as identified by Grunseit, Bellew, Goldbaum, Gale, and Bauman (2016). The FLOWPROOF protocol (Table 1 and Figure 1) was developed as a practice standard for the evaluation of MMCs and was selected because it addresses a number of principles identified across the communications literature (Cavill & Bauman, 2004; Noar, 2006; Randolph & Viswanath, 2004; Wakefield et al., 2010; World Health Organization, 2000). In this study, we used FLOWPROOF to assess adherence to best practice principles for health communication, social marketing, and evaluation. This facilitated identification of gaps in reporting within individual campaigns as well as across campaigns. Further, assessing implementation approaches alongside campaign outcomes could explicate the relationship between them, bringing to the fore impactful characteristics.

We developed a data extraction table based on the FLOWPROOF protocol. To aid understanding, we separated the outcomes component into proximal (e.g., campaign awareness), intermediate (e.g., beliefs, attitudes), and distal outcomes (e.g., behavior change) to align with the Hierarchy of Effects Model (HOEM) (Cavill & Bauman, 2004), following Leavy et al. (2011). Data extraction was completed independently by two authors (JK and EBG), with discrepancies resolved via discussion. Data were tabulated by campaign, rather than by article, to facilitate comparison between campaigns, as opposed to studies.

**Results**

In total, we reviewed 29 articles and reports, reporting on 14 discrete campaigns (Figure 2). Initially, we identified 19 eligible articles and 13 campaigns from our systematic search of the literature (Arikan et al., 2014; Barragan et al., 2014; Beaudoin, Fernandez, Wall, & Farley, 2007; Boles, Adams, Gredler, & Manhas, 2014; Croker, Lucas, & Wardle, 2012; Garney et al., 2015; George, Roberts, Beasley, Fox, & Rashied-Henry, 2016; Grunseit, O’Hara, Chau, Briggs, & Bauman, 2015; King, Grunseit, O’Hara, & Bauman, 2013; Miles, Rapoport, Wardle, Afiuwe, & Duman, 2001; Morley et al., 2016; Morley, Wakefield, Dunlop, & Hill, 2009; O’Hara, Bauman, King, & Phongsavanh, 2011; O’Hara, Bauman, & Phongsavanh, 2012; Thomas et al., 2014; Verheijden et al., 2012; Wammes, Breedveld, Looman, & Brug, 2005; Wammes, Oenema, & Brug, 2007; Wardle, Rapoport, Miles, Afiuwe, & Duman, 2001). Contact with the corresponding authors and implementing agencies resulted in three additional reports from the grey literature (Bluemoon Research and Planning, 2007; Ferguson, Rosenberg, & Lester, 2014; Miller & Tuffin, 2009) and two additional peer-reviewed publications (Luecking, Noar, Dooley, Gizlice, & Ammerman, 2017; Robles et al., 2015). The search of reference lists from the eligible articles identified one additional report from the grey literature (Department of Health, 2009), while two peer-reviewed publications and two grey literature reports were sourced from authors’ personal collections, including one additional campaign (Department of Health, 2010; Hammond, 1999; National Social Marketing Centre, 2011; O’Hara et al., 2016).

The following sections summarize the campaign characteristics according to the FLOWPROOF protocol, with full details available in Table 2. None of the campaigns provided information on financial and summative evaluation so we removed this part of the table for display purposes.
### Table 1. Flowproof components and descriptions

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formative research and evaluation</td>
<td>Whether any formative research and evaluation activity occurred, including to assess the need for and feasibility of the campaign and to develop and test the campaign elements</td>
</tr>
<tr>
<td>Logic model/use of theory objectives</td>
<td>Theoretical or planning framework used in the design of the campaign and/or its evaluation</td>
</tr>
<tr>
<td>Objectives</td>
<td>What the campaign intended to achieve, including any behavior change or non-behavior change outcomes. Includes target populations for the campaign and any links to broader strategies or initiatives. Also includes performance indicators and targets</td>
</tr>
<tr>
<td>Well-resourced</td>
<td>Financial and human resources required to manage and implement the campaign, including partnerships between organizations</td>
</tr>
<tr>
<td>Process evaluation/Run the campaign</td>
<td>Reporting of campaign implementation details, answering questions on whether the campaign was implemented as intended and what elements were planned and what were opportunistic. Includes any information on the media used for the campaign, including channel, placement, size/length, weighting, and dates and/or duration of the campaign and any campaign phasing. Also includes results from any process evaluation activity, including media weighting information (e.g., planned vs. achieved TARPs/GRPs), digital or other support response (e.g., click-thru rates, service enrolments, etc.) and perceptions of the campaign, such as salience and personal relevance of the campaign messages. Although FLOWPROOF separates out media weight metrics, scheduling, and duration under a separate heading (“Run the campaign”), it acknowledges they are process evaluation so we have combined these two headings for ease of reporting.</td>
</tr>
<tr>
<td>On-the-ground support</td>
<td>Whether the campaign was supported by other actions such as community programs, primary care ancillary strategies, worksite or other settings-based intervention, and/or digital/virtual strategies</td>
</tr>
<tr>
<td>Financial and summative evaluation</td>
<td>Detailed information on cost of the campaign and its evaluation, including cost-benefit, cost-effectiveness, or return on investment calculations</td>
</tr>
</tbody>
</table>

Source: Grunseit et al. (2016)

![Fig. 1. The FLOWPROOF Protocol.](image-url)
Formative Research and Evaluation

The amount of information available on formative evaluation was generally limited, especially with regards to the findings. No information on formative evaluation was available for five campaigns. Measure Up was the only campaign where a detailed report on part of the formative evaluation was made available to us (Bluemoon Research and Planning, 2007), although it is not publicly available. The most common method employed was pre-testing of campaign materials through focus groups or interviews, either with the target audience or with an expert advisory group, but results were generally not reported. Change4Life (C4L), Measure Up, Steps to a Healthier New Orleans (Steps), and Sugar Pack reported having conducted developmental research with the target audience to inform concept development. Results suggested awareness of obesity as a health issue was high in all target audiences but that perceived susceptibility to the health effects was low and that behavior change was perceived as being too difficult. It was often not clear how these results were incorporated into the campaign design (e.g., materials, market segmentation, choice of media channels, etc.). LiveLighter and Sugar Pack reported reviewing previous relevant campaigns to inform design but, again, there was no explanation of how the respective reviews were incorporated into subsequent design and implementation.

Logic Model/Use of Theory

Most campaign descriptions (n = 12) cited theory or frameworks for their campaign design and/or evaluation, although none included a logic model. Of those that did report using a specific theory or theories, these were typically individual-level behavior change theories, particularly the Health Belief Model. Only Fighting Fat, Fighting Fit (FFFF), Piece of String (PoS), and Weight of the Nation (WoN) used interpersonal theories and community models (Social Cognitive Theory, Social Learning Theory and Diffusion of Innovations). Once again, details of how these theories translated into campaign design or implementation or their evaluation was generally not described. Where some description was provided, theory was used to
Table 2. Campaign characteristics mapped against the FLOWPROOF protocol

<table>
<thead>
<tr>
<th>Campaign name</th>
<th>Formative research and evaluation</th>
<th>Logic model/use of theory</th>
<th>Objectives</th>
<th>Well-resourced</th>
<th>Process evaluation/Run the campaign</th>
<th>On-the-ground support</th>
<th>Outcomes²</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP3D (George et al., 2016)</td>
<td>Design: Advisory committee, including community members, leaders, researchers, and medical and social support service providers, generated concepts.</td>
<td>Social marketing</td>
<td>To raise awareness of obesity To increase involvement in type 2 diabetes prevention programs offered by BP3D</td>
<td>$US23,125 for design and implementation only</td>
<td>Delivery: 1 Sept to 13th October 2011 (6 weeks) + 4 weeks of bonus advertising</td>
<td>Type 2 diabetes prevention, nutrition, and fitness programs</td>
<td>Design: Post-campaign intercept survey (n = 171). Social media/website analytics</td>
</tr>
<tr>
<td></td>
<td>Community needs assessment in English, Spanish, and Creole conducted with the four final concepts to test community response.</td>
<td></td>
<td>Target population: 18–64 year old African American or Hispanic men and women living in low-income urban neighborhoods in New York, USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 key informant interviews and 1 focus group</td>
<td></td>
<td>Indicators: Modification of diet, advocating for healthier foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Results: Not reported</td>
<td></td>
<td>Results: 100 advertisements displayed, with estimated 'circulation' of 17,200 people per day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11,000 Facebook visits, 65 Tweets, 37 unique inquiries via email in 6 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distal: 31% of those who recognized the campaign contacted BP3D, 40% reported changing their eating habits, and 17% reported being inspired to demand healthier foods in the local markets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Campaign name</th>
<th>Formative research and evaluation</th>
<th>Logic model/use of theory</th>
<th>Objectives</th>
<th>Well-resourced</th>
<th>Process evaluation/Run the campaign</th>
<th>On-the-ground support</th>
<th>Outcomes$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change4Life (Croker et al., 2012; Department of Health, 2009; Department of Health, 2010; Lefebvre, 2011)</td>
<td>Design: Unspecified research with the target audience Expert Advisory Group</td>
<td>Social marketing</td>
<td>To encourage the target groups to: i) be aware of the health risk of excess body fat, ii) reduce calorie intake and develop healthier eating habits (reductions in foods high in added sugar and fat, a more regular meal pattern, less snacking, and increased fruit and vegetable intake), and iii) participate in regular physical activity (especially family activities) and reduce sedentary time</td>
<td>£75 m over 3 years, with 7% allocated to research, monitoring, and evaluation</td>
<td>Delivery: January 2009 to 2011 (4 phases)</td>
<td>Personalized family information pack Engagement with partners and workforces, local service providers, potential local supporters, and NGOs</td>
<td>Design: Continuous tracking study, using face-to-face interviews. Random location sampling for all adults aged 15+ years ($n \approx 300$ per month) and booster samples for specific target groups ($n \approx 550$)</td>
</tr>
</tbody>
</table>

**Results:**
Awareness of obesity as an issue was high but perceived susceptibility was low. Also found that parents underestimated the amount of food they and their children eat while overestimating PA.

**Target population:**
England, UK families with children aged 0–11 years and pregnant women, with a focus on 'at risk' groups (primarily low SES)

**Components:**
TVC Print Poster Helpline Website Sponsorship PR

Cluster RCT of parents using schools as the cluster. $n = 3,774$ families with 4,419 children (28% RR) opted in $n = 1,419$ families returned follow-up questionnaires (38% RR for recruited sample, 12% of invited) Qualitative home-based interviews with parents in the intervention group ($n = 12$)
<table>
<thead>
<tr>
<th>Indicators</th>
<th>Results:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of campaign</td>
<td>99% reach among mothers of children 0–11 years. Over 413,000 families joined Change4Life in the first year, with 44,833 still in contact after 6 months.</td>
</tr>
<tr>
<td>Importance of diet and PA</td>
<td>Parents tended to be satisfied with their family’s health and considered change unnecessary. Belief that the campaign was not useful or realistic, but positive views about the materials provided as part of the intervention were observed.</td>
</tr>
<tr>
<td>Intention to change behavior</td>
<td>The higher educated in the intervention group had a lower mean rating than those in the control. No other significant differences observed.</td>
</tr>
<tr>
<td>Parental monitoring of child’s diet and PA behavior</td>
<td>The higher educated in the intervention group had more hours/day of TV than those in the control.</td>
</tr>
<tr>
<td>Parental modeling of healthy behaviors</td>
<td>88% recognition of the logo after one year of the campaign (up from 9% at baseline). 75% recognition at follow-up.</td>
</tr>
<tr>
<td>Child’s diet, PA, and sedentary behavior</td>
<td>Proximal: 88% recognition of the logo after one year of the campaign (up from 9% at baseline). 75% recognition at follow-up. Intermediate: Post-intervention, intervention group had a lower mean rating for importance of PA than control. The higher educated in the intervention group gave a lower mean rating than those in the control. No other significant differences observed. Distal: The higher educated in the intervention group had more hours/day of TV than those in the control.</td>
</tr>
</tbody>
</table>

**Design:**
- Concept testing with target audience
- Expert steering committee
- Not reported

**Social learning theory, Health Belief Model**
- To inform people about the need for active obesity prevention, and to encourage people to eat more healthily and become more physically active.
- To mobilize social support for behavior change.
- Target population: Approx. £2 million for design and implementation, plus £20,000 for evaluation

**Delivery:**
- Approx. £2 million for design and implementation, plus £20,000 for evaluation
- 6-month self-help program
- Post-survey only
- Omnibus survey: face-to-face, computer-assisted self-administered interviews
- Random sampling of households in the UK and random sampling of household members over 16 years of age.
- In the intervention group, 1,122 completed follow-up (35% of originally invited, 57% of those initially invited in target audience). In the control group, 54% completed follow-up (35% of originally invited, 54% of those initially invited in target audience).
<table>
<thead>
<tr>
<th>Campaign name</th>
<th>Formative research and evaluation</th>
<th>Logic model/use of theory</th>
<th>Objectives</th>
<th>Well-resourced</th>
<th>Process evaluation/Run the campaign</th>
<th>On-the-ground support</th>
<th>Outcomes²</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK social classes 3NM and 3M aged 21–45 years (skilled non-manual and manual groups)</td>
<td>Indicators: Campaign penetration (awareness and message recall) Dietary intake and behavior, physical activity levels, weight, psychological measures</td>
<td>Trailers had 516 TARPsa Mentions in 60 magazines, 9 national newspapers, 120 regional newspapers 28 articles in the national press 237,865 registration packs sent out, 33,474 registration cards returned (14% RR) Total audience size for TV programs ranged from 6.7 m to 32.6 m Involvement with campaign ranged from 77% (watched a TV program) to 2% (visited broadcaster’s website)</td>
<td>Intermediate: Among those who registered for the program: 99% wanted to lose weight and 97% expected to. Increased satisfaction with weight from 3% to 11% Distal: Among those who registered for the program: 44% reported losing weight; post-campaign weight was 2.3 kg lower than before the campaign Increased consumption of fruit and vegetables and reduced consumption of fried foods, whole milk, snacks, and alcohol Increases in walking, moderate, and vigorous physical activity Higher engagement with the campaign was a significant predictor of some dietary improvements and increased physical activity. Improved psychological wellbeing, perceptions of health and other psychological measures Involvement in the campaign was a significant predictor of weight loss Mean reduction in BMI of 1.6 points</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Indicators:
- Campaign penetration (awareness and message recall)
- Dietary intake and behavior, physical activity levels, weight, psychological measures

Results:
- Trailers had 516 TARPs
- Mentions in 60 magazines, 9 national newspapers, 120 regional newspapers
- 28 articles in the national press
- 237,865 registration packs sent out, 33,474 registration cards returned (14% RR)
- Total audience size for TV programs ranged from 6.7 m to 32.6 m
- Involvement with campaign ranged from 77% (watched a TV program) to 2% (visited broadcaster’s website)

Proximal:
- 57% recognition of the campaign; higher in target audience (67% vs 54%)

Intermediate:
- Among those who registered for the program: 99% wanted to lose weight and 97% expected to.
- Increased satisfaction with weight from 3% to 11%

Distal:
- Among those who registered for the program: 44% reported losing weight; post-campaign weight was 2.3 kg lower than before the campaign
- Increased consumption of fruit and vegetables and reduced consumption of fried foods, whole milk, snacks, and alcohol
- Increases in walking, moderate, and vigorous physical activity
- Higher engagement with the campaign was a significant predictor of some dietary improvements and increased physical activity. Improved psychological wellbeing, perceptions of health and other psychological measures
- Involvement in the campaign was a significant predictor of weight loss
- Mean reduction in BMI of 1.6 points
<table>
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<tr>
<th>Campaign name</th>
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<th>Objectives</th>
<th>Well-resourced</th>
<th>Process evaluation/Run the campaign</th>
<th>On-the-ground support</th>
<th>Outcomes²</th>
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<tbody>
<tr>
<td>Fighting obesity campaign (Arikan et al., 2014)</td>
<td>Design: Not reported Results: Not reported</td>
<td>Not reported</td>
<td>Objectives not reported Target population: Adults in Turkey Strategies/initiatives: Fighting obesity and control program 2010–2014, an action plan aiming to reduce obesity prevalence by 10% by 2020 Indicators: Campaign awareness Level of knowledge and awareness about obesity, specifically the causes of obesity, preventive measures, and perceptions of the effects of obesity on society Adopting at least one protective behavior</td>
<td>Not reported</td>
<td>Delivery: Not reported Campaign components: TVC Print Outdoor Radio Website</td>
<td>Results: Not reported</td>
<td>None reported</td>
</tr>
</tbody>
</table>
It starts here (Boles et al., 2014)

**Design:** Not reported

**Results:** Not reported

**Behaviour-change theory and Flay and Cook’s (1989) model for evaluation of MMCs (evaluation only)**

To educate county residents about the amount of added sugars in SSBs, the health risks of SSB consumption, including childhood obesity

**Target population:** Women aged 18 to 44 years, especially mothers, living in Multnomah County (Portland), Oregon, USA

**Strategies/Initiatives:** Part of CDC-funded CPPW initiative

**Indicators:** Recall and recognition of campaign

Knowledge and attitudes about obesity, community health, and sugar

SSB behavioral intentions and behaviors

**Delivery:** 2011

**Components:** Paid and unpaid media on web and social media sites, TV (2 × 30-sec, 1 × 15 sec, and 1 × 60 sec TVCs), outdoor, and other community locations

**Results:** Not reported

**Toolkits for community members and partner organizations (bilingual: Spanish & English)**

**Design:** Post-campaign cross-sectional telephone survey (landlines only). Recruited from respondents to CPPW Behavioral Risk Factor Surveillance System telephone survey. \( n = 402 \) (53% RR)

**Proximal:** 69% combined recall and recognition of campaign

**Intermediate:** Among those who were aware of the campaign: higher agreement that too much sugar causes health problems. Women aware of the campaign were more likely to intend to reduce SSB offered to a child and to look for information on ways to get healthy food for children in the community but less likely to agree that sugar causes health problems.

**Distal:** Those who were aware of the campaign were less likely to report never having a sugary drink in the last month

No change in consumption behavior post-campaign

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<tr>
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<th>Outcomes</th>
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</table>
| LiveLighter (Ferguson et al., 2014; Morley et al., 2016) | **Design:** Review of best practice approaches to mass media and social marketing campaigns on PA, healthy eating, and healthy weight | Principles of behavior change, as described by Rogers (2003) and Hill and Dixon (2010). Evaluation also used Health Belief Model | To increase awareness and create new understanding of health consequences of overweight, together with exposure to physiological realities of overweight; to illustrate small achievable changes in activity and diet that can be made in the immediate-term to successfully avert the threat | Described as being 'comparable to commercial media campaigns' | Delivery: Phase 1: 24 June to 4th August 2012 Phase 2: 2 September to 6th October 2012 Components: TVC (1x 30-sec, 4x 15-sec) Cinema Radio Print Online Sponsorship | Advocacy strategy to generate support for policy and environmental changes | **Outcomes:**

**Proximal:**
Increased recall from 36% at baseline to 53% (W1) and 48% (W2), cf. no change in comparison state (~29% at each time point). Recognition was 54% at W1 and 50% at W2, with higher awareness in overweight respondents. Awareness of campaign at Perth Glory games was 62%, with higher awareness among participants who had attended multiple games and games later in the season.

**Intermediate:**
Significantly greater proportion of WA adults, but not Victoria, reported thinking about the harms to their health of being overweight at W1 compared to baseline. Intentions to meet PA guidelines increased significantly from baseline to W2 in WA only. No other significant changes were found. Among participants at Perth Glory games who were aware of the campaign, 52% intended to change behavior and 74% of those reported actually taking action.

**Distal:**
No significant changes in behavior.
Maak je niet dik (Don’t get fat) (Wammes et al., 2005; Wammes et al., 2007)

**Design:** Qualitative pre-testing of campaign materials for acceptability of message and content
Expert advice from campaign steering group

**Results:** Not reported

<table>
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<tr>
<th>Health Belief Model</th>
<th>To promote preventive action on weight gain (Phase 1: To place the issue of weight-gain prevention on the public agenda by creating awareness of a need to act to prevent weight gain, and to induce more positive attitudes and intentions toward prevention of weight gain)</th>
<th>Not reported</th>
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<tr>
<td>Model, Protection Motivation Theory, Precaution Adoption Process Model (evaluation only)</td>
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**Delivery:**
6 waves beginning December 2002 through December 2004
Phase 1: December 2002 to February 2003
Phase 2: July-August 2003
Phase 3: October 2003
Phase 4: December 2003 to January 2004
Phase 5: May 2004
Phase 6: November 2004

**Components:**
Radio
TV
Brochure
Print
Information cards
Website
Press releases
Call center

**Results:**
Phase 1: 2,294 radio commercials aired, 45 print ads, 170,500 brochures distributed, 240,000 information cards distributed, 39,655 people received personalized feedback, 594 calls to information line, 150,000 website visits, 70 unpaid media mentions

**Information pack provided to local public health organizations**

**Design:** 11 repeat cross-sectional surveys with 25–40 year olds, 20-BMI<30. RDD sampling. n = 483 to 493 for each wave (RR between 67% and 80%)

**Proximal:**
Total awareness ranged from 57% in survey 3 (21% recall, 37% recognition) and 88% in survey 11 (72% recall, 16% recognition). Message recall ranged from 43% to 68%

**Intermediate:**
Positive association between time and positive attitudes to prevention of weight gain, perceived social support, and intention to prevent weight gain. Negative association between time and self-efficacy beliefs and overweight-related risk perception. Positive association between awareness of the TVC and perceived social support and motivation to prevent weight gain, and a negative association with overweight-related risk perception.

**Distal:**
Significant association between time and higher self-reported BMI for surveys 1 to 4 only.

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| The energy balance and 'battle the belly with a balance day' campaign  
(Verheijden et al., 2012) | Design: Not reported  
Results: Not reported | Theory of planned behavior, Self-regulation theories | Increase personal relevance of weight gain and knowledge of effective weight maintenance practices | €850,000 | Delivery: Wave 1: end 2007  
Wave 2: June 2008–2010  
Components: Not reported  
Results: Not reported | None reported | Design: Online cohort, followed up at 4 time points between November 2007 and March 2009. Recruited from a panel.  
n = 1,030 at baseline (86% RR) to n = 816 at T4  
Proximal: At T2, 1% recall and 19% recognition  
At T3, 3% recall and 29% recognition  
Intermediate: Not reported  
Distal: Declines in attentiveness toward energy balance, food choice, and food amounts, but slight increase in proportion using compensatory strategies. Among low SES increase attention food choice. No change in BMI |
| Measure Up (Bluemoon Research and Planning, 2007; Grunseit et al., 2015; King et al., 2013; Miller & Tuffin, 2009; O'Hara et al., 2011; O'Hara et al., 2012; Thomas et al., 2014) | Design: Online cohort, followed up at 4 time points between November 2007 and March 2009. Recruited from a panel.  
n = 1,030 at baseline (86% RR) to n = 816 at T4  
Proximal: At T2, 1% recall and 19% recognition  
At T3, 3% recall and 29% recognition  
Intermediate: Not reported  
Distal: Declines in attentiveness toward energy balance, food choice, and food amounts, but slight increase in proportion using compensatory strategies. Among low SES increase attention food choice. No change in BMI | Social marketing Transtheoretical model of behavior change was used to guide formative evaluation recruitment | To raise awareness of the relationship between waist measurement, physical activity, healthy eating and obesity risk among adults  
Target population: Primary: 25 to 49 year olds with children in Australia  
Secondary: 45 to 65 year olds  
Indicators: Recall and recognition of the campaign  
Knowledge of health information  
Self-reported behaviors and intentions  
Risk profile and risk perception | Approx. AUS30m over 4 years | Delivery: Wave 1: October to November 2008 (4 weeks)  
Wave 2: March to April 2009 (4 weeks)  
Components: TVC (1x 60 sec, 1 × 30 sec)  
Radio  
Magazines  
Online  
Out of home  
Results: | NSW Get Healthy Information and Coaching Service Public health services and NGOs funded to undertake local activities |
People did not place high priority on maintaining a healthy lifestyle because they did not appreciate the severity of chronic conditions and underestimated their personal susceptibility. Participants also felt that changing behavior was too difficult. Pre-testing of the ads found the health consequences depicted in them were salient.

To raise awareness of the relationship between waist measurement, physical activity, healthy eating and obesity risk among adults:

**Target population:**
Primary: 25 to 49 year olds with children in Australia
Secondary: 45 to 65 year olds

**Indicators:**
- Recall and recognition of the campaign
- Knowledge of health information
- Self-reported behaviors and intentions
- Risk profile and risk perception

Wave 1: 600 TARPs
Approx. 75–80% of the target audience would likely see the TVC at least once; approx. 65% were expected to see the magazine advertisement and 70–75% of the target audience were estimated to hear the radio advertisements.

Wave 2: 450 TARPs
Estimated TV reach was 72–77% of the target population, estimated magazine reach was 77% and estimated target audience reach via radio was 70–75%. Parents reported strong personal relevance of the imagery used and recognized that the campaign asked individuals to take personal responsibility for obesity, leading some to be critical that it did not address broader societal causes of obesity. Obese parents also identified a lack of practical tools for behavior change.

**NSW Get Healthy Information and Coaching Service Public health services and NGOs funded to undertake local activities**

Get Healthy Service routine caller information.

**Proximal:**
- 87% aware (41% recall and 46% recognition)

**Intermediate:**
- Increase in knowledge and personal relevance of the link between waist circumference and chronic disease.
- Participants who recalled the campaign were more likely to have better knowledge than those who only recognized the campaign and those who did neither. Also more likely to intend to change their behaviors toward a healthier pattern.

**Distal:**
- Increase in waist measuring behavior. No other behavioral changes. Those who did not recall the campaign had lower BMI and fast food intake and higher vegetable intake. Those who were aware were more likely to have tried to change fast food or PA in the last 6 months. Dose response relationship between TVC advertising and contact with the Get Healthy Service (GHS), although Measure Up advertising was less effective at this than GHS-specific advertising. Awareness of GHS and registrations also associated with mass media, including Measure Up.
Table 2. (Continued)

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<tr>
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<tbody>
<tr>
<td>Piece of string (Morley et al., 2009)</td>
<td>Design: Focus group testing Results: The ad provided new information and an objective tool for viewers to measure themselves. Some indication that viewers would recall the mentioned waist measurements</td>
<td>Social cognitive theories of behavior change (Social learning theory, Social cognitive theory, Health belief model)</td>
<td>Primary objectives: to increase awareness of the link between cancer and obesity and to encourage viewers to identify whether they are at increased risk of cancer due to their weight. Secondary objective: to influence lifestyle behaviors with respect to weight.</td>
<td>Not reported</td>
<td>Delivery: May 2007 for 6 weeks Components: TVC Helpline Website Kit provided to registrants (print materials and tape measure) Results: Average weekly TARPs: 170</td>
<td>None reported</td>
<td>Design: Natural exposure, with pre and post-test and comparison group. Recruited randomly from existing database of survey participants, who had to be overweight or obese and aged 30 to 69 years. Comparison group were participants who did not recall the ad during post-exposure interview. n = 519 (confirmed exposed n = 101, unexposed n = 81) Proximal: 11% recall and 54% recognition of the campaign at post-exposure interview 77% awareness at follow-up interview Intermediate: Knowledge of link between overweight and cancer greater in exposed group. No other differences. Distal: Some improvement in recent weight loss behavior but not sustained at follow-up. 26% of exposed measured their waist size</td>
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</table>
Steps to a Healthier New Orleans (Beaudoin et al., 2007)

<table>
<thead>
<tr>
<th>Design</th>
<th>Not reported</th>
<th>Increase physical activity and fruit and vegetable consumption, and lower high-calorie snack food consumption</th>
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<tbody>
<tr>
<td>Results</td>
<td>Time constraints were most important factor influencing fruit &amp; vegetable consumption and PA</td>
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Target population: African-American women aged 18 to 49 years in New Orleans, USA

Indicators:
- Campaign awareness
- Attitudinal and behavioral measures specific to fruit & vegetable and snack food consumption and walking

Delivery:
- February 2005 - August 2005 (Phase 1)

Components:
- 2x TVCs
- 4x radio
- 28 taillight bus and streetcar signs
- 22 bus and streetcar sides

Results:
- Mean weekly GRPs 367 for TV and 70 for radio

Obesity Mass Media Campaigns: a Systematic Review

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<tr>
<td>Sugar Pack (Barragan et al., 2014; Robles et al., 2015)</td>
<td>Design: Reviewed other campaigns, particularly ‘Pouring on the Pounds’ and ‘Rethink your drink’ campaigns. Focus groups with parents, incl. one group in Spanish.</td>
<td>Integrative model of behavioral prediction (Evaluation only)</td>
<td>To change social norms and reduce demand for SSBs; to educate target populations about the high quantity of sugar contained in various SSBs</td>
<td>$US920,000 (estimated); $60,000 on development, formative evaluation, and media monitoring; $790,000+ on paid media; $70,000 on post-campaign evaluation</td>
<td>Delivery: October 2011 to December 2012 (Phase 1: 2011 featured unpaid media only; Phase 2: February 2012 for 8 weeks; Phase 3: June 2012 for 5 weeks)</td>
<td>None reported</td>
<td>Design: Street intercept survey conducted in June 2012 (Phase 3 of campaign) at major public transport locations; eligible participants: lived or worked in LA County, aged 18 years or over, and could speak either English or Spanish. $ = 1,041 (approx. RR 56%)</td>
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Results: Parents were aware of health risks of SSB consumption but did not believe their children were at risk. Parents reported limiting consumption but thresholds varied and were ill-defined. When shown other campaigns, messages around the quantity of sugar in SSBs were the most powerful and relevant.
**Swap It, Don’t Stop It**  
(O’Hara et al., 2016)

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<th><strong>Design:</strong></th>
<th>Not reported</th>
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<tr>
<td><strong>Results:</strong></td>
<td>Not reported</td>
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**“Nudge” theory**  
To encourage adults to make small, achievable, healthy choices through swapping unhealthy behaviors with healthy ones

| **Target population:** | Primary: 25–49 year-old Australian adults with children  
Secondary: 45–65 year-olds |
|-------------------------|-----------------------------|

**Indicators:**  
Recall and recognition of the campaign  
Knowledge of health information  
Self-reported “swapping” behaviors

**Delivery:**  
March to June 2011 (Phase 1) and September to December 2011 (Phase 2)

**Components:**  
45 sec TVCs  
Magazines  
Online  
30 sec radio  
Print  
Cinema  
Out-of-home  
Culturally and linguistically diverse press, radio, and online  
Indigenous press, radio, and online

**Results:**  
Phase 1: 600 TARPs in burst 1 (Mar to Apr), 330 TARPs in burst 2 (May). Estimated 75%–80% of the target audience would see the TVC at least once, 65% would see the magazine advertisement, and 70%–75% would hear the radio advertisements.  
Phase 2: 560 TARPs in metropolitan areas and 650 in regional areas over 3 weeks in September. Estimated TV reach was 88% and magazine reach was 46% of the target audience.

| **Design:** | 2 cross-sectional RDD landline-only surveys with adults aged 18–65 years. Conducted post TV advertising bursts in July 2011 (RR 41.8%) and November 2011 (RR 38.7%), N = 5,097.  
**Proximal:** | 16% recall, 62% recognition, with higher awareness in women, 18–44 year-olds, parents, employed participants, and those who spoke English at home. Increase in awareness from 1st survey (14% recall, 57% recognition) to 2nd (17%, 67%). Non-smokers and those meeting vegetable consumption guidelines were more likely to recall the campaign, while overweight/obese participants were more likely to recognize it.  
**Intermediate:** | Agreement with knowledge and attitudinal statements associated with awareness and swapping behaviors.  
**Distal:** | 84% of participants reported no swapping-related behaviors in the past 6 months and 14% reported only 1 swapping behavior. Swapping behaviors were more prevalent in 45–65 year-olds, employed participants, and those aware of the campaign. |

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<th>Well-resourced Process evaluation/On-the-ground support</th>
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<tbody>
<tr>
<td>Weight of the Nation (Garney et al., 2015; Luecking et al., 2017)</td>
<td>Design: Not reported</td>
<td>Results: Not reported</td>
<td>To distribute information about the rate and causes of obesity; to encourage viewers to be active and eat a healthier diet</td>
<td>Target population: USA general public</td>
<td>Indicators: Behavioral intention, efficacy, and community-and policy-related support</td>
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</table>
guide development of evaluation questions. Social marketing was listed as a guiding framework for \textit{Brooklyn Partnership to Drive Down Diabetes (BP3D)}, C4L, and \textit{Measure Up}. However, these evaluations focused on the promotion element of social marketing, with little discussion of the role of other elements like price, product, and place (Hastings, 2007) or regulation and environmental change (Janet & Sandra, 2011).

\textbf{Objectives}

Campaign objectives typically focused on the individual, particularly on increased awareness of the health risks of obesity and obesity-related behaviors. With regard to behaviors, consumption of sugar-sweetened beverages (SSB) and physical activity were the most common targets. Increasing fruit and vegetable intake was a specific objective in only one campaign (Steps), while \textit{FFFFF} and \textit{Sugar Pack} were the only campaigns targeting wider social change beyond the individual. One campaign (\textit{Fighting obesity}) did not report its objectives.

Thirteen of the 14 campaigns were conducted in high-income countries, with five in the United States (US; BP3D, \textit{It starts here, Steps, Sugar Pack, and WoN}), four in Australia (\textit{LiveLighter, Measure Up, PoS, and Swap It, Don’t Stop It}), two in the United Kingdom (UK; C4L and FFFF), and two in the Netherlands (\textit{Maak je niet dik (MJND)) and Energy balance/battle the belly with a balance day). Only one campaign was conducted in a middle-income country (Turkey; \textit{Fighting obesity}), while none were conducted in low-income countries. Campaigns from the US and the UK usually targeted disadvantaged groups (e.g., Hispanic or African Americans in low socio-economic areas), with \textit{It starts here} and WoN the exceptions. Campaigns from other countries most commonly targeted parents or general adult populations, sometimes with a focus on people who were overweight or obese. Few campaigns \((n = 3)\) targeted a specific gender and only one \((MJND)\) exclusively targeted young adults.

The identified evaluation indicators were usually appropriate to the stated objectives. However, there were some notable gaps; specifically, evaluations of the campaigns targeting social changes did not include indicators of these social changes. The indicators described for \textit{BP3D} did not appear to match its objectives. No campaign incorporated a specific time or percentage targets for change.

\textbf{Well-Resourced}

Half of the campaigns provided some information on costs but only one \((Sugar Pack\)) provided a breakdown of how the costs were distributed between design, advertising buy, and evaluation. \textit{BP3D} also provided information on staffing but no other campaign provided information on the human resources used.

\textbf{Process Evaluation \& Run the Campaign}

Almost all campaigns included a television component, with one campaign (\textit{MJND}), which introduced television advertising late in their campaign, noting the acute impact of television advertising for increasing campaign awareness. \textit{Sugar Pack} and \textit{BP3D} lacked a television component, and \textit{Energy balance/battle the belly with a balance day (Energy balance)} did not describe a breakdown of media channels used. All campaigns made use of other media channels, most commonly radio, outdoor, or online (including social media and campaign websites), but design and implementation details were limited on these.

Campaigns usually ran for 4–12 weeks, with some longer campaigns of up to two years. Most \((n = 10)\) of the campaigns occurred between 2007 and 2012, with only \textit{FFFFF, MJND, and Steps} taking place before this time and none taking place after. Campaign dates for \textit{Fighting obesity} were not reported.

Process evaluation results were reported for most campaigns \((n = 10)\) but were limited to measures of campaign reach for television, specifically target audience rating points (TARPs) or gross rating points (GRPs), which estimate how many people are exposed to a campaign and how often they see it. Only three campaigns – \textit{Measure Up, Steps, and Swap It, Don’t Stop It (Swap It)} – reported reach and exposure estimates for other channels (magazine and radio). Some campaigns \((n = 4)\) provided counts of earned media mentions, online advertising impressions and “click-throughs”, and other similar measures of broadcast reach and engagement. Three campaigns had information available on other process evaluation measures, specifically target audience opinion of and satisfaction with the campaign.

\textbf{On-The-Ground Support}

Six campaigns \((MJND, Energy balance, PoS, Steps, Swap It, WoN)\) did not report any supporting elements, suggesting that they were stand-alone campaigns, although \textit{Swap It} was described as being the follow-up campaign to \textit{Measure Up}. For the remaining eight campaigns, details on the supporting elements were sparse so it was unclear what proportion the MMC comprised of the initiative. Only two campaigns (\textit{Fighting obesity and Sugar Pack}) were reported as being part of broader prevention strategies; the remainder were linked to supporting programs or advocacy campaigns.

\textbf{Outcomes (Impact/Outcome Evaluation)}

Evaluation methodologies varied in quality and design. Five campaign evaluations involved a cohort followed up at least once, while ten campaigns included a series of repeat cross-sectional surveys, usually comprised of a baseline and one post-campaign survey; C4L employed a continuous tracking survey. Five campaigns had more than one post-campaign survey but these were conducted within relatively close proximity of each other and to the campaign. Three campaign evaluations included a comparison or control group and two campaigns described a qualitative evaluation component. Evaluation sampling methods also varied, with just over half \((n = 8)\) reporting that they used a random sampling process. Sample sizes for all quantitative elements exceeded \(n = 400\) in all cases except \textit{BP3D}. Where reported, survey sample response rates ranged between 20% and 86%. Common outcome measures included campaign awareness, attitudes or knowledge, and behavior changes but how these were operationalized varied considerably among the campaigns.

\textbf{Proximal Outcomes}

All campaigns except \textit{WoN} reported on campaign awareness, either campaign recall, recognition, or a combination of both (see
Table 2’s notes for definitions of these terms). Seven campaigns reported both recall and recognition, three campaigns reported recognition only, one campaign used a measure that combined both, and one (Steps) was unclear about how awareness was measured. Peak recall ranged from 3% for Energy balance to 72% for MJND, and peak recognition from 29% for Energy balance to 96% for C4L; the latter campaign recognition statistic was among participants in the randomized control trial, albeit from a very high baseline recognition (75%) as the study commenced after the campaign began. Steps and FFFF reported higher awareness in their target audiences compared with participants from outside their target audience, while C4L reported higher awareness in the intervention group compared to the control.

Intermediate Outcomes
BP3D and Energy balance were the only campaigns not reporting intermediate impacts. For the remaining campaigns, five reported increases in knowledge about the risks of overweight and obesity and SSB consumption. Specifically, Measure Up reported an increase in knowledge of the link between waist circumference and chronic disease, noting that participants who recalled the campaign unprompted were more likely to know this than those who did not recall the campaign. Additionally, the evaluation of PoS found that knowledge of the link between overweight and cancer was greater in the group exposed to the campaign; It starts here and Sugar Pack found greater understanding of the content and risks of SSB in participants who were aware of the campaigns, although the former did note that, overall, women were less likely to have this knowledge. Other intermediate impacts, including attitudes (reported by n = 4) and beliefs (n = 4), were reported less often but generally changed in a positive direction. One exception was the MJND evaluation, which found negative associations between time and self-efficacy and risk perception. Swap It reported an association between campaign awareness and a range of attitudinal and knowledge statements but did not examine any changes over time.

The most commonly reported intermediate impact was behavioral intentions (n = 7). The evaluation of LiveLighter found a post-campaign increase in intentions to meet physical activity recommendations, while both Sugar Pack and It starts here reported changes in intentions to reduce SSB consumption as a result of seeing the campaigns. Additionally, those aware of Measure Up were more likely to intend to change their behavior toward a healthier pattern, with a similar result noted in the WoN evaluation. A positive association between time and intentions to prevent weight gain was noted in the MJND campaign, but intentions to lose weight did not change in the evaluation of PoS.

Distal Outcomes
Behaviors were measured in most campaigns (n = 12), with the most common outcomes focusing on physical activity, sedentary time, dietary behaviors, and weight loss. Few campaigns reported any significant behavioral changes. Some campaigns (C4L, It starts here, and Steps) found associations between campaign awareness and behaviors but not behavior change. The remaining campaigns had mixed results. For example, the Energy balance evaluation found a decrease in attentiveness toward energy balance, food choice, and portion size but also a slight increase in the proportion using compensatory strategies (e.g., temporarily increasing physical activity to compensate for overeating) post-campaign. Similarly, Measure Up found an increase in reported self-assessment of waist circumference post-campaign but no changes in fruit and vegetable intake or physical activity. PoS found some improvement in recent weight loss behavior (e.g., increased physical activity or changed diet) immediately post-campaign but this was not sustained at delayed follow-up. Swap It found an association between awareness and self-reported “swapping” of unhealthy for healthy behaviors but only 16% of participants reported any swap at all and most of those reported only one swap. FFFF was the only campaign to report positive dietary and physical activity behavior changes, noting that higher engagement with the campaign was a predictor of these changes. A limitation to this reported finding is that the sample was drawn from the small proportion of people who had registered for the associated self-help program, making it unlikely to be representative of the broader population. BP3D found that nearly a third of participants who were aware of the campaign had contacted a BP3D-associated program, while 40% reported having changed their eating habits. Similarly, the Fighting obesity evaluation found that nearly a third of participants reported at least one desired behavior change, with those who liked the campaign more likely to have changed behavior. However, both of these campaigns had a post-campaign survey only.

Most campaigns (n = 8) did not report any other impacts and, where they did, these mostly related to BMI. FFFF again was the only campaign to find positive changes, reporting a mean reduction in BMI of 1.6 kg/m², albeit based on self-reported data. Energy balance found no change in BMI post-campaign, while MJND found participants reported a higher BMI immediately post-campaign, although this was not sustained over the longer-term. FFFF also reported significant improvements in psychological well-being and other psychological measures post-campaign, while exposure to and awareness of Measure Up advertising were associated with calls to a telephone-based information and coaching service (O’Hara et al., 2012).

Discussion
Our review of 14 MMCs targeting overweight and obesity found that reporting of campaigns and their evaluations varied considerably. The ability to compare the adoption of best practice principles, like those described in the FLOWPROOF protocol, between campaigns is therefore limited. Nonetheless, there are a number of lessons for overweight and obesity MMCs that can be gleaned from our review.

Formative evaluation was used in most campaigns, most commonly to pre-test campaign materials. While important, this is not the only useful role that formative evaluation can play in campaign development (Bauman & Nutbeam, 2014). Greater use of exploratory research with the target audience could be of particular benefit, especially as the few campaigns that reported conducting such research consistently found high awareness of obesity as a health issue, which is in contrast to
campaign objectives to increase this awareness. Further, this exploratory research also consistently found that behavior change was thought to be too difficult. Although this is based on only four campaigns, it suggests that campaigns may be able to focus less on the problem of obesity as a health risk and more on possible solutions. It would also be useful for improving practice if formative evaluation results were reported more often and if this reporting described exactly how the results were incorporated into the campaign design and/or implementation.

Despite calls for campaigns to move beyond individual-level behavior change to targeting socio-environmental factors (Abroms & Maibach, 2008; Wakefield et al., 2010), only two of the campaigns we reviewed included broader social objectives. This might reflect a reliance on individual-level theories, especially the Health Belief Model, to effect change. From a best practice perspective, use of theory is a positive, as previous reviews have noted a lack of theory-based campaigns in public health (Leavy et al., 2011; Randolph & Viswanath, 2004), although it was generally unclear exactly how theories had been incorporated into campaign planning and evaluation. Given the equivocal results of many of the campaigns we reviewed, greater use of interpersonal theories and community models (e.g., Social Cognitive Theory and Diffusion of Innovations) to inform campaign development may be warranted. Further, future campaigns should formally test the theories as, although they were widely used, no campaign reported specifically testing the underpinning theory to determine its accuracy.

In most cases, the indicators that were set were appropriate to the campaign objectives. However, an issue was that objectives lacked timeframes and targets, generally considered important elements of measurable objectives (Department of Health and Human Services, 2009). Including these elements would be of benefit to MMCs as they would likely force designers to consider what a campaign could be realistically expected to achieve given the available resources. It may also encourage greater consideration of the role MMCs can play in addressing obesity and reinforce the need for complementary strategies.

The dominance of television as a delivery method for campaign materials was clear in the campaigns we reviewed. Moreover, process evaluation information was focused almost exclusively on reach and frequency indicators for television advertising. Reporting of process information for other channels was rare, making it difficult to determine the contribution of other channels to overall campaign effects. Although television remains the dominant media for consumers, how people view television is changing rapidly (Regional TAM, Oztam, & Nielsen, 2015) and evaluation of other communication channels is becoming increasingly important. Digital channels like social media and online advertising especially are increasingly used in public health but evidence of their role is lacking (Kite, Foley, Grunseit, & Freeman, 2016). Improved reporting and evaluation of these channels, including where they are used in an integrated way with channels like television, is therefore important to ensuring that overweight and obesity campaigns are using them effectively.

Integration with the policy and/or environmental dimensions of social marketing was rare, with only two campaigns being explicitly linked to broader prevention strategies. Such integration could achieve greater health benefits than stand-alone campaigns when addressing complex problems like overweight and obesity (Abroms & Maibach, 2008; Wakefield et al., 2010) but continue to be under-used. Some campaigns did make mention of social marketing as an underpinning framework but these focused exclusively on persuasive marketing rather than considering other elements of the marketing mix, a finding consistent with previous research (Lefebvre, 2011). We recommend that future MMCs are integrated within broader prevention strategies that target policy and/or environmental changes. Further, there is a need to not only evaluate the campaigns themselves but to also take a broader perspective and evaluate the effect of these strategies on not just individuals, but on professions, organizations, and the community as a whole (Kite et al., 2015; Smith & Petticrew, 2010).

The evaluation methodologies varied in design and quality, likely because evaluation of real-world interventions can be a balancing act between optimal research methods and practical considerations (Bauman & Nutbeam, 2014). Most evaluations were limited to cross-sectional designs, with three having only a post-campaign measure. The use of cohorts, despite the disadvantage of priming (Morley et al., 2016), is a more powerful means of evaluating campaigns than cross-sectional methods (Leavy et al., 2011) but was less commonly used, probably because it is more resource intensive. Random sampling methods were often used but limited to landline telephones only, creating sampling biases through omitting cell phone-only households (Baffour et al., 2016). Cohort studies, with multiple follow-ups, are particularly important for the evaluation of MMCs as commonly used alternative designs are prone to selection bias because comparison or control groups are unrealistic or impractical.

Proximal impacts of campaigns, particularly awareness measures, were reported for all campaigns except WoN. However, the type of awareness measures varied across evaluations, which has significant implications for interpretation of campaign reach and effect (Grunseit et al., 2015). Fundamentally, recall and recognition of campaigns are different measures: campaign recall is measured by asking whether a person they can recall seeing, reading or hearing advertising about the campaign topic and to describe the campaign and its message (Donovan, Boulter, Borland, Jalleh, & Carter, 2003). Hence this measure indicates the proportion of the audience who was exposed to a campaign, paid attention to it, and stored the memory of that campaign. According to the HOEM (McGuire, 1984), it therefore may be influencing the person’s intention and behavior and thus represents a campaign effect. Recognition, on the other hand, measures only whether people acknowledge that they have seen the campaign before, an indication of campaign reach. Ideally, this difference should be acknowledged and campaigns should measure and report both separately. Nonetheless, it was evident that campaigns that achieved higher levels of awareness, whether recall or recognition, tended to find greater impact on intermediate outcomes, underscoring the importance of
of maximizing campaign reach, as recommended by FLOWPROOF (Grunseit et al., 2016).

Intermediate impacts were the most common focus of evaluations and it was apparent that campaigns can influence knowledge, attitudes, and intentions, especially where awareness of the campaign was high, as noted above. What was not clear, however, was whether awareness influenced behavior, as the HOEM predicts (McGuire, 1984), either directly or via changes in the intermediate outcomes. While most campaigns measured behaviors and reported on behavior change, sustained behavior change was not assessed through long-term follow-up. Although it would be difficult to attribute longer term changes to a single campaign, measurement of sustained behavior change is important in justifying the expense of campaigns, especially where they are part of broader strategies, as discussed above. There is evidence that MMCs can influence some behaviors (Wakefield et al., 2010; Yun, Ori, Lee, Sivak, & Berry, 2017) but from our analysis an increased focus on distal outcomes is necessary for future obesity prevention campaign evaluations in order to more definitively answer this question.

One important omission in all of these campaigns was consideration of financial or resourcing issues. Basic cost information was unavailable for more than half of the campaigns and, even where it was available, it was mostly in aggregate form, without breakdowns provided on how costs were distributed between development, implementation, and evaluation. Wider resourcing issues like staffing and the role of partner organizations went largely unreported. Further, financial evaluation was not reported in any campaign. Information on costs and resourcing is of importance to policymakers (Campbell et al., 2009; Milat, King, Bauman, & Redman, 2013) and a lack of costs information has been identified previously as reducing the utility of systematic reviews (Kite, Indig, Mihrshahi, Milat, & Bauman, 2015). As well as providing policymakers with clearer indications of resources required to conduct a campaign, improved reporting of costs could potentially facilitate the development of standardized metrics to enable cross-campaign comparisons of return-on-investment.

As noted by Grunseit et al. (2016), campaign evaluation information is not always published or accessible. For instance, reports from the Measure Up campaign reference grey literature formative evaluations but at the time of writing these were not publicly available. Further, in the case of C4L, the evaluation methodology for the whole campaign was not fully described in the available grey literature report, making it difficult to interpret campaign effects. Additionally, only results from the first year of evaluation were publicly available and the peer-review article on this campaign reported on only one element targeting schools, limiting the ascertainment of overall campaign effects. These two examples underline the importance of governments releasing campaign reports to inform our understanding of attributes of effective and ineffective campaigns (World Health Organization., 2000).

There were a number of limitations for the current study. Although our search was comprehensive, it was limited by the exclusion of studies not published in English and by the fact that we did not conduct a systematic search for grey literature. Both of these limitations may mean that some campaigns have been inadvertently omitted from our review. However, we included grey literature through checking the reference lists of included articles and by contacting authors and the agencies responsible for the campaigns, although in most cases this did not result in additional publications. The time between campaigns and this review meant that many of the authors were not contactable or had changed roles, or the agencies in question no longer had access to any reports. Additionally, the included campaigns were conducted almost exclusively in high-income countries, limiting the generalisability of our findings. Finally, the FLOWPROOF framework is yet to be validated against campaign outcomes and therefore may not fully represent the optimal set of practices.

**Conclusion**

We reviewed published information about adult-targeted overweight and obesity MMCs conducted since 2000 and found that these campaigns can influence intermediate outcomes, such as knowledge and attitudes. Campaigns continue to target individual-level behavior changes, despite longstanding calls for a focus on social issues, including through integration with broader obesity strategies. Improved evaluation methods should continue to be a focus, especially in relation to longer-term behavior change outcomes and communication channels other than television. Finally, we noted a number of gaps in reporting of these campaigns and so recommend the use of best practice protocols, such as FLOWPROOF, to guide design, implementation, evaluation, and reporting. This may necessitate a series of publications, peer-reviewed or otherwise, to provide comprehensive details of MMCs in order to improve the quality and effectiveness of these campaigns.

**Acknowledgments**

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**Supplemental data**

Supplemental data for this article can be access on the publisher’s website.

**References**


Obesity Mass Media Campaigns: a Systematic Review


Chapter 3: Evaluation of the NSW Make Healthy Normal campaign

3.1 Introduction
This chapter describes the findings from the evaluation of the MHN MMC. The reporting of this evaluation has been informed by the review described in the previous chapter. This chapter specifically relates to aim two as described in Chapter 1: to determine the impact of MHN on knowledge, attitudes, and behaviours.

3.2 The Healthy Eating and Active Living Strategy
In New South Wales (NSW), Australia's most populous state, 54% of adults were estimated to be overweight or obese in 2017. In addition, just over half (54%) of adults were not meeting the recommendations on daily fruit consumption (2 or more serves), while 93% were not meeting the recommendations on daily vegetable consumption (5 or more serves). Further, 42% were not meeting daily physical activity guidelines (at least 30 minutes of moderate or vigorous physical activity).

In response, the NSW Government developed the Healthy Eating and Active Living (HEAL) Strategy 2013-2018. This was the first cross-government strategy aimed at addressing overweight and obesity. The Strategy included a range of actions to be implemented as a collaboration between different agencies within the NSW Government and in partnership with other levels of government (both local and federal), as opposed to all responsibility being placed on the NSW Ministry of Health. These actions included environmental and policy changes, as well as health education.

The major communication element of the Strategy was the Make Healthy Normal (MHN) MMC, the first NSW-specific MMC aimed at preventing overweight and obesity. Examples of the MHN campaign materials are shown in Figure 4 below and can also be accessed on the campaign website (www.makehealthynormal.nsw.gov.au).
Figure 4 Examples of the MHN campaign materials (All images © NSW Ministry of Health)

3.3 Impact of the first phase of the Make Healthy Normal mass media campaign on knowledge, attitudes, and behaviours: a cohort study (published paper)


Impact of the Make Healthy Normal mass media campaign (Phase 1) on knowledge, attitudes and behaviours: a cohort study

James Kite,1 Joanne Gale,1 Anne Grunseit,1,2 William Bellew,1 Vincy Li,3 Beverley Lloyd,3 Michelle Maxwell,4 John Vineburg,4 Adrian Bauman1

Mass media campaigns are used widely in response to a range of health issues including overweight and obesity (‘obesity’), which affects many adults in Australia and globally. Campaigns can positively affect attitudes and knowledge of obesity and related behaviours such as physical inactivity and sugar-sweetened beverage consumption. However, campaign evaluation research is not commonly published, impeding knowledge sharing and dissemination.

In New South Wales (NSW), 63% of the adult population was overweight or obese in 2014-15. Further, significant proportions of the NSW population are not meeting current recommendations for the key modifiable risk factors for obesity, physical activity (PA) and diet. In response, the State Government developed the Healthy Eating and Active Living (HEAL) Strategy, which aims to address behavioural and environmental factors that contribute to obesity through cross-government action and partnerships with non-government organisations.

The Make Healthy Normal (MHN) campaign is the major communication element of HEAL. Aimed at challenging the normalisation of being unhealthy and encouraging healthier lifestyles, the campaign’s specific objectives are to: (1) increase awareness of the health risks and decreased quality of life associated with obesity; (2) encourage people to make healthy choices by challenging their perception of ‘normal’; (3) drive people toward support programs and tools according to their needs; and (4) lay foundations for long-term changes in awareness, attitudes and behaviour, and the reduction of obesity levels in NSW. The first phase of MHN focused on objectives (1) and (2). It targeted adults aged 18 years and over, particularly those who were overweight or obese and/or at risk of developing chronic disease because they did not meet healthy eating or PA guidelines. Campaign messages encouraged: smaller portions; increased consumption of fruit and vegetables and water; and sitting less, moving more.

A number of campaigns that have addressed overweight and obesity related behaviours have been run in NSW. These campaigns encouraged people to lose weight, be more physically active, or eat more healthily. Results have been mixed, with significant changes in intermediate outcomes (e.g. knowledge, intentions) but minimal or no changes in behaviours. MHN shares some similar messaging with such campaigns.
but differs in challenging social norms that normalise unhealthy behaviours. MHN was developed following a rigorous formative evaluation process. Creative agencies submitted draft concepts that were appraised by a panel of experts and focus tested with the target audience. MHN was preferred for its tone of collective responsibility and the novel focus on changing social norms; the attention-grabbing nature of the visceral imagery and descriptions of disease closely linked to positive support messages and easy, actionable tips; and the believability and authority added by the presence of a health care professional for the television commercials (TVCs).

MHN was launched in June 2015 with the bulk of the advertising spend allocated to two TVCs (available at: https://www.makehealthynormal.nsw.gov.au/), which aired in five bursts from November 2015 through June 2016 (Supplementary Table 1). The TVCs were supported by community events, press, out-of-home (e.g. billboards), online advertising, public relations, a website and social media. The campaign included ‘problem’ and ‘solution’ creative, problematising normalisation of unhealthy lifestyles and providing suggestions for simple lifestyle changes. The investment in development and first year of implementation was approximately $AU3.5 million, with $2.6 million allocated to cover the media costs, with the remainder for evaluation and research, creative design and production.

In this study, we determined the impact of the first phase of MHN on NSW adults’ knowledge and attitudes towards active living and healthy eating, and physical activity and dietary intentions and behaviour. Specifically, we asked: 1) to what extent was the target audience aware of the campaign; 2) how did NSW adults’ knowledge, attitudes, intentions and behaviour change over time; and 3) did impact differ between adults who were aware of MHN and those who were not?

Method

The campaign’s evaluation framework (Figure 1) was based on a hierarchy of effects. The evaluation study used a cohort design, with participants (NSW adults aged 18+ years) recruited via a research panel and completing three online surveys over approximately 12 months. Quotas were applied at baseline for age, gender and location to reflect the broader NSW population. Data were collected in June 2015, before the campaign launched (baseline or Wave 1); in March 2016 (Wave 2), following peak campaign activity; and June 2016 (Wave 3), after TV advertising concluded. The study was approved by the University of Sydney Human Research Ethics Committee (Protocol number: 2015/177).

Measures

Proximal outcomes – campaign awareness

We operationalised campaign awareness in three ways to capture differing effects by measurement type:12 unprompted recall; prompted recognition of the MHN tagline; and prompted recognition of campaign advertising. Recall was measured by asking participants whether they had seen, read or heard any advertising or messages about active living, healthy eating or healthy weight in the past month. Those who said ‘yes’ were asked to describe the advertising or message, with the response retained verbatim. Two coders independently identified those that related to MHN, with differences resolved by discussion or referred to a third coder.

Recognition of the MHN tagline was measured by asking participants at all waves whether they had seen, read or heard any advertising or messages about active living, healthy eating or healthy weight that included the phrase ‘make healthy normal’. A ‘yes’ response at Wave 1 constituted spurious recognition. A programming error at Wave 2 meant this question was asked of only a subset (n=415) instead of all participants, as was done in Waves 1 and 3. We therefore excluded Wave 2 from the relevant analyses here.

During Waves 2 and 3, all participants were shown images from both TVCs and asked whether they had seen them before. Links to the full advertisements were also available. Participants were then asked whether they recalled seeing any advertisements using TVC images on billboards or posters, online, in newspapers or magazines, or at the cinema. Participants who answered ‘yes’ to at least one of these questions were deemed to have ‘recognised’ the campaign.

Intermediate outcomes – Knowledge, attitudes, and intentions

Knowledge was assessed by recall of the PA recommendations (30 minutes of moderate to vigorous PA per day),13 and level of agreement on a five-point Likert scale with a series of campaign-specific statements, namely that: ‘excess belly fat is a sign of toxic fat inside your body,’ ‘making small

Figure 1: Make Healthy Normal hierarchy of effects model and campaign performance indicators.
changes to what you eat’ and ‘how physically active you are will decrease your risk of chronic disease,’ losing just a few kilos on the outside will remove toxic fat from inside your body’ if you are overweight, ‘drinking sugar-sweetened soft drinks is a cause of overweight and obesity’, and ‘it’s alright to be a bit overweight’.

Attitudes were measured through sets of statements on perceived personal susceptibility to lifestyle-related chronic diseases, self-efficacy to change lifestyle-related behaviours and lifestyle behaviour norms with five-point Likert response scales. Subscales were generated through two exploratory principal component analyses (PCAs; n=6 and n=7 statements, respectively) using principal axis factor extraction with varimax rotation (Supplementary Table 2). We retained components with eigenvalues greater than 1, and based our interpretation on statements with factor loadings greater than 0.3. Where statements loaded on more than one component, the question was incorporated into the subscale that had the higher loading. The magnitude and direction of component loadings were consistent when the analyses were repeated separately for wave of survey, gender, age, socioeconomic status and weight status.

Using the PCA solutions, we generated three subscales: Personal Susceptibility (first PCA: statements 4 to 6, Cronbach’s α=0.65); Self-Efficacy for Behaviour Change (first PCA: statements 1 to 3, Cronbach’s α=0.65); and Lifestyles Behaviour Norms (second PCA: statements 1 to 3, Cronbach’s α=0.71). Raw scores of the constructive questions forming the subscales were summed to produce a subscale score for each respondent. Only participants who had non-missing values for all statements were included. Scores were coded such that higher scores indicated higher perceived susceptibility and self-efficacy and a stronger perception that other people were adopting healthier lifestyle behaviours.

To assess a possible unintended consequence of the campaign, we measured stigmatisation of obese people through agreement that ‘most people I know have no sympathy for people who are overweight or obese’. Intention to increase PA was measured through asking participants whether they had tried in the last six months to change the amount of PA they do, with response options being ‘yes, tried to increase’, ‘yes, tried to decrease’ and ‘no, I have not tried to change’, in line with other evaluations.4,6 We dichotomised responses to ‘tried to increase’ and ‘did not try to increase’.

**Distal outcomes – current behaviour and recent behaviour change**

Total time spent in PA per week was computed in accordance with the Active Australia survey analysis protocol.13 Sufficient PA (150 minutes of PA a week over at least five sessions), was defined in line with current Australian PA guidelines.13 Aligning with dietary guidelines,16 sufficient fruit and vegetable consumption was two or more serves per day and five or more serves per day, respectively. The guidelines also recommend ‘limiting’ soft drink consumption, which we defined as less than one cup per day, consistent with available evidence.17 Questions used to assess these measures were based on questions used in other NSW Ministry of Health surveys.18 We also examined the ratio of cups of water per day to cups of soft drink per day, as one of the campaign’s messages was to drink water instead of soft drink. A positive ratio indicates the participant consumes more water than soft drink per day, while a negative ratio indicates more soft drink than water.

Participants were also asked whether they had tried in the last six months to change the amount of PA they do, with response options being ‘yes, tried to increase’, ‘yes, tried to decrease’ and ‘no, I have not tried to change’, in line with other evaluations.4,6 We dichotomised responses to ‘tried to increase’ and ‘did not try to increase’.

**Covariates**

Age and location were dichotomised into 18 to 39 years and 40 years or over (in line with the Measure Up campaign) and Sydney and rest of NSW, respectively. Socioeconomic status was operationalised using the Socio-Economic Indexes for Areas (SEIFA), based on participants’ postcodes.19 SEIFA quintiles were then dichotomised into least disadvantaged (quintiles 1 to 3) and most disadvantaged (quintiles 4 and 5).

We dichotomised body mass index (BMI) (healthy weight vs. obese), based on World Health Organization (WHO) categories.20

We also generated a lifestyle risk index by summing insufficient PA, insufficient consumption of fruits and vegetables (coded separately), and current smoking, coded as either ‘at risk’ (1) or ‘not at risk’ (0), giving a total score between 0 and 4. Participants with missing values for any of the behaviours were excluded. Similar risk indexes usually include alcohol consumption,21 which we did not measure.

**Statistical analysis**

We used generalised linear mixed models in SAS (Version 9.4) to compare awareness of the campaign, knowledge, attitudes, intentions and behaviours across data collection waves. These were preferred over generalised estimating equations so that participants with some missing data could be included in the analysis. Participants were modelled as a random effect to account for the correlations between repeated measures on the same participant. All models were adjusted for gender, age, socioeconomic status, location, BMI group and risk index score. In addition, we tested differential change across waves in awareness, knowledge, attitudes, intentions and behaviours by these factors using interaction terms entered singly into the covariate adjusted model; results are presented only for interactions that were statistically significant (p<0.05). Awareness of MHN was also included in all models where awareness was not the dependent variable. We explored differences in outcomes based on participant recognition of MHN at Wave 2 by stratifying Wave 3 outcomes by recognition of the campaign at Wave 2. Additionally, change in behaviour of participants at Wave 3 was stratified by PA intentions at Wave 2. Similar analyses of other outcomes were not possible because comparable questions were not asked.

We conducted sensitivity analyses to ascertain the effect of missing data and whether the results were robust to loss-to-follow-up by comparing the baseline demographic profile, behavioural and knowledge patterns of those who completed the survey at all time-points with those who did not.

**Results**

Of the original sample (n=2,259), just over half completed Wave 2 (n=1,225) and Wave 3 (n=1,113). Wave 3 included 174 participants who had not completed Wave 2, meaning 939 participants completed all surveys.
The principal reason for loss-to-follow-up appeared to be panel dynamics; that is, participants had become non-responsive to surveys generally (n=728) or had left the panel entirely (n=126). Despite high loss-to-follow-up, the demographic profile remained relatively unchanged across the waves (Table 1) except for a significant decline in younger participants (18 to 39 years; p<0.001). Participants who completed all three waves (completers) were more likely to be overweight or obese (p<0.001), decrease soft drink consumption (p<0.001) and less likely to intend to increase PA (p<0.001), have tried to increase their PA (p<0.001), and to be meeting the PA guidelines (p=0.027) compared to non-completers (Supplementary Tables 3 and 4). The highest percentage of missing data on any given outcome was 2.4%. Thirteen per cent of participants were missing BMI at baseline, predominantly younger females.

**Proximal outcomes – campaign awareness**

Awareness of MHN increased over time for all three measures (Figure 2). Participants at Wave 3 had significantly higher adjusted odds of recalling MHN unprompted (AOR 2.71, 95% CI 1.91-3.84, p<0.001) at Wave 3 compared to Wave 2 and of recognising the MHN tagline at Wave 3 compared to Wave 1 (3.73, 3.07-4.54, p<0.001). Similarly, participants at Wave 3 had significantly higher adjusted odds of recognising the MHN campaign, compared to Wave 2 (1.54, 1.36-1.76, p<0.001).

Significant interactions between covariates and survey wave showed that, while both male and female and younger and older participants exhibited increased recognition of the tagline between Waves 1 and 3, the effect was stronger among females and those aged 40 years or over (Table 2). The odds of unprompted recall and recognition of the tagline at Wave 3 were over five times greater for those who recognised MHN at Wave 2 than those who did not (Table 3).

**Intermediate outcomes – knowledge, attitudes and intentions**

Participants at Wave 3 had significantly higher odds of correctly recalling the Australian PA recommendations, compared to baseline (Table 4). Similarly, participants at Wave 2 and Wave 3 had higher odds of agreeing that “excess belly fat is a sign of toxic fat inside your body” and that “losing just a few kilos on the outside will remove toxic fat from inside your body” if you are overweight. Recognition of MHN at Wave 2 was associated with higher odds of agreeing with both statements at Wave 3 (Table 3).

Participants had a lower mean Self-Efficacy for Behaviour Change score at Wave 2 and Wave 3, compared to Wave 1 (Table 4). Odds of intending to increase the amount of PA in the next month and decrease consumption of soft drink in the next six months were lower at Wave 3 compared to baseline. Participants who recognised MHN at Wave 2 had higher adjusted mean Personal Susceptibility and Self-Efficacy scores at Wave 3 compared with those who did not (Table 3).

Although the odds of agreeing with the statement “excess belly fat is a sign of toxic fat inside your body” increased for both age groups over time, the effect was stronger in participants aged 40 years and over (Table 2). The odds of agreeing that “drinking sugar-sweetened soft drinks is a cause of overweight and obesity” declined significantly over time for healthy weight participants, compared to no significant change among obese participants.

**Distal outcomes – current behaviour and recent behaviour change**

At Waves 2 and 3 participants had significantly increased mean ratios of cups

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**Table 1: Sample demographics by wave.**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Baseline N=1,259</th>
<th>Wave 2 N=1,225</th>
<th>Wave 3 N=1,113</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1,025 (45.4)</td>
<td>570 (46.5)</td>
<td>529 (47.5)</td>
<td>0.119</td>
</tr>
<tr>
<td>Female</td>
<td>1,234 (54.6)</td>
<td>655 (53.5)</td>
<td>584 (52.5)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18−39</td>
<td>775 (34.2)</td>
<td>284 (23.2)</td>
<td>258 (23.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>40 and over</td>
<td>1466 (65.8)</td>
<td>941 (76.8)</td>
<td>855 (76.8)</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney</td>
<td>1,181 (52.3)</td>
<td>617 (50.4)</td>
<td>580 (52.1)</td>
<td>0.063</td>
</tr>
<tr>
<td>Rest of NSW</td>
<td>1,078 (47.7)</td>
<td>608 (49.6)</td>
<td>533 (47.9)</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>1,674 (74.2)</td>
<td>915 (74.7)</td>
<td>830 (74.6)</td>
<td></td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>583 (25.8)</td>
<td>310 (25.3)</td>
<td>283 (25.4)</td>
<td>0.353</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>788 (40.0)</td>
<td>413 (38.7)</td>
<td>355 (37.0)</td>
<td>0.039</td>
</tr>
<tr>
<td>Overweight or obese</td>
<td>1183 (60.0)</td>
<td>655 (61.3)</td>
<td>605 (63.0)</td>
<td>0.359</td>
</tr>
<tr>
<td>Risk index score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0−1 (low risk)</td>
<td>725 (33.3)</td>
<td>440 (36.6)</td>
<td>381 (35.4)</td>
<td>0.745</td>
</tr>
<tr>
<td>2−4 (high risk)</td>
<td>1,451 (66.7)</td>
<td>763 (63.4)</td>
<td>694 (64.6)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2: Awareness of MHN campaign and total target audience rating points (TARPs) by wave.**

- TARPs
- Recall of the phrase ‘make healthy normal’
- Recognition of MHN
- Unprompted recall

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of water to soft drink per day compared with baseline (Table 4). Overall, participants had lower odds of trying to increase PA over the past 6 months as the campaign progressed but those who recognised MHN at Wave 2 had higher odds of trying to increase their PA than those who did not recognise the campaign at Wave 3. Further, these participants had higher odds of meeting PA and fruit consumption recommendations at Wave 3 (Table 3).

There was a significant interaction between age and wave for the mean ratio of water to sugar-sweetened beverages, with older participants having a higher adjusted mean at both Wave 2 and Wave 3, compared to baseline (Table 2). Participants who intended to increase their PA at Wave 2 had significantly higher odds of reporting having tried to increase their PA at Wave 3 compared to those who did not intend to increase their PA (AOR 3.79, 95% CI 2.72-5.28, p<0.001). However, there was no difference in the odds of actually meeting PA recommendations at Wave 3 between those who did and did not intend to change their PA at Wave 2 (1.17, 0.78-1.76, p=0.446).

### Sensitivity analysis

The sensitivity analysis conducted using only data from completers showed no major differences to the results presented in Tables 2 to 4, with the direction of effect remaining consistent for all outcomes. Further, a sensitivity analysis adjusting for age and sex only, and therefore including participants missing BMI data, yielded similar results to the main analysis. This indicates that the missing BMI data were unlikely to have biased the results presented.

### Discussion

This study evaluated the first phase of the MHN mass media campaign and suggests that the campaign has achieved a reasonable level of awareness among the target population and has had some impact on knowledge. Continuing investment in the campaign will be necessary if these early impacts are to be sustained and built upon. It also highlights the need to continue to monitor relevant outcomes, particularly behaviour, even after campaign activity ceases in order to capture any longer-term impacts like those seen in similar campaigns. The results provide valuable insights into campaigns of this nature, especially given that evaluations of this kind are rarely published.

Awareness of MHN has built steadily over time to a level comparable with that of a similar recent Australian campaign, LiveLighter but below that of other campaigns with similar Target Audience Rating Point (TARP; a measure of exposure) weights. The relatively low proportion (9%) at Wave 3 who recalled MHN is noteworthy as this measure indicated the proportion of the audience that had both seen the campaign and stored the memory of it, which others have argued makes it more likely to influence behaviour. A possible explanation for the lower than expected recall

| Table 2: Adjusted odds ratios (AOR) where interactions between covariates and waves were significant for awareness, knowledge, attitudes, intentions, and behaviours. |
|---|---|---|---|---|---|---|---|---|
| Covariate Category | Wave | Frequency [n ( %)] or Mean | AOR/Adjusted Mean | Lower CL | Upper CL | P value |
| **Awareness** | | | | | | |
| Prompted recognition of MHN tagline | | | | | | |
| Sex | Wave 1 | 110 (10.9) | | | | | <0.001 |
| | Wave 3 | 125 (24.1) | 2.73 | 2.08 | 3.58 | | | |
| | Female | Wave 1 | 109 (9.0) | | | | | |
| | Wave 3 | 168 (19.3) | 5.12 | 3.87 | 6.77 | | | <0.001 |
| Age (years) | Wave 1 | 97 (12.8) | | | | | |
| | Wave 3 | 54 (21.0) | 2.11 | 1.42 | 3.14 | | | <0.001 |
| 18−39 | Wave 1 | 122 (8.3) | | | | | |
| | Wave 3 | 239 (28.3) | 4.57 | 3.62 | 5.77 | | | <0.001 |
| 40+ | Wave 1 | 299 (36.7) | | | | | |
| | Wave 3 | 85 (34.6) | 0.96 | 0.70 | 1.32 | 0.798 | |
| Prompted recognition of MHN campaign | | | | | | |
| Age (years) | Wave 1 | 97 (12.8) | | | | | |
| | Wave 3 | 54 (21.0) | 2.11 | 1.42 | 3.14 | | | <0.001 |
| 18−39 | Wave 1 | 122 (8.3) | | | | | |
| | Wave 3 | 239 (28.3) | 4.57 | 3.62 | 5.77 | | | <0.001 |
| 40+ | Wave 1 | 299 (36.7) | | | | | |
| | Wave 3 | 85 (34.6) | 0.96 | 0.70 | 1.32 | 0.798 | |
| Knowledgea | | | | | | |
| Agree that “excess belly fat is a sign of toxic fat inside your body” | Wave 1 | 384 (50.1) | | | | | |
| | Wave 2 | 141 (51.3) | 1.07 | 0.81 | 1.41 | 0.650 | |
| | Wave 3 | 142 (56.1) | 1.37 | 1.01 | 1.86 | 0.046 | |
| Age (years) | Wave 1 | 783 (33.4) | | | | | |
| | Wave 2 | 588 (62.8) | 1.53 | 1.33 | 1.81 | <0.001 | |
| | Wave 3 | 562 (66.1) | 1.92 | 1.61 | 2.27 | <0.001 | |
| Healthy weight | Wave 1 | 668 (85.2) | | | | | |
| | Wave 2 | 341 (83.0) | 0.79 | 0.58 | 1.38 | 0.129 | |
| | Wave 3 | 281 (79.6) | 0.61 | 0.45 | 0.82 | 0.001 | |
| Overweight or obese | Wave 1 | 1001 (85.1) | | | | | |
| | Wave 2 | 556 (85.8) | 0.94 | 0.73 | 1.20 | 0.596 | |
| | Wave 3 | 524 (87.3) | 1.06 | 0.81 | 1.38 | 0.693 | |
| Current behaviour | | | | | | |
| Meeting physical activity recommendations | | | | | | |
| Sex | Wave 1 | 668 (65.8) | | | | | |
| | Wave 2 | 381 (67.3) | 1.05 | 0.80 | 1.38 | 0.714 | |
| | Wave 3 | 341 (65.5) | 1.05 | 0.80 | 1.37 | 0.744 | |
| Female | Wave 1 | 712 (58.5) | | | | | |
| | Wave 2 | 360 (55.3) | 0.70 | 0.54 | 0.91 | 0.007 | |
| | Wave 3 | 312 (64.4) | 0.76 | 0.59 | 0.99 | 0.090 | |
| Meeting fruit consumption recommendations | | | | | | |
| Age group | Wave 1 | 634 (48.0) | | | | | |
| | Wave 2 | 137 (48.6) | 0.66 | 0.45 | 0.97 | 0.036 | |
| | Wave 3 | 138 (53.5) | 1.40 | 0.95 | 2.06 | 0.091 | |
| 18−39 | Wave 1 | 712 (48.8) | | | | | |
| | Wave 2 | 511 (54.5) | 1.29 | 1.05 | 1.58 | 0.017 | |
| | Wave 3 | 423 (50.0) | 1.02 | 0.84 | 1.25 | 0.838 | |
| 40+ | Wave 1 | 4.8 (3.1) | | | | | |
| | Wave 2 | 5.1 (3.5) | 0.28 | 0.04 | 0.60 | 0.086 | |
| | Wave 3 | 4.9 (3.8) | 0.22 | -0.10 | 0.53 | 0.181 | |
| Mean water to SSB ratio | Age group | Wave 1 | 4.2 (2.8) | | | | |
| | Wave 2 | 4.8 (3.0) | 0.77 | 0.60 | 0.94 | <0.001 | |
| | Wave 3 | 4.4 (2.7) | 0.30 | 0.14 | 0.46 | <0.001 | |

**Notes:**

- a. Interactions for sex not included because they were not significant.

- The relatively low proportion (9%) at Wave 3 who recalled MHN is noteworthy as this measure indicated the proportion of the audience that had both seen the campaign and stored the memory of it, which others have argued makes it more likely to influence behaviour. A possible explanation for the lower than expected recall...
is the increasingly fractured and cluttered media environment, even though television remains the dominant form of media.25 The TARP weighting for the MHN TVCs was in line with best practice guidelines from tobacco control mass media campaigns26 so increased investment in other communication channels may be required to increase awareness, particularly recall, which in turn would be expected to lead to increased campaign impact.27 However, others have argued that using mass media campaigns to address obesity is more difficult than for other health issues, including smoking,1 which may reduce the applicability of these guidelines to MHN and similar campaigns. Campaign awareness was comparable among men and women, as with the Measure-Up campaign,12 but this runs counter to prevailing evidence that women are generally more receptive to health messages than men.28 We speculate that the MHN campaign creative, which does feature a number of male characters, appeals to men in a way that other campaigns have not, although further research would be required to confirm this. Nonetheless, this is a positive finding for the campaign, given the higher prevalence of obesity in men in NSW.9 We observed some consistent increases in knowledge of the benefits of lifestyle changes and the risks of overweight between Baseline and Wave 3, similar to other campaigns.4,6 Notably, effects were stronger among participants who recognised the campaign, which supports the first stage of the hierarchy of effects framework.23 However, social norms did not change over time, which is significant given MHN is one of very few campaigns to attempt to address these directly.29 Further, we observed a consistent decline in PA and soft drink intentions, as well as a reduction in Self Efficacy for behaviour change. We did find that participants who reported intending to increase their PA at Wave 2 had significantly higher odds of reporting having tried to do so at Wave 3 but no change in behaviour. This may reflect environmental barriers, making it harder for people who intend to change to do so, or responses to this question may have been subject to social desirability bias. Converting intentions into behaviour may be a task for later campaign phases but it will be important to understand why intentions have moved in an undesired direction, especially considering Measure-Up found an increase in intentions.4 Obesity is considered a complex problem, underscoring the need for comprehensive strategies, of which mass media campaigns are just one component.1 Addressing the decline in intentions may therefore be addressed through the coordinated approach underpinning the HEAL Strategy, which reinforces the importance of evaluating the Strategy as a whole, especially considering that mass media campaigns can prompt regulatory and environmental changes.1

Although behaviour change was not expected after only the first phase of the campaign, we observed a consistent increase in the ratio of water to soft drink consumption, in line with campaign messages. However, the lack of change in soft drink consumption and the decline in intentions to decrease consumption of soft drink suggest that participants were simply consuming more water, rather than replacing soft drink with water, and that this was confined to participants aged 40 years and over. Given younger Australians are known to drink more soft drink than older Australians,50 changing this behaviour in younger adults may require other, complementary strategies, such as those targeting availability or price.31 Other campaigns have similarly found mixed results with distal outcomes.48,52,22 The use of a cohort design is a strength of this study, providing greater ability to understand the determinants of the observed changes, notwithstanding the possible priming effects.34 Without a comparison group we cannot attribute the findings entirely to the campaign. In addition, our study relied on self-report and thus may have been subject to recall and social desirability bias and the Susceptibility, Self-Efficacy, and Lifestyle Behaviour Norm scores have not been tested.

### Table 3: Adjusted odds ratios (ADOR) and adjusted means for knowledge, attitudes, intentions, and behaviours stratified by participants’ recognition of the MHN campaign at Wave 2.

<table>
<thead>
<tr>
<th>Response at Wave 3</th>
<th>Adjusted Mean*</th>
<th>Lower 95% CL</th>
<th>Upper 95% CL</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unprompted recall</td>
<td>5.95</td>
<td>3.50</td>
<td>10.10</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Recognition of the MHN tagline</td>
<td>5.66</td>
<td>4.02</td>
<td>7.97</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correctly recalled the physical activity recommendations</td>
<td>0.89</td>
<td>0.66</td>
<td>1.19</td>
<td>0.427</td>
</tr>
<tr>
<td>Agree that “excess belly fat is a sign of toxic fat inside your body”</td>
<td>1.62</td>
<td>1.18</td>
<td>2.24</td>
<td>0.003</td>
</tr>
<tr>
<td>Agree that “making small changes to what you eat will decrease your risk of chronic disease”</td>
<td>1.51</td>
<td>1.00</td>
<td>2.27</td>
<td>0.049</td>
</tr>
<tr>
<td>Agree that “making small changes how physically active you are will decrease your risk of chronic disease”</td>
<td>0.98</td>
<td>0.65</td>
<td>1.49</td>
<td>0.936</td>
</tr>
<tr>
<td>Agree that “losing just a few kilos on the outside will remove toxic fat from inside your body if you are overweight”</td>
<td>1.75</td>
<td>1.27</td>
<td>2.40</td>
<td>0.001</td>
</tr>
<tr>
<td>Agree that “drinking sugar-sweetened soft drinks is a cause of overweight and obesity”</td>
<td>1.15</td>
<td>0.76</td>
<td>1.72</td>
<td>0.508</td>
</tr>
<tr>
<td>Agree that “it’s alright to be a bit overweight”</td>
<td>1.30</td>
<td>0.89</td>
<td>1.91</td>
<td>0.174</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean susceptibility scoreb</td>
<td>0.46</td>
<td>0.45</td>
<td>0.78</td>
<td>0.004</td>
</tr>
<tr>
<td>Mean self-efficacy scoreb</td>
<td>0.36</td>
<td>0.06</td>
<td>0.67</td>
<td>0.020</td>
</tr>
<tr>
<td>Mean social norm scoreb</td>
<td>0.13</td>
<td>-0.16</td>
<td>0.42</td>
<td>0.375</td>
</tr>
<tr>
<td>Agree that “most people I know have no sympathy for people who are overweight or obese”</td>
<td>1.11</td>
<td>0.82</td>
<td>1.50</td>
<td>0.496</td>
</tr>
<tr>
<td><strong>Intentions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intends to increase the amount of physical activity they do in the next month</td>
<td>1.00</td>
<td>0.73</td>
<td>1.37</td>
<td>0.983</td>
</tr>
<tr>
<td>Intends to reduce consumption of sugar-sweetened beverages in the next six months</td>
<td>1.05</td>
<td>0.75</td>
<td>1.46</td>
<td>0.790</td>
</tr>
<tr>
<td><strong>Behaviour change</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tried to increase physical activity in the last six months</td>
<td>1.46</td>
<td>1.09</td>
<td>1.94</td>
<td>0.010</td>
</tr>
<tr>
<td><strong>Current behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meeting physical activity recommendations</td>
<td>1.35</td>
<td>1.01</td>
<td>1.81</td>
<td>0.043</td>
</tr>
<tr>
<td>Meeting fruit consumption recommendations</td>
<td>1.32</td>
<td>1.00</td>
<td>1.74</td>
<td>0.048</td>
</tr>
<tr>
<td>Meeting vegetable consumption recommendations</td>
<td>1.29</td>
<td>0.81</td>
<td>2.07</td>
<td>0.285</td>
</tr>
<tr>
<td>Less than one cup of soft drink per day</td>
<td>0.71</td>
<td>0.48</td>
<td>1.05</td>
<td>0.089</td>
</tr>
<tr>
<td>Mean ratio of cups of water per day to cups of soft drink per day*</td>
<td>-0.39</td>
<td>-0.79</td>
<td>0.01</td>
<td>0.054</td>
</tr>
</tbody>
</table>

Notes:
- a: Comparing those who recognised the campaign at Wave 2 to those who did not recognise the campaign.
- b: Linear mixed models were used to analyse outcomes on a continuous scale.
outside of this study. Another limitation was the high loss-to-follow-up between baseline and Wave 2. An unforeseen delay in the commencement of television advertising was responsible for the prolonged inter-survey period and may have contributed to the loss of almost half the sample, particularly younger participants. This, combined with the selection bias inherent in using an online research panel, reduced the generalisability of our findings. In addition, the loss of younger participants was undesirable but not unexpected given younger participants are generally harder to recruit, illustrated by the use of age quotas in other public health campaign evaluations.6,5 However, our sensitivity analyses yielded similar results, suggesting that the conclusions reached in this paper are robust to the high loss-to-follow-up. In addition, external factors may have influenced the outcomes we examined. For example, during the campaign there were public discussions about introducing a tax on sugar-sweetened beverages32 and the NSW Premier announced that childhood obesity was to be one of 12 ‘Premier Priorities’ for the Government.33 We were unable to account for these effects in our analyses. Finally, mass media campaigns are context-specific, hence our results may not be generalisable to populations outside of NSW.

Conclusion

Overall, the evaluation of the first phase of the MHN campaign found some positive results. This includes the increase in knowledge, especially among participants who recognised the campaign. Awareness of the campaign also built to a reasonable level but should continue to be a focus in subsequent phases, particularly in generating higher levels of unprompted recall. There were, however, mixed findings in relation to soft drink consumption, with intentions to decrease consumption declining over time, while at the same time the ratio of water to soft drink consumption improved. Taken together, these results suggest that the complex nature of obesity requires a multi-faceted response, of which mass media campaigns are only one component. Increased focus on shifting intermediate outcomes, including social norms, will be necessary to build on the gains in knowledge noted here.

Table 4: Adjusted odds ratios (AOR)/Adjusted Means for knowledge, attitudes, intentions, and behaviours by wave (n=1,868).

<table>
<thead>
<tr>
<th>Wave</th>
<th>Frequency [%] or Mean</th>
<th>AOR/ Adjusted Mean</th>
<th>Lower 95% CL</th>
<th>Upper 95% CL</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correctly recalled the physical activity recommendations</td>
<td>1</td>
<td>1,013 (45.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>578 (47.3)</td>
<td>1.03</td>
<td>0.90</td>
<td>1.19</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>554 (50.0)</td>
<td>1.18</td>
<td>1.02</td>
<td>1.37</td>
</tr>
<tr>
<td>Agree that “excess belly fat is a sign of toxic fat inside your body”</td>
<td>1</td>
<td>1,167 (52.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>729 (60.2)</td>
<td>1.40</td>
<td>1.23</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>704 (63.8)</td>
<td>1.75</td>
<td>1.52</td>
<td>2.03</td>
</tr>
<tr>
<td>Agree that “making small changes to what you eat will decrease your risk of chronic disease”</td>
<td>1</td>
<td>1,844 (82.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>977 (80.4)</td>
<td>0.84</td>
<td>0.7</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>891 (80.7)</td>
<td>0.93</td>
<td>0.77</td>
<td>1.12</td>
</tr>
<tr>
<td>Agree that “making small changes how physically active you are will decrease your risk of chronic disease”</td>
<td>1</td>
<td>1,908 (85.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>996 (82.8)</td>
<td>0.77</td>
<td>0.65</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>916 (83.0)</td>
<td>0.85</td>
<td>0.69</td>
<td>1.04</td>
</tr>
<tr>
<td>Agree that “losing just a few kilos on the outside will remove toxic fat from inside your body” if you are overweight</td>
<td>1</td>
<td>1,174 (52.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>707 (58.6)</td>
<td>1.26</td>
<td>1.09</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>712 (64.6)</td>
<td>1.62</td>
<td>1.39</td>
<td>1.88</td>
</tr>
<tr>
<td>Agree that “drinking sugar-sweetened soft drinks is a cause of overweight and obesity”</td>
<td>1</td>
<td>1,866 (83.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1,010 (83.4)</td>
<td>0.86</td>
<td>0.72</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>904 (82.0)</td>
<td>0.85</td>
<td>0.69</td>
<td>1.03</td>
</tr>
<tr>
<td>Agree that “it’s alright to be a bit overweight”</td>
<td>1</td>
<td>426 (19.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>210 (17.5)</td>
<td>0.93</td>
<td>0.78</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>187 (17.1)</td>
<td>0.83</td>
<td>0.69</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Personal Susceptibility scorea</td>
<td>1</td>
<td>9.42 (2.60)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.13 (2.60)</td>
<td>-0.13</td>
<td>-0.26</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>9.20 (2.57)</td>
<td>-0.09</td>
<td>-0.22</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean Self-Efficacy for Behaviour Change scorea</td>
<td>1</td>
<td>11.04 (2.25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10.99 (2.20)</td>
<td>-0.21</td>
<td>-0.34</td>
<td>-0.08</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>11.28 (2.25)</td>
<td>-0.20</td>
<td>-0.33</td>
<td>-0.07</td>
</tr>
<tr>
<td>Mean Lifestyle Behaviour Norms scorea</td>
<td>1</td>
<td>9.55 (2.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.53 (2.10)</td>
<td>0.08</td>
<td>-0.06</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>9.45 (2.04)</td>
<td>-0.03</td>
<td>-0.17</td>
<td>0.11</td>
</tr>
<tr>
<td>Agree that “most people I know have no sympathy for people who are overweight or obese”</td>
<td>1</td>
<td>876 (39.1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>491 (40.5)</td>
<td>1.10</td>
<td>0.97</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>405 (35.8)</td>
<td>0.90</td>
<td>0.78</td>
<td>1.04</td>
</tr>
<tr>
<td><strong>Intentions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intends to increase the amount of physical activity they do in the next month</td>
<td>1</td>
<td>873 (39.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>402 (33.0)</td>
<td>0.87</td>
<td>0.76</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>343 (31.0)</td>
<td>0.83</td>
<td>0.72</td>
<td>0.96</td>
</tr>
<tr>
<td>Intends to reduce consumption of sugar-sweetened beverages in the next six months</td>
<td>1</td>
<td>691 (31.3)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2</td>
<td>333 (27.9)</td>
<td>0.95</td>
<td>0.83</td>
<td>1.09</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>258 (23.6)</td>
<td>0.74</td>
<td>0.63</td>
<td>0.87</td>
</tr>
<tr>
<td><strong>Behaviour change</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Tried to increase physical activity in the last six months</td>
<td>1</td>
<td>1,336 (59.6)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>648 (53.3)</td>
<td>0.86</td>
<td>0.75</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>578 (52.2)</td>
<td>0.85</td>
<td>0.74</td>
<td>0.97</td>
</tr>
<tr>
<td>Current behaviour</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Meeting physical activity recommendations</td>
<td>1</td>
<td>1,380 (61.8)</td>
<td></td>
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<tr>
<td></td>
<td>2</td>
<td>741 (60.9)</td>
<td>1.01</td>
<td>0.89</td>
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<td></td>
<td>3</td>
<td>653 (59.6)</td>
<td>0.93</td>
<td>0.82</td>
<td>1.06</td>
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<tr>
<td>Meeting fruit consumption recommendations</td>
<td>1</td>
<td>1,076 (48.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>648 (53.2)</td>
<td>1.18</td>
<td>1.06</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>561 (50.0)</td>
<td>1.09</td>
<td>0.97</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Continued next page
Table 4 cont.: Adjusted odds ratios (AOR)/Adjusted Means for knowledge, attitudes, intentions, and behaviours by wave (n=1,868).

<table>
<thead>
<tr>
<th>Wave</th>
<th>Frequency (%)</th>
<th>Mean Wave Frequency</th>
<th>AOR/Adjusted Mean</th>
<th>Lower 95% CL</th>
<th>Upper 95% CL</th>
<th>P value</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>195 (8.8)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>117 (6.9)</td>
<td>1.07</td>
<td>0.87</td>
<td>1.32</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>105 (9.5)</td>
<td>1.10</td>
<td>0.88</td>
<td>1.38</td>
<td>0.392</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1,799 (80.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1,013 (83.4)</td>
<td>1.06</td>
<td>0.92</td>
<td>1.23</td>
<td>0.439</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>930 (84.4)</td>
<td>1.13</td>
<td>0.96</td>
<td>1.32</td>
<td>0.138</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4.40 (2.96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4.89 (3.10)</td>
<td>0.67</td>
<td>0.52</td>
<td>0.82</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.52 (3.01)</td>
<td>0.27</td>
<td>0.13</td>
<td>0.42</td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Linear mixed models were used to analyse outcomes on a continuous scale.

Acknowledgements

We would like to thank the participants for taking the time to complete the survey.

Funding

This study was funded by the NSW Ministry of Health.

References


Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary Table 1: Planned and delivered Target Audience Rating Points (TARPs) for television advertising bursts, November 2015-June 2016.

Supplementary Table 2: Statements used in principle component analyses and component loadings.

Supplementary Table 3: Mismeasurement by demographic factors at Wave 1, comparing those who completed all three waves against those that did not.

Supplementary Table 4: Mismeasurement by outcome at Wave 1, comparing those who completed all three waves against those that did not.
3.4 Addendum to Section 3.3
The strengths and limitations of cohort study designs
The use of a cohort design in Section 3.3 is a strength of the study, especially as there have been calls for increased use of cohorts in the evaluation of MMCs. The major strength of this design is that it allows for assessment of the causes of the observed changes. This is as opposed to the more commonly-used repeat cross-sectional design, which only allows for assessment of associations and not causation. Further, the cohort design allows for assessment of a sequence of events, an important consideration in the context of MMCs given the theoretical underpinnings of the HOEM. Finally, cohorts allow for both assessment of changes at a population-level and at individual-level; cross-sectional studies, on the other hand, only allow for assessment at a population-level.

There are also some limitations associated with this choice of study design. In particular, priming is a significant risk as participants were exposed to campaign material through completing the surveys. This means that they may later recall the campaign, despite having no exposure to it outside of the surveys, which would inflate estimates of awareness. However, the estimates of awareness obtained through the cohort surveys were consistent with those obtained through the cross-sectional surveys discussed in 3.5. This suggests that priming effects were limited. A second limitation of cohort designs is their cost. The additional cost, compared to cross-sectional surveys, is brought on by the need to follow up the same people over multiple time points. Similarly, loss-to-follow-up is a concern, particularly as the length of time between contact points increases, as was the case with the MHN Phase 1 evaluation. Differential losses-to-follow-up are problematic because they introduce bias into the results. However, in the case of MHN, our sensitivity analyses suggested that there had been no differential losses-to-follow-up. Nonetheless, this remains a concern for cohort designs. Finally, it is important to use appropriate statistical tests to account for intra-individual correlation of measures caused by the collection of the same measures from the same people at multiple time points; our use of generalised linear mixed models appropriately accounted for this correlation.

Addressing the observed reduction in self-efficacy
In our study, we observed a reduction in self-efficacy across the three surveys. Similar findings have been observed in other overweight and obesity campaigns and in campaigns targeting other public health issues. This raises the question as to what could be done to help increase self-efficacy in the context of MMCs. Social Cognitive Theory suggests that self-efficacy is determined by interacting personal (e.g. past experience), behavioural (e.g. if a behaviour is habitual or episodic), and environmental factors (e.g. modelling of the desired behaviour by others).

It follows that targeting these determinants of self-efficacy would be expected to maintain or increase self-efficacy during campaigns. In the case of MHN, it may be that the campaign conveyed the message that change is easy to enact, something which may conflict with the target audiences’ past experiences of failure to enact behaviour change (as discussed in Section 3.5 below). Amendments to the campaign material could attempt to address these past failures, recognising that change is not simple while still emphasising its importance. Further, supporting policy and environmental initiatives would also help to address environmental factors, over which the individual has very little control. This might include initiatives such as improvements to food labelling, restrictions on junk food advertising, and urban design that supports walking and cycling.
The HEAL Strategy did seek to introduce initiatives such as these but it is not clear whether any of the initiatives were introduced during the campaign. Nonetheless, creating supportive environments would help to remove or reduce a key barrier to enacting change and thus would help in the maintenance of self-efficacy.

3.5 A mixed methods evaluation of Phase 2 of the Make Healthy Normal mass media campaign (submitted paper)

*Paper under review*

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**Abstract**

The *Make Healthy Normal* obesity prevention mass media campaign was a government-led campaign implemented in New South Wales, Australia from 2015 to 2018. This study used mixed methods to evaluate Phase 2 (2017-2018) of that campaign. We conducted three cross-sectional online surveys with men aged 18-54 years and six focus groups with men aged 35-54 years and parents with children aged 5-12 years, which reflected the two target audiences of the campaign: namely, adult men and families with young children. We analysed survey data using a series of linear and logistic regressions to examine changes over time in key outcomes, in line with the campaign’s theorised hierarchy of effects. Focus group data were analysed thematically and integrated with the survey results at the interpretation stage. We found that, while the campaign achieved reasonable levels of recognition in the target audience, unprompted recall was low and there were mixed results with regards to knowledge, attitudes, intentions, and behaviour. Focus group results suggested that this was because the campaign reinforced participants’ beliefs but did not challenge or address their rationalisations for inaction. That is, participants felt it was their personal responsibility to change their behaviour but found it difficult to do so. This meant that the campaign functioned principally as a reminder of reasons for lifestyle change but was unlikely to result in behaviour change in isolation. Collectively, these results suggest the need to reconsider the role of campaigns in addressing overweight and obesity as they may not have a direct effect on the desired behaviours, especially in the absence of complementary policy and environmental strategies. Campaign evaluators must also consider the best way to determine campaign success, ensuring that the measures used are appropriate and realistic and capture any indirect as well as planned direct effects.
Introduction
Mass media campaigns (MMCs) have been employed to address many different public health issues.\textsuperscript{14} These campaigns use channels such as television, radio, billboards, online display advertising, and social media to disseminate health-related messages to as many people as possible within a given population. The aim is typically to increase awareness and understanding, shape beliefs and attitudes, and/or encourage people to change their behaviour with respect to a particular health condition.\textsuperscript{15} Reviews and commentaries have proposed several principles of effective MMCs, including: ensuring campaigns are of a sufficient duration; investing adequate resources to maximise reach; using theories and frameworks to inform campaign design, implementation, and evaluation; setting appropriate, measurable objectives; and ensuring campaigns are part of a comprehensive approach that also includes policy and environmental changes.\textsuperscript{16-19} Many of these reviews also highlight the importance of rigorous evaluation and the dissemination of results. However, despite the widespread popularity of MMCs among government-led health strategies, there remain significant gaps in our understanding of how campaigns affect targeted populations because few are evaluated and even fewer are published.\textsuperscript{17}

Within tobacco control, campaigns are known to be effective in encouraging quit attempts and are cost effective.\textsuperscript{20, 21} For other complex health issues, however, the results are more mixed, with evidence consistently showing impacts on factors such as awareness, knowledge, and attitudes but limited impact on behaviours themselves.\textsuperscript{3, 22-24} We recently conducted a review of overweight and obesity prevention campaigns and similarly found that campaigns can influence knowledge and attitudes but limited evidence for meaningful impact on behaviour.\textsuperscript{25} Most of the campaigns included in our review focused on increasing awareness and knowledge, with the assumption that behaviour change would follow. This reflects the popular advertising framework the hierarchy of effects model (HOEM).\textsuperscript{26-28} However, very few studies have been conducted explicitly testing the HOEM in public health campaigns. The few that have been conducted provide some support for the model\textsuperscript{29-31} but it is not yet clear how well the model reflects the mechanisms leading to behaviour change.\textsuperscript{32, 33} Moreover, from the evidence available for the campaigns in our review, it appeared that that knowledge of the health effects of obesity and the benefits of behaviour change was already high before campaign implementation. This suggests that lack of knowledge is not the issue and that other factors must explain why campaigns are not influencing behaviour change, at least in the context of overweight and obesity prevention campaigns. Testing this hypothesis requires that more campaigns be evaluated using both quantitative and qualitative methods to elucidate the relationship with subsequent behaviour. This study aims to address this gap.

The Make Healthy Normal campaign
Make Healthy Normal (MHN) was an Australian overweight and obesity prevention campaign, launched by the New South Wales (NSW) Government in 2015. It was part of the Healthy Eating and Active Living (HEAL) Strategy 2013-2018\textsuperscript{2} and aimed to challenge the normalisation of unhealthy behaviours. In Phase 1 (June 2015-April 2017), the campaign targeted all adults (18+ years) in NSW but in Phase 2 (May 2017-April 2018), the campaign narrowed its focus to 1) males aged 35-54 years and 2) families with children aged 5-12 years (with fathers of children aged 5-12 years captured in both of these target audiences).

The impacts of Phase 1 were assessed through a cohort study, involving surveying participants three times over 12-months. We found that there were significant increases in knowledge, particularly
among those who recognised the campaign, but significant declines in self-efficacy and intention to change behaviour and no change in behaviour over the three time-points.\textsuperscript{34} In addition, testing of the campaign’s HOEM using the same cohort data found that there was a linear pathway from awareness of the campaign to behaviour change for both physical activity and fast food consumption, two of the campaign’s targeted behaviours.\textsuperscript{31} However, the results also suggested that knowledge may not be an integral part of an individual’s progression through the hierarchy.

Phase 2 of the campaign had an advertising budget of approximately $AU1.5 million. Of that, just under 30 percent was allocated to television advertising, with between five percent and 10 percent allocated to each of radio, out-of-home (billboards, bus sides, public transport stops and stations etc.) displays, digital display and search engine optimisation, social media, and media partnerships. The media buying strategy was skewed towards areas of low socio-economic status as they demonstrate higher rates of obesity.\textsuperscript{35} Process evaluation of the campaign showed that it overachieved in reach metrics for television, as measured by Target Audience Rating Points (TARPs; an estimate of reach and frequency of exposure), with 1,140 TARPs planned and 1,513 TARPs achieved during a single one-month burst of advertising. The other channels ran more consistently throughout the year, with digital channels, including social media, running continuously. These channels significantly exceeded their targeted metrics, particularly digital video (targeted 434,000 views, achieved over 992,000 views), digital display (targeted 4,000 clicks, achieved over 37,000 clicks), and paid social media advertising (targeted 449,000 clicks, achieved over 1 million clicks). The campaign also included a website (www.makehealthynormal.nsw.gov.au), which had over 30,000 visits per month during Phase 2, also well above the target of 17,000 visits per month.

In this study, we explored (1) MHN’s impact on knowledge, attitudes, and behaviours relating to healthy eating, physical activity, and healthy weight in adult males, and (2) the target audiences’ perceptions of and response to the campaign. The findings from this study will be useful for health promotion practitioners, policymakers, and evaluators developing MMCs for public health improvement.

**Methods**

The campaign’s evaluation framework was based on a HOEM (Figure 1) that covers three categories of outcome according to classical understandings of HOEM within public health; namely proximal, intermediate, and distal.\textsuperscript{27, 28} To evaluate Phase 2, we conducted a sequential mixed methods study,\textsuperscript{36} comprising three cross-sectional online surveys and six focus groups. The study was approved by the University of Sydney’s Human Research Ethics Committee (Protocol number: 2015/177) and South Western Sydney Local Health District Human Research Ethics Committee (Protocol number: LNR/16/LPOOL/6/67).
Online surveys
Phase 2 of the campaign was quantitatively evaluated through the use of online surveys, with separate surveys administered to the two target audience groups (males and families). In this study, we report results from the males surveys only; the families surveys will be reported separately.

Participants were males aged 18-54 years, recruited via online research panels. The baseline survey (Survey 1) was conducted in April/May 2017, Survey 2 in September 2017 (after peak Phase 2 activity), and Survey 3 in February/March 2018 (after the conclusion of television advertising) (Figure 2). While the intention was to have completely independent samples, the limited size of online research panels meant that 189 of 1,214 participants in Survey 3 had also completed either Survey 1 or Survey 2.

* Only used for awareness comparison shown in Figure 3
Measures

Collecting multiple measures of awareness has been identified previously as providing valuable insights into message uptake among different population subgroups.\textsuperscript{37} For this reason, we operationalised awareness in three ways: unprompted recall; recognition of the MHN tagline; and prompted recognition of MHN. Recall was measured by asking participants whether they had seen, read, or heard any advertising about active living, healthy eating, or healthy weight in the last month. Those who said ‘yes’ were asked to describe what they had seen or heard, with the response retained verbatim. Two coders then independently examined all verbatim responses to this question to identify those that related to MHN, with differences resolved by discussion. Where agreement could not be reached, responses were referred to a third coder. Recognition of the MHN tagline was measured by asking participants whether they had seen or heard any advertising about active living, healthy eating, or healthy weight that included the phrase “make healthy normal”. Prompted recognition was measured by first showing participants the campaign’s two television commercials and asking whether they had seen either before. Participants were then asked whether they recalled seeing any ads that used images from the television commercials, on billboards or posters, online, in newspapers, in magazine, or at the cinema. Participants who answered ‘yes’ to at least one of these questions were deemed to have ‘recognised’ the campaign.

Knowledge comprised accurate recall of the physical activity recommendations (30 minutes of physical activity per day).\textsuperscript{38} Responses were dichotomised as ‘correct’ (30 minutes) vs. ‘not correct’ (all other non-missing responses). In addition, participants were shown a number of statements and asked the extent to which they agreed or disagreed with them on a 5-point Likert scale, dichotomised into ‘agree’ (strongly or somewhat agree) vs. ‘not agree’ (neither agree nor disagree and strongly or somewhat disagree). Statements included that “making small changes to what you eat” and “how physically active you are will decrease your risk of chronic disease”, “losing just a few kilos on the outside will remove toxic fat from inside your body” if you are overweight, and that “drinking sugar-sweetened soft drinks is a cause of overweight and obesity”.

As in the Phase 1 evaluation, we created subscales for perceived personal susceptibility (Cronbach’s $\alpha=0.57$), self-efficacy (Cronbach’s $\alpha=0.74$), and lifestyle behaviour norms (Cronbach’s $\alpha=0.59$), based on principal components analyses of a series of attitude statements.\textsuperscript{34} Only two of the three statements used to create the lifestyle behaviour norms score in Phase 1 were asked in Phase 2; this score was therefore based on the two remaining items. Principal component analyses confirmed that the same questions loaded onto the same components as seen in Phase 1 (Supplementary Table). To be included, participants must have non-missing values for all statements. Higher scores indicated higher perceived susceptibility and self-efficacy and a stronger perception that other people were adopting healthier lifestyle behaviours respectively.

Intentions for physical activity and soft drink consumption were measured through two items that asked participants whether they intended to increase the amount of physical activity or decrease soft drink consumption, with response options dichotomised into ‘intends to increase in the next month’ and ‘does not intend to increase in the next month’ (‘yes, in the next 6 months,’ or ‘not at all’). Participants were also asked how likely it was that they would decrease their fast food consumption and snack food consumption in the next 6 months, with response options on a six-
point scale, ranging from ‘likely to decrease a lot’ to ‘likely to increase a lot’. These were then
dichotomised as ‘likely to decrease’ and ‘not likely to decrease’.

Physical activity behaviour was measured by computing total time spent in physical activity per week
in accordance with the Active Australia survey analysis protocol.\textsuperscript{39} Sufficient physical activity was
defined as per the Australian physical activity guidelines.\textsuperscript{38} In addition, we used the NSW Population
Health Survey questions for daily soft drink consumption and weekly fast food consumption,\textsuperscript{40}
retaining both as continuous variables.

Participants were also asked about behaviour change, specifically whether they had tried to change
the amount of physical activity they do. Response options were dichotomised as ‘Tried to increase’
and ‘Did not try to increase’ (‘yes, tried to decrease’, and ‘no, I have not tried to change’). Finally,
participants were asked whether they had tried to decrease the amount of fast food or snack foods
they consume in the last 6 months, with responses ‘tried to decrease fast food’, ‘tried to decrease
snack food’, ‘tried to decrease both’, and ‘not tried to decrease either’. Dichotomised responses
(‘Tried to decrease’ vs. ‘Did not try to decrease’) were analysed separately for fast food and snack
food.

Covariates included target group, location (relative remoteness of residence), socio-economic status
(SES), and body mass index (BMI). Target group was defined by age, with 18-34-year-olds and 35-54-
year-olds representing the (male) non-target audience and target audiences (respectively). Location
and SES were based on participants’ postcodes using the Accessibility/Remoteness Index of Australia
(ARIA) and Socio-Economic Indexes for Areas (SEIFA), respectively.\textsuperscript{41, 42} BMI was calculated using self-
reported height and weight and dichotomized as healthy weight vs. overweight or obese, using
World Health Organization categories.\textsuperscript{43} Underweight participants (n=91) were excluded.

Analysis
We conducted a series of linear and logistic regressions in SPSS Version 22 to examine any changes
in recognition of the campaign, knowledge, attitudes, intentions, and behaviours over time,
adjusting for location, SES, and BMI. In addition, we included interaction terms for target group and
survey wave and, where recognition was not the dependent variable, for recognition and survey
wave. Results are presented only for interactions that were statistically significant (p<0.1); in all
other cases the interaction was removed from the model. For logistic regressions, we used a log link
function to convert the exponentiated coefficients into relative risk ratios (as opposed to odds
ratios) to aid in interpretation. All regressions used robust error estimation to account for
participants who completed more than one survey.

Focus groups
We conducted three focus groups with men aged 35-54 years living in NSW and three with mothers
of children aged 5-12 years. One of the men’s groups comprised participants who were also parents
of children aged 5-12 years. Groups were moderated by a market research agency appointed by the
NSW Ministry of Health. Groups were conducted in both metropolitan and regional locations and
involved between four and seven participants per group, recruited via a recruitment agency. To be
eligible, participants must have seen MHN before, have a household income of less than $95,000,
and have no tertiary qualifications, reflecting the campaign’s media buying strategy described
earlier.
Discussion topics included awareness, understanding and opinion of MHN, their response to the campaign, and views on healthy and unhealthy behaviours. During the session, participants were shown the two MHN television commercials and a selection of campaign posters. They were also shown commercials from Swap it, don’t stop it,44 Change4Life,45 and/or LiveLighter46 to provide a comparison point for MHN.

Analysis

Focus group discussions were audio recorded and transcribed verbatim. JK and MT developed an inductive coding frame through an iterative process of listening to the recordings and reviewing the transcripts. The same researchers then used the coded data to develop common themes that represented important understandings in relation to the research questions. Themes were generated from the content of the discussions and not a priori.47 All authors were consulted on the final theme definitions and interpretations. We used NVivo 11 for analysis.

Following analysis, we found that the main themes for both target audiences were substantially the same, with only minor differences evident. For this reason, we present the results of the focus groups overall, rather than by audience group.

Mixed methods integration
The mixed methods data were integrated in two ways. Firstly, the survey results were used to develop the discussion guide for the focus groups as the qualitative component was designed to explain the pattern of results observed in the quantitative data (sequential explanatory design).48 We focused particularly on where the data showed conflicting or mixed results. Secondly, integration of the two methods also occurred at the stage of interpretation (following separate analyses),49 with equal emphasis given to both components.36 The purpose of the integration was to enable a deeper exploration of the implementation and impact of the campaign.50

Results

Online surveys
Total sample sizes for the Phase 2 surveys were 1,531, 1,607, and 1,214 for Survey 1, 2, and 3, respectively (Table 1). Approximately a two-thirds of participants were aged 35-54 years, one-third were from areas of the highest two quintiles of disadvantage and about 30% were from regional areas. Finally, approximately two-thirds were classified as overweight or obese.
<table>
<thead>
<tr>
<th></th>
<th><strong>Phase 1</strong></th>
<th><strong>Phase 2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015 N=1,058</td>
<td>2016 N=716</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 to 34 years</td>
<td>224 (21%)</td>
<td>226 (32%)</td>
</tr>
<tr>
<td>35 to 54 years</td>
<td>834 (79%)</td>
<td>490 (68%)</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>786 (74%)</td>
<td>550 (77%)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>271 (26%)</td>
<td>163 (23%)</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major cities</td>
<td>784 (74%)</td>
<td>578 (81%)</td>
</tr>
<tr>
<td>Regional or remote</td>
<td>272 (26%)</td>
<td>135 (19%)</td>
</tr>
<tr>
<td>Weight status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>302 (32%)</td>
<td>232 (37%)</td>
</tr>
<tr>
<td>Overweight or obese</td>
<td>652 (68%)</td>
<td>392 (63%)</td>
</tr>
</tbody>
</table>

Recognition of MHN’s tagline and recognition of the campaign built steadily to 29% and 59%, respectively, by Survey 3 (Figure 3). Unprompted recall peaked at 9% in Survey 2, before declining at Survey 3. Participants who were overweight or obese, aged 35-54 years, and those at Survey 2 and Survey 3 were more likely to recall the campaign unprompted, compared to healthy weight, 18-34-year-olds, and Survey 1, respectively (Table 2). There were significant interactions between age and wave for both tagline recognition and prompted recognition, with the proportion recognising the tagline significantly increasing from Survey 1 to Survey 2 for 35-54-year-olds, while for 18-34-year-olds the significant increase occurred between Survey 2 to Survey 3.

**Figure 3 Awareness of MHN over time**
Table 2 Regression models predicting awareness-related outcomes  

<table>
<thead>
<tr>
<th>Weight status</th>
<th>Unprompted recall RR (95% CI)</th>
<th>Recognition of tagline RR (95% CI)</th>
<th>Prompted recognition RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy weight</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>1.45 (1.06 to 1.98)</td>
<td>0.98 (0.83 to 1.14)</td>
<td>1.11 (0.96 to 1.28)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audience group</th>
<th>Unprompted recall RR (95% CI)</th>
<th>Recognition of tagline RR (95% CI)</th>
<th>Prompted recognition RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-34 years</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>35-54 years</td>
<td>1.42 (1.01 to 1.99)</td>
<td>0.80 (0.59 to 1.07)</td>
<td>1.02 (0.80 to 1.31)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Survey wave</th>
<th>Unprompted recall RR (95% CI)</th>
<th>Recognition of tagline RR (95% CI)</th>
<th>Prompted recognition RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey 1</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Survey 2</td>
<td>7.01 (4.44 to 11.06)</td>
<td>1.12 (0.80 to 1.56)</td>
<td>1.11 (0.83 to 1.48)</td>
</tr>
<tr>
<td>Survey 3</td>
<td>3.87 (2.35 to 6.37)</td>
<td>1.84 (1.32 to 2.56)</td>
<td>1.89 (1.40 to 2.57)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audience group by wave interaction</th>
<th>Unprompted recall RR (95% CI)</th>
<th>Recognition of tagline RR (95% CI)</th>
<th>Prompted recognition RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-54 years/Survey 2</td>
<td>-</td>
<td>1.52 (1.02 to 2.26)</td>
<td>1.72 (1.22 to 2.43)</td>
</tr>
<tr>
<td>35-54 years/Survey 3</td>
<td>-</td>
<td>0.87 (0.58 to 1.32)</td>
<td>1.05 (0.73 to 1.52)</td>
</tr>
</tbody>
</table>

Abbreviations: CI – Confidence interval; RR – Adjusted relative risk ratio

\( ^a \) All models adjusted for location and socio-economic status

\( ^b \) Results only reported where the interaction was significant (p<0.1)

Overall, overweight and obese participants, those aged 35-54 years, and those who were aware of the campaign were generally more likely to agree with knowledge statements around the health consequences of excess weight and soft drink consumption, and the benefits of behaviour change and weight loss (Table 3). In general, agreement with the statements declined over time, except in relation to the benefits of weight loss, which increased. We found a significant interaction between age and wave for knowledge of the physical activity guidelines, with 18-34-year-olds’ knowledge declining significantly over time and 35-54-year-olds remaining stable.
Table 3 Regression models predicting knowledge-related outcomes

<table>
<thead>
<tr>
<th>Weight status</th>
<th>Knowledge of PA guidelines RR (95% CI)</th>
<th>Agreement that making small changes to what you eat will decrease your risk of chronic disease RR (95% CI)</th>
<th>Agreement that making small changes to how physically active you are will decrease your risk of chronic disease RR (95% CI)</th>
<th>Agreement that losing just a few kilos on the outside will remove toxic fat from inside your body if you are overweight RR (95% CI)</th>
<th>Agreement that drinking sugar-sweetened soft drinks is a cause of overweight and obesity RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy weight</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>1.00 (0.91, 1.21)</td>
<td>1.31 (1.08, 1.60)</td>
<td>1.26 (1.03, 1.54)</td>
<td>1.14 (0.98, 1.33)</td>
<td>1.34 (1.10, 1.64)</td>
</tr>
<tr>
<td>Audience group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34 years</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>35-54 years</td>
<td>1.58 (1.22, 2.03)</td>
<td>0.86 (0.70, 1.06)</td>
<td>1.14 (0.92, 1.41)</td>
<td>1.40 (1.20, 1.64)</td>
<td>1.09 (0.88, 1.35)</td>
</tr>
<tr>
<td>Prompted recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Yes</td>
<td>1.05 (0.92, 1.21)</td>
<td>1.45 (1.20, 1.75)</td>
<td>1.51 (1.24, 1.85)</td>
<td>1.42 (1.23, 1.64)</td>
<td>1.26 (1.03, 1.53)</td>
</tr>
<tr>
<td>Survey wave</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey 1</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Survey 2</td>
<td>1.19 (0.89, 1.61)</td>
<td>0.87 (0.69, 1.09)</td>
<td>0.87 (0.68, 1.10)</td>
<td>1.11 (0.94, 1.31)</td>
<td>1.07 (0.85, 1.35)</td>
</tr>
<tr>
<td>Survey 3</td>
<td>0.63 (0.46, 0.88)</td>
<td>0.70 (0.55, 0.89)</td>
<td>0.59 (0.46, 0.76)</td>
<td>1.21 (1.01, 1.46)</td>
<td>0.75 (0.59, 0.96)</td>
</tr>
<tr>
<td>Audience group by wave interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-54 years/Survey 2</td>
<td>0.84 (0.59, 1.20)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>35-54 years/Survey 3</td>
<td>1.43 (0.97, 2.10)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: CI – Confidence interval; RR – Adjusted relative risk ratio

a All models adjusted for location and socio-economic status

b Results only reported where the interaction was significant (p<0.1)
On average over the three waves, participants who were overweight or obese had a significantly higher personal susceptibility score and a lower self-efficacy score, compared to those with a healthy weight (Table 4). Older participants had significantly lower personal susceptibility and self-efficacy scores, compared to younger participants. Those who recognised MHN were more likely to agree that ‘most people I know have no sympathy for people who are overweight or obese’ and had significantly higher self-efficacy and lifestyle behaviour norms scores. There were no significant interactions between survey wave and age or recognition for any of these outcomes.

Table 4 Regression models predicting attitude-related outcomes

<table>
<thead>
<tr>
<th>Weight status</th>
<th>Personal susceptibility score β co-efficient (95% CI)</th>
<th>Self-efficacy score β co-efficient (95% CI)</th>
<th>Lifestyle behaviour norms score β co-efficient (95% CI)</th>
<th>Agreement that ‘most people I know have no sympathy for people who are overweight or obese’ RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy weight</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Overweight/ obese</td>
<td>1.64 (1.47, 1.80)</td>
<td>-0.18 (-0.33, -0.02)</td>
<td>0.09 (-0.03, 0.21)</td>
<td>0.91 (0.79, 1.05)</td>
</tr>
<tr>
<td>Audience group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34 years</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>35-54 years</td>
<td>-0.18 (-0.35, -0.01)</td>
<td>-0.26 (-0.42, -0.10)</td>
<td>-0.12 (-0.25, 0.00)</td>
<td>0.93 (0.80, 1.08)</td>
</tr>
<tr>
<td>Prompted recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Yes</td>
<td>0.11 (-0.30, 0.27)</td>
<td>0.30 (0.15, 0.45)</td>
<td>0.22 (0.11, 0.33)</td>
<td>1.20 (1.04, 1.38)</td>
</tr>
<tr>
<td>Survey wave</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey 1</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Survey 2</td>
<td>0.07 (-0.12, 0.25)</td>
<td>-0.06 (-0.23, 0.11)</td>
<td>0.03 (-0.09, 0.16)</td>
<td>1.08 (0.92, 1.27)</td>
</tr>
<tr>
<td>Survey 3</td>
<td>0.11 (-0.09, 0.30)</td>
<td>-0.05 (-0.24, 0.13)</td>
<td>0.14 (0.00, 0.28)</td>
<td>1.15 (0.97, 1.37)</td>
</tr>
</tbody>
</table>

Abbreviations: CI – Confidence interval; RR – Adjusted relative risk ratio

* All models adjusted for location and socio-economic status

We found that overweight and obese participants and those who recognised MHN were more likely to intend to increase physical activity and to decrease soft drink consumption in the next month and fast food and snack foods in the next six months (Table 5). Conversely, 35-54-year-olds were less likely to report that they intend to decrease soft drink consumption and snack consumption. There were also significant interactions between age and wave for both physical activity intentions and fast food intentions: the proportion of 18-34-year-olds who reported that they intended to increase their
Overweight and obese participants were more likely to report having tried to increase physical activity and to decrease fast food and snack food consumption in the last six months, compared to healthy weight participants (Table 6). They also consumed on average 0.19 more cups of soft drink per day. Older participants were less likely to report having tried to increase physical activity and to decrease fast food and snack food in the last six months, compared to 18-34-year-olds, but they consumed on average 0.38 fewer serves of fast food per week and 0.23 fewer cups of soft drink per day. Participants who recognised MHN were more likely to have tried to increase physical activity, decrease fast food and snack food consumption and be meeting the physical activity guidelines, compared to those who did not recognise MHN. Participants at Survey 3 were less likely to have tried to increase physical activity and to decrease snack food consumption in the last six months,
compared to baseline. Finally, there were significant interactions between age and wave for meeting the physical activity guidelines and between recognition and wave for soft drink consumed per day: the proportion of 35-54-year-olds meeting the guidelines declined over time, while for 18-34-year-olds it increased, and those who did not recognise MHN increased their consumption of soft drink over time, while those who did recognise MHN remained unchanged.

Table 6 Regression models predicting behaviour-related outcomes

<table>
<thead>
<tr>
<th>Weight status</th>
<th>Tried to increase physical activity in the last 6 months RR (95% CI)</th>
<th>Tried to decrease fast food consumption in the last 6 months RR (95% CI)</th>
<th>Tried to decrease snack consumption in the last 6 months RR (95% CI)</th>
<th>Meeting physical activity guidelines RR (95% CI)</th>
<th>Serves of fast food consumed per week β coefficient (95% CI)</th>
<th>Cups of soft drink consumed per day β coefficient (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy weight</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>1.29 (1.11, 1.49)</td>
<td>1.87 (1.61, 2.16)</td>
<td>1.45 (1.23, 1.70)</td>
<td>0.75 (0.62, 0.90)</td>
<td>-0.16 (-0.38, 0.06)</td>
<td>0.19 (0.09, 0.28)</td>
</tr>
<tr>
<td>Audience group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34 years</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>35-54 years</td>
<td>0.51 (0.43, 0.60)</td>
<td>0.56 (0.48, 0.65)</td>
<td>0.80 (0.68, 0.94)</td>
<td>0.70 (0.50, 0.97)</td>
<td>-0.38 (-0.60, -0.17)</td>
<td>-0.23 (-0.34, -0.12)</td>
</tr>
<tr>
<td>Prompted recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Yes</td>
<td>1.50 (1.30, 1.73)</td>
<td>1.35 (1.18, 1.55)</td>
<td>1.20 (1.03, 1.39)</td>
<td>1.30 (1.10, 1.53)</td>
<td>0.14 (-0.04, 0.33)</td>
<td>0.22 (0.06, 0.39)</td>
</tr>
<tr>
<td>Survey wave</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Survey 1</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Survey 2</td>
<td>1.00 (0.85, 1.19)</td>
<td>0.93 (0.79, 1.09)</td>
<td>0.92 (0.78, 1.09)</td>
<td>0.85 (0.57, 1.25)</td>
<td>0.07 (-0.13, 0.28)</td>
<td>-0.22 (-0.38, -0.06)</td>
</tr>
<tr>
<td>Survey 3</td>
<td>0.81 (0.67, 0.96)</td>
<td>0.90 (0.75, 1.07)</td>
<td>0.73 (0.60, 0.88)</td>
<td>1.30 (0.84, 2.03)</td>
<td>0.05 (-0.19, 0.28)</td>
<td>0.03 (-0.15, 0.22)</td>
</tr>
<tr>
<td>Audience group by wave interaction b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-54 years/Survey 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.04 (0.66, 1.63)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35-54 years/Survey 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.55 (0.33, 0.91)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
**Recognition by wave interaction**

<table>
<thead>
<tr>
<th>Not recognised/ Survey 2</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>0.28 (0.06, 0.50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not recognised/ Survey 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.16 (-0.10, 0.42)</td>
</tr>
</tbody>
</table>

Abbreviations: CI – Confidence interval; RR – Adjusted relative risk ratio

*a All models adjusted for location and socio-economic status*

*b Results only reported where the interaction was significant (p<0.1)*

**Focus groups**

We generated five themes that seemed to shape participants’ responses to obesity prevention campaigns like MHN (Figure 4). These themes could be broadly divided into two domains: ‘beliefs’ and ‘rationalisations’. ‘Beliefs’ constituted two themes (‘Individual responsibility’ and ‘Change is beneficial and easy’) that describe beliefs and perceptions about the role of the individual in lifestyle change and the value and simplicity of such changes. The ‘Rationalisations’ domain could be divided into three themes (‘Barriers’ and ‘Confusion and misconceptions’, and ‘Balance and moderation’) that encompassed participants’ explanations for why making and sustaining changes was difficult despite their intentions to live a healthy life. Campaigns like MHN interacted with the beliefs, reinforcing them, and acting as reminder of participants’ motivations for wanting to change their lifestyles. However, it was apparent that campaigns of this nature were, in themselves, not able to bring about actual behaviour change. This is because they do not address or challenge the participants’ rationalisations. All themes are described in detail below.

*Figure 4 Conceptual map of the role of campaigns in behaviour change*
Individual responsibility

There was a strong theme of individual responsibility for maintaining or improving health in all groups. Participants’ discussions had a consistent undercurrent reinforcing the primacy of the individual in health-related choices and lifestyle changes. For most participants, this meant that any change of lifestyle, either for themselves or for their families, was their individual responsibility and almost entirely dependent on their own willpower.

*Males, outer metropolitan*

Participant: It's not hard to have an ice water instead of a can of Coke. It's just a choice.

*Parents, regional*

Participant: I guess like anything in life we have to teach people and our children that just because [unhealthy food is] there you don't have to have it.

One participant appeared to hold this belief so strongly that they rejected the notion that campaigns influence them at all. However, for most participants, campaigns like MHN served to reinforce the concept of individual responsibility, with lifestyle change considered simply a matter of making better choices. Consequently, participants attributed failed or aborted attempts at lifestyle change to poor decision making or a lack of willpower.

*Males, inner metropolitan*

Participant: [MHN is] suggesting to me that people have ended up [overweight] because of choices they’ve made.

Change is beneficial and easy

Participants believed that changes to their own or their families’ lifestyles would be beneficial and help avoid the consequences of obesity.

*Parents, regional*

Participant: I think that all of us would probably say that we all want to change. I think everyone in the world would put their hand up and say, “we want to change something.”

The canvassed lifestyle changes were perceived as being minor and the expectation was that they should therefore be relatively easy to do. Some participants provided ‘health hacks’ – suggestions on changes that they or their families have made or could make to be healthier. For example, storing ‘only’ two beers in the fridge at a time to reduce consumption of alcohol or keeping a water dispenser on the kitchen bench to increase water consumption. These were framed as being a conscious choice of the individual, necessitating some willpower, but were nonetheless considered realistic or simple things to do.
Parents, regional

Participant: Knowing that there's those small changes that you can make. Or that there's the choices [that we] make every day that are affecting our health and [MHN] kind of brings [home] the fact that we can make those small changes every day to improve it considerably.

It was apparent that campaigns of this nature effectively reinforced participants’ belief that lifestyle change is beneficial and easy. There was an acceptance that, in general, ads like MHN are logical, reasonable, of a good standard, and presented important information in an understandable and actionable way. This was despite the fact that most participants struggled to recall MHN unprompted.

Males, regional

Participant: And the second [MHN ad] was all positive and reinforced healthy options and lifestyles. It represented it as being easy.

However, there was little evidence that participants would change their lifestyle as a direct response to exposure to campaigns of this nature. Instead, the effects were perceived as more subliminal and cumulative. That is, campaigns principally functioned as a reminder of an individual’s motivations for making changes. For example, parents believed that they should change their lifestyle to ensure that they could support their family and ‘be there’ for their children. Some participants, particularly parents, were also reminded of behaviours they wanted to avoid (e.g. being the family that has a fridge full of junk food and soft drink, as depicted in MHN). Others were reminded of personal health scares or stories of colleagues, friends, and family members who were at high risk of or suffered from chronic disease.

Parents, inner metropolitan

Participant: I think not only does an ad [like MHN] make you want to change, I think also your family and your children probably give you that motivation even more.

Parents, outer metropolitan

Participant 1: Well, I suppose [MHN] puts a little thing in the back of your mind to be concerned but not alarmed.

Participant 2: It reminds you, doesn't it, when you watch it.

Balance and moderation

At the same time, participants rationalised their unhealthy or less desirable behaviours by describing life as a balancing act where anything could be consumed, provided the balance between healthy and unhealthy was maintained. For some, this meant that their ‘unhealthy’ behaviours could be justified by compensatory ‘healthy’ behaviours. Further, treats and rewards were considered an important part of maintaining balance. Some participants stated that what is healthy or unhealthy varies from person to person and depended on their personal circumstances. For example, people
who have physically demanding jobs could afford to drink soft drink every day without adverse effects on their health because the expectation was that they would ‘burn off’ the energy in the soft drinks more easily than others.

**Males, outer metropolitan**

Participant: I’ve brought dinner from home, it was something we cooked at home, fresh fruit and vegetables... Okay, I’m having a soft drink [but] it’s not like I went to the shops, grabbed a burger and chips, washed it down with a Coke. Which, don’t get me wrong, we all do it, I mean, that’s fine, but... yeah, you gotta treat yourself sometimes.

**Males, regional**

Participant 1: It comes back to the quantities that you’re having.

Participant 2: Because in moderation, everything’s fine, but if you have too much chocolate, too much sugar, too much drinking, it’s not good for you.

**Barriers**

Many participants reported that they were already making ‘healthy’ choices, or at least were trying to do so. However, it was clear that meaningful changes to lifestyle were perceived as very difficult to maintain, with participants describing several barriers to change. The most common were a lack of time, ingrained habits and preferences, and life commitments, which included issues such as work and parenting demands. There was also some recognition that the prevailing food environment is not conducive to good health, with hidden sugar, food advertising, confusing labels, and a lack of affordable healthy alternatives commonly mentioned. A small number of participants cited unsupportive physical and political environments. In most cases, the individual was perceived as having very little or even no control over these barriers.

**Parents, regional**

Participant: We’re blasting [food advertising] on the TV and using jingles and brainwashing everyone, [then] that’s what [children are] going to choose.

**Males, inner metropolitan**

Participant 1: At times, with kids, [being healthy is] bloody hard. Kids are draining.

Participant 2: And work. Taking up more time. Spend more time in traffic, if you’re driving.

**Confusion**

According to our participants, confusion and misconceptions about what constitutes healthy behaviour also played a significant role in preventing change. For example, in most groups, participants debated whether coffee consumption contributed to obesity. For some participants, their uncertainty about healthy and unhealthy behaviours manifested as a desire for more information or instruction from campaigns on what they could do to improve their health although it
was not apparent that participants would avail themselves of such information even if it were available. Instead, participants commented that they or other people ‘might’ look at it.

For some participants, there was a clash between their beliefs in individual responsibility and the expectation that change should be easy and their rationalisations of why they could not change. This resulted in disempowerment, with campaigns simply reminded them of their own failings.

**Parents, outer metropolitan**

Participant 1: It kind of upset me that I went through all this [dieting and exercise] for nothing... 'Cause I hate exercise. But I was doing it because I had to. And, you know, when you don't see results... what's the point? So, I did see that ad and I go, "Well, I hope it works for you," You know what I mean? “Because it didn't for me.” But I really, really, really wanna do it again. But it's just like, okay, I need a push. I need something. I need... I don’t know.

**Discussion**

Our mixed methods study found that, while MHN achieved reasonable recognition, it had limited direct impact on either intermediate or distal outcomes, including behaviour change. The messages of MHN appears to have reinforced beliefs in individual responsibility while not addressing or challenging a number of rationalisations for a lack of response to the campaign. Overall, our findings highlight the need to reconsider what MMCs addressing overweight and obesity are aiming to achieve as they are unlikely to achieve behaviour change in isolation. Our results therefore reinforce the need for MMCs to be part of a comprehensive, multi-faceted strategy that includes environmental and policy initiatives, rather than as a stand-alone campaign. Below, we interpret the findings of the quantitative and qualitative data together in light of the HOEM approach taken by the MHN campaign.

In relation to proximal outcomes on the campaign’s HOEM, we found that prompted recognition of MHN continued to build from Phase 1 to a level of that is comparable to similar campaigns, such as Swap it, which also emphasised small lifestyle changes. However, unprompted recall of MHN was notably lower (6% compared to 16%), even though Swap it was not on air for as long. While this may in part be due to the rapid change in the media environment since Swap it was on air in 2011, it also suggests that MHN’s creative elements were not sufficiently memorable. Our focus group results were consistent with this, with few participants able to recall the MHN campaign unprompted, even though they had been recruited specifically because they had seen the campaign before. The lack of cut-through for MHN is particularly noteworthy given participants described the food environment, including advertising, as being powerfully persuasive and tempting people towards unhealthy products. It highlights the need to design campaigns in a way that will stand out from the cluttered media environment, especially considering the amount of junk food advertising to which people are exposed.

Phase 2 of the campaign appears to have had mixed results in relation to intermediate outcomes, again consistent with the Phase 1 evaluation. For example, participants who recognised the campaign were more likely to have accurate knowledge, hold health-positive attitudes, and intend
to improve their health-related behaviours. On the other hand, there was limited, if any, evidence of improvements in these outcomes over time, which would be expected if the campaign was having a population-wide impact. Distal outcomes likewise showed mixed results, with participants who recognised MHN more likely to report having tried to change their behaviour but no evidence of positive changes in actual behaviour over time across the target population. These results are in line with previous research examining overweight and obesity and physical activity MMCs.3, 25 They also reinforce findings from our testing of the campaign’s HOEM; namely that change in knowledge may not be integral to how MHN (or any other obesity prevention campaign, for that matter) influences behaviour change.31 Our focus group findings may help explain this, as participants were aware of the benefits of lifestyle change and wanted to make changes but also reported that although they were trying to be healthy lifestyle change was difficult. This adds to evidence from previous research that has shown that campaigns are unlikely to bring about behaviour change when implemented without robust environmental and policy actions, at least in the current climate.14 Campaign planners might therefore target indirect effects, such as social norms, and public opinion on wider policy and environmental changes, to bring about behaviour change.32

In addition, the failure to find a link between what people know and desire to do and their actual behaviour reinforces the need for rigorous formative evaluation. This includes reviewing the available evidence on what makes campaigns effective.17 In particular, there is ample evidence demonstrating that campaigns need a supportive environment to have a meaningful effect. For instance, campaigns that aim to reduce alcohol-impaired driving are most effective when accompanied by complementary legislative and enforcement strategies.54 Tobacco control MMCs, for which the strongest evidence exists on the effectiveness of MMCs, have similarly been implemented alongside a variety of different strategies, including tax increases, advertising bans, quit support services, and a steady expansion of smoke-free environments.55 MMCs are now internationally recognised as an important strategy for reducing smoking prevalence but only as part of a comprehensive approach to tobacco control.56 For the most part, overweight and obesity MMCs have not been implemented as part of comprehensive approaches like those seen in tobacco control.25 MHN itself was part of a broader five-year strategy – HEAL – that included initiatives relating to nutrition labelling, availability of fresh and healthy foods, reducing exposure to unhealthy marketing messages, and improving and expanding public infrastructure that supports active travel, among other things.2 However, it is not clear how much of HEAL was implemented while MHN was being run, especially considering some of these initiatives, like the infrastructure changes, can take a long time to implement, while others, such as food labelling, are primarily Federal responsibilities and largely outside the jurisdiction of the NSW State Government. It is perhaps not surprising then that our focus group participants reported that lifestyle change is challenging, despite a stated desire to make these changes and despite MHN, and similar campaigns, acting as a reminder of why they should do so. In this context, there needs to be a sustained commitment to well-designed campaigns with clear, proximal objectives while the policy and environmental changes are implemented and take effect.

Nonetheless, participants viewed campaigns like MHN as worthwhile initiatives and generally well-executed, similar to findings from our evaluation of the MHN Facebook page.57 It seems that there is correspondence between the campaign’s messages and a strongly held belief in individual responsibility. This belief is reflective of broader social attitudes in Australia and socially similar countries like the United States.58, 59 Indeed, education-based initiatives, like MMCs, often receive
the highest level of support from the public, politicians, bureaucrats, and other stakeholders because they fit with prevailing discourses and do not challenge the existing power structures, unlike policy or environmental changes.\textsuperscript{60-62} However, in our focus groups we found that some participants felt disempowered by campaigns like MHN. We also noted a positive relationship between recognition of MHN and a measure reflecting a cultural norm of stigmatisation of people who are overweight and obese, consistent with the logic implied by the individual responsibility discourse; if an individual is solely or predominantly responsible for their own weight gain then they are not deserving of sympathy. These results raise questions about the value and impact of campaigns that reinforce the belief in individual responsibility. In a worst-case scenario, campaigns of this nature may potentially do more harm than good as the target audience feel disempowered by their inability to make change despite knowing that change would be beneficial for their health. Once again, formative evaluation, especially problem definition, is crucial so that the most appropriate campaign messages, aims, and design can be identified.\textsuperscript{63}

Our study has some methodological strengths. Firstly, our use of mixed methods provides insights into both the impacts of the campaign and potential explanations for these results have occurred. Quantitative and qualitative data have both contributed to ensuring the evaluation focuses where it needs to through serial data collection and instrument development, but also have allowed us to explore in greater detail the patterns observed in the survey data through qualitative methods (triangulation).\textsuperscript{49} Similarly, reporting these methods together is a strength as each can inform the other in interpreting the outcomes of the campaign as a whole. In the case of MHN, for example, only considering the survey results may have led to the conclusion that, while MHN did not have an effect on behaviour change, another campaign of a similar nature might. Our focus group results suggest that this would be unlikely and instead a new approach to MMCs must be taken if they are to contribute meaningfully to overweight and obesity prevention. More mixed methods evaluations of MMCs would aid our understanding of the effect of campaigns and the mechanism of those effects. Doing so would also help campaign planners and evaluators in setting appropriate goals for campaigns and using appropriate measures to assess achievement of those goals. It is clear that MHN and similar campaigns are unlikely to have a significant direct influence on behaviour (as opposed to other types of outcomes); evaluators should take this into account and ensure that the measures against which a campaign is assessed are appropriate and feasible.

This study also has limitations. Firstly, the use of cross-sectional surveys precludes any assessment of causality; our survey results are associations only. In addition, the representativeness of the online panel from which the survey participants were recruited is uncertain, meaning that our findings may not reflect the true population response to MHN. We also had low internal reliability for our personal susceptibility and lifestyle behaviour norms subscales but included these as outcomes to maintain comparability with the Phase 1 evaluation. Finally, our analysis is limited to one campaign, conducted in one jurisdiction, focused on prevention of overweight and obesity, and with target populations of males aged 35-54 years and families with children aged 5-12 years; therefore, our results may not be generalizable outside these specific circumstances.

Conclusion
Our study has highlighted the need to reconsider the potential role of MMCs in addressing overweight and obesity. It is apparent that campaigns like MHN, in the absence of environmental and policy actions, are unlikely to have a direct effect on behaviour, necessitating a change in what
we expect campaigns to do and how we measure their success. Further, campaigns which reinforce individual responsibility yet are not embedded in supportive system change risk further stigmatising those who are overweight and obese. This means that we may need to adopt other outcomes for campaigns aside from behaviour change; for example, social norms and policy support. Finally, campaign planners should consider the use of mixed methods evaluation techniques to provide valuable insights into how best to design, implement, and evaluate campaigns.

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References


Chapter 4: The Make Healthy Normal campaign and the Hierarchy of Effects model

4.1 Introduction
This chapter builds on the thorough evaluation of MHN described in the previous chapter by exploring the theoretical basis for the evaluation framework. Specifically, it tests the HOEM, which underpinned the design of the evaluation of the MHN campaign. The study uses structural equation modelling to investigate the extent to which HOEM accurately predicts the effects of the MHN MMC and explores the implications of this for future campaigns. The analysis reported in this chapter addresses both aims one and two, as described in Chapter 1: to identify and critique current practice in the design, implementation, and evaluation of overweight and obesity MMCs; and to determine the impact of MHN on knowledge, attitudes, and behaviours.

4.2 From awareness to behaviour: Testing a hierarchy of effects model on the Australian Make Healthy Normal Campaign using mediation analysis (published paper)

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Research Paper

From awareness to behaviour: Testing a hierarchy of effects model on the Australian Make Healthy Normal campaign using mediation analysis

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\section*{ABSTRACT}

The Make Healthy Normal mass media campaign was a three-year campaign launched in 2015 in New South Wales (NSW), Australia to address community norms around overweight and obesity. It was underpinned by a hierarchy of effects model; a commonly used framework in campaigns but one that has rarely been tested. The campaign evaluation included a cohort study of NSW adults, surveyed three times over 12 months (n = 939 at Wave 3). This study tested the campaign’s hierarchy of effects model, which theorized that participants would move from recognition to behaviour change via understanding, knowledge, attitude, social norms, self-efficacy, and intention, using these data. We used the moderation and mediation of effects method proposed by Baron and Kenny, adjusting for age and sex, to test for progression through the hierarchy of effects for two outcomes: physical activity and fast food consumption. We found a clear progression through the theorized model, from recognition through to behaviour change, via the intermediate variables for both outcomes. We also found several effects not predicted by the theorized model, with consistently strong associations between understanding and attitude, understanding and self-efficacy, attitude and self-efficacy, and self-efficacy and behaviour change in both outcome models. Our study provides support for the hierarchy of effects as a conceptual model in campaign planning and evaluation of social marketing campaigns. To our knowledge, this is the first study to compare the hierarchy between two behavioural outcomes and the consistency observed between the models adds to the potential usefulness of the hierarchy of effects.

\section*{1. Introduction}

The Make Healthy Normal (MHN)\textsuperscript{1} mass media campaign was launched in June 2015 as part of the strategy to address overweight and obesity in the state of New South Wales (NSW), Australia (Centre for Epidemiology and Evidence, 2016). The campaign ran for three years, using television as the primary media, supported by other channels, including billboards and social media. It was the major communication element of NSW’s cross-government approach to obesity prevention, the Healthy Eating and Active Living Strategy (Centre for Population Health, 2013). It challenged the normalisation of being overweight and encouraged adults to adopt healthier lifestyle behaviours, including increasing physical activity and reducing consumption of energy dense, nutrient poor foods. In phase one (2015–2017), the target audience was all NSW adults. Evaluation of phase one found that it was effective at increasing knowledge of physical activity recommendations and the health effects of overweight and obesity but had no effect on behaviour (Kite et al., 2018a).

Best practice principles for mass media campaigns suggest that the use of theories or frameworks is important in improving the likelihood of a successful mass media campaign (Grunseit et al., 2016; Noar, 2006; World Health Organization, 2000). Accordingly, MHN’s logic model incorporated the hierarchy of effects model (HOEM), shown in Fig. 1, as a central component. However, a recent review of overweight and obesity campaigns found that while many campaigns ostensibly used theories or frameworks in their design and/or evaluation, no campaign reported explicitly testing the underpinning theory or framework (Kite et al., 2018b). Without formal testing, there is no way of knowing whether theories or frameworks are accurate reflections of the constructs they describe, which in turn makes it more difficult to refine and

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\textsuperscript{1}Abbreviations: HOEM – Hierarchy of effects model; MHN – Make Healthy Normal campaign.

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improve the usefulness of public health campaigns.

The HOEM has been recommended for use in public health campaigns since the 1980s (McGuire, 1984), having developed in the 1960s to improve the usefulness of public health campaigns. It posits that proximal variables (e.g. awareness) are causally linked to distal outcomes (e.g. behaviour change) through a series of intermediate measures (e.g. social norms, attitudes, intentions) (Cavill & Bauman, 2004), although the sequence of effects can vary (Barry & Howard, 1990). HOEM also holds that the probability of achieving each outcome decreases as the process moves through the hierarchy, meaning that the proportion of a population that engages in the desired behaviour change would be small.

Within the broader advertising and marketing literature, the HOEM has been tested in the context of sport sponsorship (Alexandris & Tsiotsou, 2012) and digital advertising (Bruner & Kumar, 2000; Yoo et al., 2004; Schlee & Schlee III, 2006), with mixed results. Indeed, Weilbacher (Weilbacher, 2001) has argued that HOEM should be abandoned as an advertising framework because it suffers from several conceptual weaknesses. He believes there has been an uncritical acceptance of HOEM because measurements of HOEM constructs, such as brand awareness, are possible, even though the model itself has not been validated. On the other hand, Barry (Barry, 2002) has argued that the model remains important and that the problem is not, as Weilbacher (Weilbacher, 2001) implies, that the model has not been validated but rather that it is inherently difficult to test. Barry concludes that it is essential to test the model, including investigating different temporal sequences.

Within public health, there is some support for HOEM, although some of the evidence relies on cross-sectional measures (Russell-Bennett et al., 2016). One study using repeat cross-sectional survey data to explore the effects of a radio soap opera on adoption of family planning methods found that the HOEM was useful in predicting the effects of the program in moving people through the stages of change toward adoption (Vaughan & Rogers, 2000). HOEM has also been used as a conceptual framework for understanding the relationship between exposure to junk food marketing and diet and weight without being formally tested (Kelly et al., 2015). Only two studies have examined HOEM using longitudinal data, both investigating physical activity mass media campaigns (Bauman et al., 2008; Craig et al., 2010). Bauman et al. (Bauman et al., 2008) found some support for a hierarchy of effects in the United States-based VERB campaign, with awareness and understanding of the campaign's messages (proximal variables) predicting behaviour change (distal outcome) in adolescents, the target audience for VERB. However, adolescent attitudes and expectations (both intermediate variables) were not mediators of behaviour change, which would ordinarily be expected based on classical understandings of the HOEM. In their examination of HOEM in an adult population using data from Canada's ParticipACTION campaign, Craig et al. (Craig et al., 2010) similarly found support for the model. In this case, however, the results did show that awareness predicted intermediate variables that in turn predicted behaviour change. Collectively, the results of these studies suggest that the HOEM may work differently depending on demographic or other characteristics. Longitudinal studies such as those described above allow investigation of the sequence of HOEM and the limited number of such studies restricts our understanding of how campaigns work.

Hornik (Hornik, 2002) has argued that exposure to messages may affect behaviour by changing social norms – unwritten rules or codes of conduct that govern the way people behave in certain contexts (Chung & Rimal, 2016). Accordingly, social norms are part of several established theories of behaviour change commonly used to inform campaign design and evaluation, including Social Cognitive Theory (Bandura, 1989), Social Learning Theory (Bandura, 1977), and the Theory of Planned Behaviour (Ajzen, 1991). In addition, there have been calls for mass media campaigns to adopt broader social goals, rather than only focusing on the individual (Wakefield et al., 2010; Abroms & Maibach, 2008) and there is clear evidence that social norms have a measurable impact on obesity (Christakis & Fowler, 2007; Shoham et al., 2015). MHN is one of only a handful of campaigns to expressly challenge social norms around diet, physical activity, and weight (Kite et al., 2018b). However, the inclusion of social norms as a step in a campaign’s HOEM, has not, to our knowledge, been previously reported.

Explicitly testing a theory or framework is essential if we are to maximise its usefulness through revision or rejection (Rothman, 2004; Nutbeam et al., 2010). To this end, this study aimed to test the Make Healthy Normal HOEM. Specifically, we sought to determine whether (1) the HOEM that underpins the evaluation of MHN is a useful and valid predictive tool; and (2) the cascade of effects in the HOEM varies

![Fig. 1. Make Healthy Normal theorized hierarchy of effects model (with evaluation measures, right hand side).]
for different behavioural outcomes. Note that this study does not evaluate the campaign's effectiveness, which has been done elsewhere (Kite et al., 2018a).

2. Methods

This study drew on data collected for the evaluation of Phase 1 of the MHN campaign, comprising a population-based cohort (i.e. a longitudinal panel) in NSW. The sample was recruited via an online research panel. Participants were invited to complete three online surveys via email in June 2015 (Wave 1 or baseline), March 2016 (Wave 2), and June 2016 (Wave 3). The waves occurred just before the campaign launched, just after the peak television advertising period, and after all television advertising ceased, respectively. To be eligible, participants needed to be 18 years of age or older and living in NSW. Quotas on age, gender, and location were applied at baseline to ensure broad representation of the target audience. In line with the campaign's HOEM (Fig. 1), participants answered questions on their awareness of and response to the campaign, knowledge, attitudes, intentions, and behaviours. In this study, we modelled two obesity-prevention behaviours targeted by the campaign: increasing physical activity and reducing consumption of energy-dense, nutrient-poor snack and fast foods (the latter being defined as food prepared outside of home).

2.1. Measures

Exposure (or recognition) was operationalized as prompted recognition of MHN, assessed by showing each participant the campaign's television commercials and asking if they had seen them before. Participants were then asked if they had seen images from the commercials online, on billboards, bus sides, or at bus stops, in the cinema, or in newspapers or magazines. If a participant answered 'yes' to any of the above, they were deemed to have recognized MHN.

Self-assessed understanding was assessed by asking participants their level of agreement with the statement that MHN was 'easy to understand'. Participants who agreed, strongly or somewhat, were deemed to have 'understood' MHN. This operationalisation of understanding represents a self-assessed judgement of understanding of the campaign.

In both models, the recognition and self-assessed understanding steps in the HOEM were operationalized as described above. The measures used for the remaining steps varied by model and are described in Table 1 and are mapped against the HOEM steps specified in Fig. 1. We included two social norms variables for the physical activity model (family norms and community norms) but a comparable family norms question was not available for the fast food model so only one social norms variable was used in this model. In both models, we opted to use a variable capturing whether participants had tried to change their behaviour as the final outcome, rather than using actual behaviour change. We used this variable because available evidence suggests that one-year of a campaign is unlikely to be enough time for intention to change to behaviour to convert to sustained behaviour change (Kite et al., 2018b), and this way we captured attempted change as well as actual change.

Likert scale questions were dichotomised (agree vs. not agree) as the distribution of responses was not normal. As we were interested in agreement with the variables, neutral responses were combined with disagree responses. All measures were from Wave 2 of the survey, except for behaviour change, which was from Wave 3.

2.2. Statistical analysis

We conducted a series of logistic regression models to test progression through the theorized HOEM, using the moderation and mediation of effects method proposed by Baron and Kenny (Baron & Kenny, 1986) and used by Craig et al. (Craig et al., 2010) in their test of ParticipACTION's HOEM. Specifically, we tested for mediation by introducing each of the steps in the theorized HOEM sequentially, controlling for each of the intervening variables. For example, the association between recognition and attitude was tested while controlling for self-assessed understanding and knowledge. We used Holm adjustments applied during inference to minimise Type 1 errors due to the number of tests required (Bender & Lange, 2001; Aickin & Gensler, 1996). A variable was determined to be a mediator if three conditions were met: (1) it was significantly associated with the independent variable; (2) it predicted the outcome variable; and (3) when both the independent and proposed mediator were included in the model, any association between the independent variable and the outcome variable became non-significant (full mediation) or the odds ratio moved closer to non-significance (partial mediation). We modified our approach from that of Baron and Kenny by testing for mediation regardless of whether there was a significant association between the independent and outcome variables in models without the proposed mediator, as this has been highlighted as a significant limitation of this method (Hayes, 2009). While we acknowledge the relative strengths and weaknesses of other methods compared to Baron and Kenny's method, we note that the different methods have been shown to agree > 90% of the time (Hayes & Scharkow, 2013).

As we included two social norms variables in the physical activity model and did not hypothesise that one would precede the other, all results for family norms and community norms have been adjusted for the other variable. We included age and sex as covariates in all models and set an alpha threshold of 0.05 for statistical significance. Only significant relationships are included in the final models. Participants with missing data were excluded from the analysis.

We also conducted sensitivity analyses to test whether baseline behaviour influenced the models. In these analyses, we excluded participants who were meeting Australian physical activity guidelines at baseline (Department of Health, 2014) and those who ate fast food or snack foods less than once a day at baseline, respectively. The latter grouping was chosen to reflect the Australian dietary guidelines, which recommend that the consumption of such foods be limited (National Health and Medical Research Council (NHMRC), 2015).

All analyses were conducted in SAS Version 9.4.

3. Results

In total, 2259 participants completed the baseline survey, with 1225 completing Wave 2 and 1113 Wave 3. Just over half the sample (approximately 53%) at each time point were female, and two-thirds (66%) were aged over 40 years at baseline, increasing to 76% at Waves 2 and 3. Almost two-fifths (39%) of the sample failed to meet Australian physical activity recommendations and over one-third (35%) consumed one or more serves of fast food or snack foods per day at baseline. The complete demographics of the sample are available elsewhere (Kite et al., 2018a). The prevalence of the modelled variables is shown in Table 2.

A clear path from recognition to behaviour change through the intermediate variables was evident in both the model predicting an attempted increase in physical activity (Fig. 2 and Supplementary Table 1) and the model predicting a reduction in consumption of fast food (Fig. 3 and Supplementary Table 2). Each step in both models had a significant positive association with the step immediately preceding it, in line with the theorized HOEM, with two exceptions: attitude did not predict community norms and community norms did not predict self-efficacy in the physical activity model. These associations were instead fully mediated by the associations between attitude and family norms and family norms and self-efficacy. After applying Holm adjustments, the associations between understanding and knowledge became non-significant in both models, while in the physical activity model, the associations between knowledge and attitude and between family norms and self-efficacy also became non-significant.

Several significant effects that were not predicted by the theorized
Table 1
Measures used to operationalise steps in HOEM models.

<table>
<thead>
<tr>
<th>HOEM Step</th>
<th>Physical activity model</th>
<th>Fast food model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>To maintain good health, how many minutes of moderate or vigorous physical activity do you think you should do every day? Moderate physical activity can be anything you do that causes a slight increase in your breathing and heart rate for a sustained period such as a brisk walk.</td>
<td>Approximately how many kilojoules do you think is the Australian average daily adult intake?</td>
</tr>
<tr>
<td>Attitude</td>
<td>To what extent do you agree or disagree that making small changes to how physically active you are will decrease your risk of chronic disease</td>
<td>To what extent do you agree or disagree that making small changes to what you eat will decrease your risk of chronic disease</td>
</tr>
<tr>
<td>Social Norms</td>
<td>To what extent do you agree or disagree with the following: 1. Most of my family members walk for at least 30 min on almost every day (Family norms) 2. Most people I know walk for at least 30 min on almost every day (Community norms)</td>
<td>To what extent do you agree or disagree with the following: More people are avoiding fast food and takeaway snacks to be healthier</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>To what extent do you agree or disagree with the following: I am confident I could increase my physical activity to improve my health</td>
<td>To what extent do you agree or disagree with the following: I am confident I could decrease the amount of fast food or snack food I eat to improve my health</td>
</tr>
<tr>
<td>Intention</td>
<td>Do you intend to increase the amount of physical activity you do in the next six months?</td>
<td>To what extent do you think you are likely to decrease or increase your consumption of fast food or snack foods in the next six months?</td>
</tr>
<tr>
<td>Behavioural trialling</td>
<td>In the past six months, have you tried to change the amount of moderate or vigorous physical activity that you do?</td>
<td>In the last six months, have you tried to decrease the amount of fast food or snack foods that you eat?</td>
</tr>
</tbody>
</table>

Note: In all Likert scale responses, 'neither agree nor disagree' responses were coded as 'not agree'. 'Don't know' and 'I'd prefer not to say' responses were coded as missing.
HOEM (that is, they were not fully mediated by the interim variables) were evident in the models. We observed positive associations between understanding and attitude, understanding and self-efficacy, attitude and self-efficacy, and self-efficacy and behaviour change in both models. In the case of understanding and attitude and attitude and self-efficacy, the interim variables did not appear to have any mediating effect on their associations in either model. We also observed some differences between the models. In the physical activity model, we found a significant positive association between community norms and behaviour change and significant inverse associations between knowledge and community norms and family norms and behaviour change, although these became non-significant after applying Holm adjustments. In the fast food model, we found a significant positive association between understanding and social norms. We also found associations between recognition and intention, and knowledge and self-efficacy, although these became non-significant after applying Holm adjustments.

Sensitivity analyses showed broadly consistent results compared to the models including all participants (Supplementary Tables 3 and 4). The one notable exception was that in the physical activity model all associations between both family norms and community norms and the other variables became non-significant, although the directions of effect remained consistent with the full models.

4. Discussion

Our results provide some support for the HOEM as a theoretical framework for explaining mass media campaigns. Additionally, we have shown that the cascade of effects in the HOEM is broadly consistent across two separate outcomes: physical activity and consumption of snack or fast foods. This suggests that the mechanisms described in the HOEM are useful in describing campaign effects, as well as supports the use of HOEM in campaign planning and evaluation. This adds more to the theoretical evidence base underpinning campaigns, and is in line with best practice principles which recommend an increase in the use of theory and frameworks in mass media campaigns (Grunseit et al., 2016; World Health Organization, 2000; Randolph & Viswanath, 2004).

Notably, there were very strong associations between understanding and attitude and attitude and self-efficacy in both models. While this study did not set out to evaluate MHN and we cannot conclude that these associations are causal, this, coupled with the results from evaluation of Phase 1 (Kite et al., 2018a), suggests that MHN may effectively convey the need to make small changes to lifestyle to benefit health and that accepting such messages gives people confidence that they can make changes. Further, the fact that these associations were not mediated by the interim variables suggests that campaign messages relating to knowledge and social norms could be afforded lesser attention in similar campaigns, particularly when limited resources are available. This is supported by an earlier review we did of overweight and obesity prevention mass media campaigns, which found that campaigns with formative evaluation consistently found that knowledge of the health effects and of behaviours was relatively high before implementation (Kite et al., 2018b). We therefore argue that, following rigorous formative evaluation, future campaigns could focus less on such messages and more on behaviour change.

As mentioned above, there have been calls for mass media campaigns to move beyond focusing exclusively on the individual and adopt broader social goals (Wakefield et al., 2010; Abroms & Maibach, 2008), although to date few obesity prevention campaigns have done so (Kite et al., 2018b). Our inclusion of social norms is therefore innovative in the obesity prevention context, considering that most previous social norms campaigns research relates to alcohol reduction campaigns in college students in the United States (Wechsler et al., 2003; DeJong et al., 2006; Foxcroft et al., 2015). While there is evidence of correlations between social norms and obesity (Shoham et al., 2015; Burke et al., 2010; Lynch et al., 2009), our analysis is one of the first to show
longitudinal associations between social norms and trialling of behaviour change.

In the physical activity model, we were able to divide social norms into two variables: family norms and community norms. Although we did not hypothesise that one of these variables would precede the other, the lack of associations between community norms and attitude and self-efficacy (the immediately preceding and following steps in the HOEM) suggests that changing family norms is a first step before changing community norms. This may reflect the social and environmental context within which an individual's behaviour takes place, as described by the social ecological model (McLeroy et al., 1988). That is, a participant might be aware of the benefits of increasing how physically active and feel that their immediate family is supportive of physical activity, but also of environmental barriers, such as working hours and urban design, which may inhibit their personal ability to enact behaviour change. It also appears that family norms may be more important for progression in the HOEM as community norms was not associated with self-efficacy.

Alternatively, this pattern of associations may be due to community norms being on a different cognitive path to attitude and self-efficacy, which are cognitively individualised attributes, while community norms...
is an externalised cognition shared across a community. Further research on the role of social norms in these campaigns is warranted, especially considering that many of the associations became non-significant after Holm adjustment and in our sensitivity analysis.

Our findings support those of the ParticipACTION campaign in that the intermediate variables did play a role in the hierarchy (Craig et al., 2010), in contrast to VERB (Bauman et al., 2008). Given VERB’s findings, further analyses in children and adolescents are necessary to explore the cognitive processes and relevance of HOEM for adolescents, compared to adults. It will also be important to explore whether there are differences by other demographic or behavioural characteristics, given that for ParticipACTION, inactive and active participants had varying cascades of effects through the hierarchy, with the model a better fit for inactive participants. Our modelling, conversely, showed broadly consistent effects for both physical activity and snack and fast food consumption, regardless of baseline behaviour. That the models were broadly comparable for both behavioural outcomes may indicate that the concept of a hierarchy of effects is robust across behaviours but further analyses for other behaviours will be necessary to confirm this.

A limitation of this study is that we are demonstrating associations, rather than causal pathways. Nonetheless, as discussed above, our findings are suggestive of mechanisms that could be useful in campaign planning and implementation. While our use of longitudinal data was a strength, ideally, the study would have had more than two waves of follow-up as that would have given us more scope to explore the associations over time. However, that we were able to go beyond physical activity and examine the HOEM for fast food consumption is a strength of this study. Next, the mediation analysis requires a high number of tests, increasing the likelihood of Type 1 error (Pollard & Richardson, 2007). The application of Holm adjustments did not significantly alter the nature of the final models. Further, we cannot be sure that the variables used in this study are measuring the latent concepts to which we assigned them. Future studies should consider testing their measures as part of formative evaluation to ensure that the measures capture what is intended. The high loss to follow-up between Wave 1 and 2 may also have introduced bias, although sensitivity analyses conducted for an earlier study (Kite et al., 2018a) suggest our findings are robust. Finally, we were not able to model factors outside the immediate campaign, such as supportive community programs and infrastructure, such as the broader implementation of the Healthy Eating and Active Living Strategy, that should form part of all comprehensive mass media campaigns (Hastings, 2007; Hoek & Jones, 2011). Therefore our results could not assess the influence of these important external factors.

5. Conclusions

To our knowledge, this is the first study to test a HOEM for two separate health behavioural outcomes. Our finding that the cascade of effects were broadly consistent between the two outcomes adds further weight to the usefulness of HOEM as a campaign planning and evaluation framework. Further testing of HOEM is needed in campaigns targeting a wider variety of behaviours and outcomes. Nonetheless, this study has provided support for the use of HOEM in mass media campaign planning.

Acknowledgments

We would like to thank all of the participants for their time in completing the surveys.

Declaration of competing interests

The authors declare that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2018.09.003.

References


Chapter 5: Using Facebook for public health communication

5.1 Introduction
As outlined in the introduction, social media is increasingly being used as part of public health campaigns, including MHN. This chapter reviews the use of Facebook by Australian-based public health organisations for communication of public health-related messages. This study, which addresses research aim three (to identify the strengths and limitations of current practices on Facebook as a component of public health MMCs), provides some understanding of the type and style of public health content that maximises user engagement on Facebook, as well as important information for helping policymakers and practitioners make decisions about resourcing for future campaigns.

5.2 Please like me: Facebook and public health communication (published paper)

Link: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0162765
Please Like Me: Facebook and Public Health Communication

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Abstract

Facebook, the most widely used social media platform, has been adopted by public health organisations for health promotion and behaviour change campaigns and activities. However, limited information is available on the most effective and efficient use of Facebook for this purpose. This study sought to identify the features of Facebook posts that are associated with higher user engagement on Australian public health organisations’ Facebook pages. We selected 20 eligible pages through a systematic search and coded 360-days of posts for each page. Posts were coded by: post type (e.g., photo, text only etc.), communication technique employed (e.g. testimonial, informative etc.) and use of marketing elements (e.g., branding, use of mascots). A series of negative binomial regressions were used to assess associations between post characteristics and user engagement as measured by the number of likes, shares and comments. Our results showed that video posts attracted the greatest amount of user engagement, although an analysis of a subset of the data suggested this may be a reflection of the Facebook algorithm, which governs what is and is not shown in user newsfeeds and appear to preference videos over other post types. Posts that featured a positive emotional appeal or provided factual information attracted higher levels of user engagement, while conventional marketing elements, such as sponsorships and the use of persons of authority, generally discouraged user engagement, with the exception of posts that included a celebrity or sportsperson. Our results give insight into post content that maximises user engagement and begins to fill the knowledge gap on effective use of Facebook by public health organisations.

Introduction

In countries with high Internet penetration, many people gather in online communities to share information, knowledge, and opinions; platforms facilitating these gatherings are known collectively as 'social media'. Social media activities currently include multi-media sharing, service and product review sites, blogging and microblogging, and social networking. Globally, Facebook, a social networking platform, is by far the most widely used social media. For example, in Australia, nearly two-thirds of adults maintain a Facebook profile, compared with...
less than one-fifth of adults for the next two most popular sites, LinkedIn and Instagram.[2] Additionally, almost 40% of Australian Facebook users log in 20 times or more per week, far exceeding any other platform. Research from the United States has also shown that while the rate of new members joining Facebook may have slowed, engagement has intensified, with over 70% of Facebook users engaging with the site at least once a day and 45% several times a day.[4] Although use of Facebook is greatest among young adults (18–29 years), significant proportions of older adults and adolescents maintain a Facebook profile, underlining the ubiquity of this social media platform. [2, 4]

Facebook is also the most widely used social media platform by businesses.[2] Although an emerging area of research, a recent examination of the most popular Facebook pages of energy dense, nutrient poor food and beverage brands revealed the host companies use a range of marketing techniques, such as interactive games and competitions and prizes based on user-generated content (i.e. content that is created by and posted to the site by users, not administrators), to engage with consumers, with adolescent and young adults the most receptive to these techniques.[5] Another study found similar techniques being used by alcohol brands and noted in particular the strategic use of timing and context to maximise user engagement.[6] Importantly, many of the techniques are unique to social media suggesting a deliberate strategy by these organisations to exploit the bidirectional format of social media and generate maximum interest and engagement with users.

Facebook defines engagement as users reacting to (i.e. 'liking'), sharing, or commenting or clicking on any content.[7] Generating engagement is important because it not only reflects the ability of the content to capture the attention of users but also directly influences the reach of content.[8–10] Previous research has found that users of social networking sites such as Facebook primarily share information on these platforms when they believe the information is beneficial to others.[11] Researchers argue that this reflects an expectation that the shared information will be beneficial to maintaining and strengthening the users’ online community, thereby creating an incentive to maximise user engagement in order generate word-of-mouth marketing; that is, marketing between consumers.[12, 13]

As Freeman et al. [5] showed, Facebook users who engage with commercial brand pages through liking, sharing, or commenting on content are either unaware or unconcerned that their engagement generates virtually free word-of-mouth marketing. In an environment with increasing consumer distrust of corporate messages, word-of-mouth marketing is potentially a powerful way of increasing consumer confidence. A 2013 international survey found that 84% of people place the most trust in the word-of-mouth recommendations of family and friends.[14] Further, social media facilitates word-of-mouth marketing to ‘go viral’ and spread a message across as many, if not more, consumers than would be reached through traditional broadcast media, often for comparatively little investment.[15]

Public health organisations have recognised that they, too, can make use of social media platforms like Facebook to engage their target market.[16–18] Some of the key benefits of using social media for health communication include: the ability to make health information more available, sharable, and tailored; to provide peer, social, or emotional support; and to influence health policy.[19] Moreover, it appears the public is generally receptive to receiving health messages through social media.[20] However, despite longstanding discussion,[21] there is very little evidence available on the best ways to engage with public health audiences in this space, particularly at the population level.[17, 22] Limited information is available describing non-profit organisations’, including health-related organisations, use of Facebook [18, 23, 24] but, to our knowledge, there has been no examination of what are effective strategies for driving user engagement for these sorts of organisations. Consequently, public health
organisations may not be making optimal use of social media platforms like Facebook as part of their overall communication strategy.

There is, however, considerable and expanding evidence demonstrating the effectiveness and importance of population-level health communications.[25] One strategy that has been employed is social marketing, which involves the application of conventional marketing techniques, including advertising and promotion, to achieve a social benefit.[26] These communication techniques have proven particularly effective in tobacco control, where they have been shown to influence attitudes, knowledge, and behaviour change.[27–29] For example, a defining feature of successful tobacco control mass media campaigns has been their emotional appeal, and studies show these types of campaigns have the greatest effect on audiences.[30, 31] Evidence showing benefit for mass media campaigns on other health topics is still developing but is nonetheless generally supportive of the value of population-level health communications.[32, 33]

This study aimed to review the use of Facebook by Australian public health organisations to identify features of their posting activity that are associated with user engagement, which we define as likes, shares, or comments. Specifically, we asked: (1) what communication and conventional marketing techniques are being employed by public health organisations on Facebook? and (2) what techniques are associated with greater user engagement?

Methods

Two authors (JK and BCF) independently identified a shortlist of Facebook pages relevant to selected public health issues (Table 1). We selected these pages on the basis that the associated public health issues contribute significantly to current levels of morbidity and mortality both in Australia and globally.[34, 35] The shortlist was generated in two phases: an initial search on the social media-monitoring site, Socialbakers [36] and a subsequent search on Google. Socialbakers provides a freely available list of the top 1,000 Facebook pages by 'likes' across a range of industries, with the option to filter 'likes' by user country. On Facebook, the 'like' feature allows users to show support for posted content or pages. We scanned all industries for any public health-related pages with more than 10,000 'likes' by Australian users. To distinguish between liking a post and liking a page, we refer to users who have liked a page as 'fans'.

Table 1. Selected public health issues and related search terms.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Search terms (Facebook AND ...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>Smoking, Quit smoking, quitting smoking, tobacco, no tobacco, tobacco free, smoking cessation, give up smoking, lung cancer</td>
</tr>
<tr>
<td>Healthy diet</td>
<td>Diet, nutrition, fruit, vegetables, sugar, fat, eat fruit, eat vegetables, fruit and vegetables, healthy eating</td>
</tr>
<tr>
<td>Physical activity/sedentariness</td>
<td>Physical activity, exercise, fitness, active travel, physical inactivity, sedentary, sitting, move more, get active</td>
</tr>
<tr>
<td>Overweight/obesity</td>
<td>Overweight, obesity, weight loss, weight management, healthy weight, fat, healthy lifestyle</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Alcohol, anti-alcohol, drinking, binge drinking, drunk, intoxication, drink driving</td>
</tr>
<tr>
<td>Sexual health</td>
<td>Sexual health, HIV, AIDS, contraception, condoms, the pill, HPV, Safe sex, Oral contraceptive pill</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>Drugs, illicit drugs, cannabis, methamphetamine, cocaine, heroin, weed, pot, ecstasy, meth,</td>
</tr>
<tr>
<td>Skin cancer</td>
<td>Skin cancer, melanoma, sun protection, ‘slip, slop, slap’, sun safety</td>
</tr>
<tr>
<td>Aboriginal Health</td>
<td>Aboriginal health, Indigenous health</td>
</tr>
</tbody>
</table>

DOI:10.1371/journal.pone.0162765.t001
To increase the comprehensiveness of our search, we supplemented our Socialbakers search with a Google web search of key terms relating to the selected public health issues. We examined the first three pages of search results for any public health-related Facebook pages, regardless of the number of likes. We excluded pages that were not predominately focussed on a public health issue(s) (e.g. healthcare-related pages) and any commercial pages from the analyses. Once both authors had finalised their shortlist, we compared the lists and resolved discrepancies through discussion or through referral to BF. All searches were conducted in late September 2015.

We further restricted our sample to exclude pages that did not have a primary prevention focus or had less than 10,000 likes by Australian users. The latter criterion was applied so that our analyses were focused on those pages that had already generated comparatively high-levels of interest from Facebook users and for practical reasons; namely to limit the number of pages included in the analyses to an amount that we could manage within available resources. One exception was a page focused on Aboriginal health, which was retained despite not reaching our threshold (this page only had 4,895 Australian fans) because it covers a health priority not explicitly addressed by any of the other eligible pages. A list of the excluded pages and their characteristics is provided in S1 Table.

We recorded descriptive characteristics of each page, including the number of fans, the date of first post, comments/likes/shares per post, the number of users ‘talking about’ a page and calculated the average number of posts made per day and per month, and the median likes, shares, and comments per post. The ‘Talking about’ characteristic represents the number of unique users who have created a story about a page in a 7-day period, and is calculated and updated daily by Facebook. A user ‘creates a story’ when they like a page, post on a page wall, or like, comment, or share a post, among other things. We used this metric to calculate the percentage of people talking about the page as a proportion of the total number of fans to give an indication of the proportion of fans who actively engage with the page beyond just liking it, as done previously.[5]

We developed a coding frame based on that used by Freeman et al. [5], with modifications made during iterative testing to ensure consistency across coders and make the coding frame more relevant to public health communication, as opposed to conventional promotion of commercial goods. Specifically, we added an indicator for the primary communication technique, as defined in Table 2, which captured the messaging style. The coding frame was developed by three of the authors (JK, BCF, and BF) through examining a subset of posts (n = 40) from two of the included pages. Inter-rater reliability was then tested by two authors (JK and BCF) independently coding the same subset of posts (n = 80) from four additional pages. As with page selection, discrepancies were resolved through discussion, with input from a third researcher (BF) where agreement could not be reached. Once inter-rater reliability reached 80%, JK and BCF then individually coded half of eligible pages each. We coded every post generated by the page administrators for a one-year period, from 6 September, 2014 to 31 August, 2015. Multiple marketing elements were possible in a single post, however the predominant communication technique and post-type contained mutually-exclusive categories only.

We also noted whether the pages allowed user-generated content to be posted and if the page administrators engaged with users either through liking or replying to user comments on their own posts or on user-generated posts. Consistent with Freeman et al. [5], we did not further examine user-generated content because page users are considerably less likely to be exposed to such content as it does not appear in the primary news feed of the page.

We also asked page administrators whether they were willing to share their pages’ Insights data [37] for all page, post, and video data for the same period. Insights data covers a number of metrics not publically available including the total reach of the post (defined as the total number of times the post appeared in a news feed within the first 28 days after posting), the
number of clicks on the post, the amount of negative feedback received on a post, and, for videos, the total number of video views.

Excluding the Insights data, all data used in this study are publically available and were collected in accordance with Facebook’s and Socialbakers’ terms and conditions. Insights data were used with the permission of the relevant page administrators.

Statistical analyses

We generated descriptive statistics for each post type, communication technique, and marketing element. We then investigated associations between the use of each post type, communication technique, and marketing element and the amount of user engagement, operationalized as likes, shares, and comments in this study. To do this, we conducted a series of (separate) negative binomial regressions (the data were over-dispersed) with the count of likes, comments and shares as the outcome variables, and post type, communication technique, and marketing elements as categorical independent variables. The reference category for post-type was photos as this was the most popular category and for communication technique was call-to-action.

Table 2. Final coding frame with definitions.

<table>
<thead>
<tr>
<th>Item</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook post type</td>
<td>Whether the post was a photo (or image), text only, game, poll or quiz, app, link, event, or video.</td>
</tr>
<tr>
<td>Communication techniques&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Informative</td>
<td>Provides information on a health issue, its associated behaviours and/or associated consequences or benefits.</td>
</tr>
<tr>
<td>Call-to-action</td>
<td>Encourages users to undertake a specific action (e.g. call a quitline, make an appointment, register for a program or event etc.). A call-to-action was given precedence of instructive or informative messages.</td>
</tr>
<tr>
<td>Instructive</td>
<td>Provides instruction on how to do a behaviour.</td>
</tr>
<tr>
<td>Positive emotive appeal</td>
<td>Aims to elicit positive emotions like hope and excitement in users. Also includes posts that aim to generate a positive feeling about the brand.</td>
</tr>
<tr>
<td>Fear appeal</td>
<td>Aims to elicit fear or other negative emotions in users.</td>
</tr>
<tr>
<td>Testimonial</td>
<td>Use of ‘real’ people and/or tells a personal story to encourage behaviour change or to generate emotions about the brand or the health issue. A testimonial was given precedence over emotional appeals.</td>
</tr>
<tr>
<td>Humour</td>
<td>Uses any humorous technique (e.g. sarcasm, jokes, memes etc.) to convey a health message</td>
</tr>
</tbody>
</table>

Marketing elements

| Branding elements              | Any logos, colours, trademarks, or slogans                               |
| Celebrities/ sportspeople      | People with an entertainment, media, or sports profile who have been linked to the brand. The link could be explicit or implied. |
| Characters/ mascots            | Any characters or mascots developed for the brand                         |
| Competitions, prizes, giveaways| Any contest involving a participant entry, including minimal requirements such as liking or commenting on a post. |
| Person of authority            | Any person used for the purpose of lending their personal or positional authority to the brand or health issue (e.g. doctor, academic, scientist, politician). |
| Sponsorships and partnerships  | Any events that the brand supports or other brands with which the brand partners |
| Vouchers, offers, rebates      | Any special deal for brand-related merchandise or events                  |

<sup>a</sup> The communication technique used in the video or photo was coded first and we only referred to associated text within the post when the technique was not apparent.

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because it represented a concrete action for users to take, as opposed to all of the other categories, which aimed to either inform or evoke emotion. As posts were nested within pages, a variable indicating the page on which the post was published was also included in the models. In addition, we conducted post-estimation contrasts of the effect for each page compared with mean as there was no one page that could sensibly serve as a reference category.

For the subset of pages for which we had Insights data (n = 9) we examined the descriptive characteristics of posts, including the total reach (number of unique users to whom the post was shown) and impressions (total number of times the post appeared in all users’ newsfeeds), as well as the number of post consumers (unique users who clicked anywhere on the post), link clicks (unique users who clicked on a link), video plays (unique users who clicked ‘play’ on a video), and video views (unique users who watched the video for 30 seconds or until the end, whichever came first). Video views includes both users who actively clicked ‘play’ on a video and those who viewed the video as a result of Facebook’s ‘auto-play’ feature, which will automatically start playing a video when a user scrolls through their newsfeed.

In addition, we used the Insights data to identify significant correlates of post-engagement while controlling for users’ exposure to the post; that is by including an exposure or “offset” variable, we can estimate engagement with a post (ie., likes, comments etc) whilst accounting for the different number of people each post is delivered to or times the post appears in a newsfeed.[38] The relationship between post characteristics and engagement therefore becomes a rate per exposure. To do this, we re-ran the models described above using a number of offsets, namely reach and impressions and fan-reach and fan-impressions (reach and impression measures restricted to the fan population only). In addition to likes, comments, and shares, the number of post consumers was used as an outcome variable as another way of operationalizing engagement.

All analyses were conducted using Stata 14.1. Results for all regression are presented as incident rate ratios (IRR) with 95% confidence intervals.

Results

Our initial search returned 63 eligible pages, which was reduced to a final list of 22 included pages after elimination of those with less than 10,000 fans (Table 3). Two pages, ‘Be the influence: Tackling binge drinking’ and ‘Shape Up Australia’, had no posts during the study period, leaving 20 pages for further analysis.

Included pages had a median of 28,040 Australian fans and 33,077 total fans; had been active for on average 4.5 years; and averaged 0.5 posts per day with a range of 0.1 to 2.0. An average of 2.3% of fans had talked about the page in the last seven days. Almost all pages were administered by a non-government organisation and mental health (n = 5) and cancer prevention (n = 5) were the most common public health issues. Over three-quarters of the pages allowed user-generated content (77%) and 86% engaged in conversations with fans. Having a mental health focus attracted the highest number of fans, with four of the top five most-liked pages focusing on this issue. Additionally, the top two pages, ‘beyondblue’ and ‘R U OK Day’, were ranked inside the top 1,000 most liked Facebook pages in Australia, according to Socialbakers.

In total, we coded 5,356 posts. Most posts were photos (or images), with the next most common being links (Table 4). Very few posts were apps, games, polls or quizzes, or events. The most common communication technique was a positive emotional appeal, closely followed by testimonial, while the least common was the use of fear appeal. Only half of the posts contained any marketing elements.
Table 3. Characteristics of included Facebook pages.

<table>
<thead>
<tr>
<th>Page name</th>
<th>Public health issue</th>
<th>Number of Australian fans (total fans)</th>
<th>Date of first post</th>
<th>Average posts per day</th>
<th>Average posts per month</th>
<th>Number of users talking about the page (as a % of total fans)</th>
<th>Median likes per post (as a % of total fans)</th>
<th>Median shares per post (as a % of total fans)</th>
<th>Median comments per post (as a % of total fans)</th>
</tr>
</thead>
<tbody>
<tr>
<td>beyondblue</td>
<td>Mental health</td>
<td>384,121 (465,839)</td>
<td>11 July 2012</td>
<td>0.5</td>
<td>14.5</td>
<td>17,564 (3.8%)</td>
<td>2089.0 (0.45%)</td>
<td>421.5 (0.09%)</td>
<td>63.5 (0.01%)</td>
</tr>
<tr>
<td>R U OK Day</td>
<td>Mental health</td>
<td>282,293 (303,171)</td>
<td>28 Sept 2010</td>
<td>0.6</td>
<td>19.1</td>
<td>4,493 (1.5%)</td>
<td>467.5 (0.15%)</td>
<td>100.5 (0.03%)</td>
<td>13.0 (0.00%)</td>
</tr>
<tr>
<td>Be the influence: tackling binge drinking</td>
<td>Alcohol</td>
<td>151,533 (165,655)</td>
<td>14 Feb 2010</td>
<td>0.0</td>
<td>0.0</td>
<td>211 (0.1%)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>headspace</td>
<td>Mental health</td>
<td>73,922 (84,221)</td>
<td>26 Aug 2009</td>
<td>0.8</td>
<td>23.0</td>
<td>1,390 (1.7%)</td>
<td>177.0 (0.21%)</td>
<td>32.0 (0.04%)</td>
<td>4.5 (0.01%)</td>
</tr>
<tr>
<td>Reachout.com Australia</td>
<td>Mental health</td>
<td>53,475 (60,699)</td>
<td>26 Oct 2009</td>
<td>1.0</td>
<td>31.2</td>
<td>5,402 (8.9%)</td>
<td>374.5 (0.62%)</td>
<td>40.0 (0.07%)</td>
<td>12.0 (0.02%)</td>
</tr>
<tr>
<td>Movember Foundation Australia</td>
<td>Men’s health</td>
<td>45,669 (53,937)</td>
<td>25 Jan 2012</td>
<td>0.8</td>
<td>22.6</td>
<td>2,623 (4.9%)</td>
<td>164.0 (0.30%)</td>
<td>19.0 (0.04%)</td>
<td>5.0 (0.01%)</td>
</tr>
<tr>
<td>Mums united—Heart Foundation</td>
<td>Heart disease</td>
<td>41,084 (43,069)</td>
<td>19 Aug 2011</td>
<td>0.1</td>
<td>2.3</td>
<td>22 (0.1%)</td>
<td>35.5 (0.08%)</td>
<td>13.5 (0.03%)</td>
<td>1.0 (0.00%)</td>
</tr>
<tr>
<td>Cancer Council Australia</td>
<td>Cancer prevention and treatment</td>
<td>39,100 (44,885)</td>
<td>4 Jun 2009</td>
<td>1.4</td>
<td>41.9</td>
<td>795 (1.8%)</td>
<td>33.0 (0.07%)</td>
<td>4.0 (0.01%)</td>
<td>1.0 (0.00%)</td>
</tr>
<tr>
<td>Liptember</td>
<td>Mental health</td>
<td>36,322 (37,799)</td>
<td>16 May 2010</td>
<td>0.2</td>
<td>5.1</td>
<td>1,135 (3.0%)</td>
<td>48.0 (0.13%)</td>
<td>2.0 (0.01%)</td>
<td>3.0 (0.01%)</td>
</tr>
<tr>
<td>How to drink properly</td>
<td>Alcohol</td>
<td>31,612 (33,125)</td>
<td>20 Feb 2014</td>
<td>0.1</td>
<td>2.3</td>
<td>17 (0.1%)</td>
<td>463.0 (1.40%)</td>
<td>19.5 (0.06%)</td>
<td>78.0 (0.24%)</td>
</tr>
<tr>
<td>Cancer Council NSW</td>
<td>Cancer prevention and treatment</td>
<td>30,062 (36,087)</td>
<td>24 May 2010</td>
<td>1.3</td>
<td>40.2</td>
<td>3,557 (9.9%)</td>
<td>111.0 (0.31%)</td>
<td>14.5 (0.04%)</td>
<td>2.0 (0.01%)</td>
</tr>
<tr>
<td>SunSmart</td>
<td>Skin cancer prevention</td>
<td>26,017 (28,018)</td>
<td>13 Nov 2011</td>
<td>0.5</td>
<td>14.6</td>
<td>101 (0.4%)</td>
<td>15.0 (0.05%)</td>
<td>2.0 (0.01%)</td>
<td>0.0 (0.00%)</td>
</tr>
<tr>
<td>Heart Foundation</td>
<td>Heart disease</td>
<td>25,408 (31,459)</td>
<td>20 Sept 2010</td>
<td>0.8</td>
<td>24.4</td>
<td>3,197 (10.2%)</td>
<td>51.0 (0.16%)</td>
<td>11.0 (0.03%)</td>
<td>1.0 (0.00%)</td>
</tr>
<tr>
<td>Quit Victoria</td>
<td>Smoking</td>
<td>20,611 (21,785)</td>
<td>27 Jul 2010</td>
<td>0.5</td>
<td>13.8</td>
<td>99 (0.5%)</td>
<td>32.0 (0.15%)</td>
<td>2.0 (0.01%)</td>
<td>4.0 (0.02%)</td>
</tr>
<tr>
<td>Cancer Council Queensland</td>
<td>Cancer prevention and treatment</td>
<td>18,467 (19,076)</td>
<td>18 Feb 2010</td>
<td>1.7</td>
<td>49.8</td>
<td>1,090 (5.7%)</td>
<td>25.5 (0.13%)</td>
<td>1.0 (0.01%)</td>
<td>0.0 (0.00%)</td>
</tr>
<tr>
<td>Shape Up Australia</td>
<td>Obesity</td>
<td>16,502 (17,545)</td>
<td>2 Jan 2013</td>
<td>0.0</td>
<td>0.0</td>
<td>21 (0.1%)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Hello Sunday Morning</td>
<td>Alcohol</td>
<td>14,407 (33,029)</td>
<td>1 Jan 2010</td>
<td>0.5</td>
<td>13.8</td>
<td>84 (0.3%)</td>
<td>251.0 (0.76%)</td>
<td>19.0 (0.06%)</td>
<td>12.0 (0.04%)</td>
</tr>
<tr>
<td>Make Smoking History WA</td>
<td>Smoking</td>
<td>13,118 (13,663)</td>
<td>19 Aug 2012</td>
<td>0.4</td>
<td>11.8</td>
<td>64 (0.5%)</td>
<td>19.0 (0.09%)</td>
<td>0.0 (0.00%)</td>
<td>1.0 (0.01%)</td>
</tr>
<tr>
<td>Ending HIV</td>
<td>Sexual health</td>
<td>12,898 (14,496)</td>
<td>1 Jan 2010</td>
<td>2.0</td>
<td>61.0</td>
<td>354 (2.4%)</td>
<td>13.0 (0.09%)</td>
<td>1.0 (0.01%)</td>
<td>0.0 (0.00%)</td>
</tr>
<tr>
<td>Nutrition Australia</td>
<td>Nutrition</td>
<td>12,826 (15,024)</td>
<td>14 Feb 2011</td>
<td>0.4</td>
<td>12.5</td>
<td>737 (4.9%)</td>
<td>36.0 (0.24%)</td>
<td>8.5 (0.06%)</td>
<td>1.5 (0.01%)</td>
</tr>
<tr>
<td>Pretty Shady</td>
<td>Skin cancer prevention</td>
<td>11,136 (11,631)</td>
<td>7 Nov 2013</td>
<td>0.1</td>
<td>4.4</td>
<td>7 (0.1%)</td>
<td>78.0 (0.67%)</td>
<td>1.0 (0.01%)</td>
<td>6.0 (0.05%)</td>
</tr>
</tbody>
</table>

(Continued)
On average, over all pages, video posts received on average 25% more likes than photo posts, while links and text posts received 37% and 31% fewer likes respectively (Table 5). Shares displayed a similar pattern, with videos receiving nearly four times as many likes as photo posts on average, while links and text received 30% and 69% fewer shares, respectively. Video and text only posts received more comments on average than photo posts (IRR = 2.03 and 1.59, respectively).

With regards to communication technique, posts that made use of positive emotional appeal received on average 18% more likes than call-to-action posts but 27% fewer shares. Humorous posts and testimonials also received fewer shares than call-to-action (IRR = 0.30 and 0.73 respectively), while informative posts received more than twice as many shares but with no effect observed for likes or comments. Both fear appeal and humorous posts received more comments on average than call-to-action posts (IRR = 1.72 and 2.01, respectively), while instructive posts received 23% fewer.

Posts with celebrities and sportspeople generally received a greater level of engagement, receiving 62% more likes, two and a half times the number of shares and 64% more comments than posts without celebrities and sportspeople. Most other marketing elements tended to

---

**Table 3. (Continued)**

<table>
<thead>
<tr>
<th>Page name</th>
<th>Public health issue</th>
<th>Number of Australian fans (total fans)</th>
<th>Date of first post</th>
<th>Average posts per day^a^</th>
<th>Average posts per month^a^</th>
<th>Number of users talking about the page^b^ (as a % of total fans)</th>
<th>Median likes per post (as a % of total fans)</th>
<th>Median shares per post (as a % of total fans)</th>
<th>Median comments per post (as a % of total fans)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naccho Aboriginal Health Australia</td>
<td>Aboriginal health</td>
<td>4,895 (5,143)</td>
<td>27 Mar 2012</td>
<td>1.3</td>
<td>37.5</td>
<td>1,243 (24.2%)</td>
<td>21.5 (0.42%)</td>
<td>2.0 (0.04%)</td>
<td>0.0 (0.00%)</td>
</tr>
</tbody>
</table>

^a^ Calculated for the period 6 September, 2014 to 31 August 2015

^b^ The number of unique users who have created a story about a page in a 7-day period, calculated and updated daily by Facebook. A user creates a story when they like a page, post on a page wall, and like, comment, or share a post, among other things.

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**Table 4. Frequencies of types of post, communication techniques, and use of marketing elements, all pages combined (n = 5356).**

<table>
<thead>
<tr>
<th>Type of post</th>
<th>n (%)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photos (or images)</td>
<td>3,802 (71.0)</td>
<td>Links 1,286 (24.0)</td>
</tr>
<tr>
<td>Videos</td>
<td>181 (3.4)</td>
<td>Text only 80 (1.5)</td>
</tr>
<tr>
<td>Other</td>
<td>7 (0.1)</td>
<td></td>
</tr>
</tbody>
</table>

**Communication technique**

| Positive emotional appeal | 1,811 (33.8) | Testimonial 1,366 (25.5) |
| Call-to-action | 750 (14.0) | Informative 674 (12.6) |
| Humour | 425 (7.9) | Instructive 278 (5.2) |
| Fear appeal | 52 (1.0) | |

**Marketing elements^a^**

| Branding elements | Sponsorships or partnerships | 2,047 (38.7) | 576 (10.8) |
| Celebrities and sportspeople | Person of authority | 241 (4.5) | 123 (2.3) |
| Competitions, prizes, or giveaways | Characters or mascots | 107 (2.0) | 52 (1.0) |
| Vouchers, offers, or rebates | None | 32 (0.6) | 2,655 (49.6) |

^a^ Marketing elements were not mutually exclusive so total will not add to 100%

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receive either fewer likes, shares, and comments than posts without these elements, or there was no association. The only exceptions to this were for competitions, prizes, and giveaways and characters or mascots, which received significantly more comments on average than posts without these elements (IRR = 1.64, 4.05, and 2.56, respectively).

The frequencies of types of post, communication techniques, and use of marketing elements for posts for which we were able to obtain Insights data (n = 1,563) were similar to the complete sample. Median impressions and reach were greatest for video posts and text only posts, instructive and testimonial posts, and characters or mascots and celebrities and sportspersons (Table 6). Regardless of the post type, communication technique employed, or marketing element used, only 2% to 6% of potential consumers engaged with it in some way.

When we analysed this subset of posts using the Insights data to account for total reach and impressions and fan-reach and impressions, video posts consistently received fewer likes, shares, and comments per unique user reached and per impression, compared to photo posts (S2–S4 Tables), in contrast to the analysis without the offset. Humorous posts also consistently received fewer likes, shares and comments per user reached and per impression, while positive emotional appeal posts generally received more likes and shares, but not comments, than calls-to-action. The sub-analysis also consistently showed that having a celebrity or sportsperson in a post either made no difference to the number of likes, shares, or comments per user reached or per impression or the association was reversed and they received fewer likes, shares, or comments.

In the analysis where the outcome of interest was post consumers, video posts were significantly more likely to receive any interaction than photo posts when accounting for fan impression
and reach, but not when accounting for all impressions and reach (S5 Table). Links and text only posts consistently received fewer post consumers than photo posts, regardless of offset. Testimonial-style posts had a greater number of post consumers per impression and per unique user compared to call-to-action posts, while humour and instructive posts received fewer post consumers per fan impression and unique fan. Branding elements were found to have a mixed relationship with post consumers, receiving fewer per impression and unique user than posts without branding elements but receiving more per fan impression and unique fan. On the other hand, sponsorships and partnerships and persons of authority had fewer post consumers per fan impression and unique fan.

### Table 6. Median reach, impressions, post consumers, video plays, and video views of posts with Insights data (n = 1,563).

<table>
<thead>
<tr>
<th>Post type</th>
<th>Median impressions per post</th>
<th>Median reach per post</th>
<th>Median post consumers per post (as a % of reach)</th>
<th>Median link clicks/video plays per post (as a % of reach)</th>
<th>Median video views per post (as a % of reach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photos</td>
<td>7,173</td>
<td>3,772</td>
<td>111 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Links</td>
<td>6,303</td>
<td>3,211</td>
<td>80 (2%)</td>
<td>36 (1%)</td>
<td>-</td>
</tr>
<tr>
<td>Videos</td>
<td>42,129</td>
<td>34,608</td>
<td>705 (2%)</td>
<td>553 (2%)</td>
<td>1,863 (5%)</td>
</tr>
<tr>
<td>Text only</td>
<td>16,534</td>
<td>8,675</td>
<td>287 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication technique</th>
<th>Median impressions per post</th>
<th>Median reach per post</th>
<th>Median post consumers per post (as a % of reach)</th>
<th>Median link clicks/video plays per post (as a % of reach)</th>
<th>Median video views per post (as a % of reach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call-to-action</td>
<td>6893</td>
<td>3506</td>
<td>81 (2%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fear appeal</td>
<td>4857</td>
<td>3360</td>
<td>97 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Humour</td>
<td>4889</td>
<td>2441</td>
<td>81 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Informative</td>
<td>6820</td>
<td>3394</td>
<td>93 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Instructive</td>
<td>9094</td>
<td>4674</td>
<td>136 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Positive emotional appeal</td>
<td>7453</td>
<td>3910</td>
<td>114 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Testimonial</td>
<td>8743</td>
<td>4919</td>
<td>157 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marketing elements</th>
<th>Median impressions per post</th>
<th>Median reach per post</th>
<th>Median post consumers per post (as a % of reach)</th>
<th>Median link clicks/video plays per post (as a % of reach)</th>
<th>Median video views per post (as a % of reach)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No marketing elements</td>
<td>6438</td>
<td>3317</td>
<td>97 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Branding elements</td>
<td>7741</td>
<td>4126</td>
<td>114 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sponsorships and partnerships</td>
<td>10522</td>
<td>5363</td>
<td>168 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Celebrities and sportspeople</td>
<td>11869</td>
<td>7067</td>
<td>197 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Person of Authority</td>
<td>7008</td>
<td>3281</td>
<td>161 (5%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Competitions, prizes, or giveaways</td>
<td>7841</td>
<td>4116</td>
<td>120 (3%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Characters or mascots</td>
<td>47534</td>
<td>26448</td>
<td>1590 (6%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vouchers, offers, or rebates</td>
<td>8222</td>
<td>5377</td>
<td>130 (2%)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

doi:10.1371/journal.pone.0162765.t006

### Discussion

This study has identified some of the characteristics of public health-related Facebook posts that are associated with increased or decreased user engagement. Notably, very few fans will actively engage with any one post, with median likes per post as a percentage of total fans ranging between 0.05% and 1.4%. This reinforces the need for posting content that maximises the chance of high engagement if an organisation is to have any opportunity to make a meaningful impact on public health outcomes on social media. The results presented in this paper provide
public health organisations some guidance on how they may improve engagement with social media users.

Our results showed that video posts were the most engaging post type, shared on average four times more often than photo posts. This suggests that fans are more likely to see video posts as novel, interesting, and worthy of sharing with their friends, which is in line with current industry predictions about the value of video for any content provider.[39] However, only 3% of all posts we coded were videos suggesting that public health organisations are trailing behind conventional marketers, with Cisco predicting that video will account for 69% of all consumer internet traffic by 2017 and 80% by 2019.[40]

Conversely, links and text-only posts received fewer likes and shares than photo posts, implying that these posts are generally not seen as engaging, regardless of the content. Lack of engagement with links may be because Facebook users are reluctant to leave Facebook for an external site.[41] Our results suggest that links in particular do not promote engagement, especially when it seems that links are generally reach the fewest number of people of all types of posts and only 1% of these users actually click on the link.

When we accounted for the exposure that people have to a post, the strong effect on engagement of having a video post compared to photo posts was reversed indicating that, per impression, a photo attracted greater engagement and the very high reach of video posts is perhaps what accounts for their popularity. Although Facebook has revealed little about the algorithm which determines the amount of exposure a post receives, [8–10] it is clear that it is complicated and multifactorial, depending not only on the form the post takes but a dynamic combination of factors taking into account each individual’s engagement patterns (like, share or comment) with that particular post.[42] All of this underlines the need for public health organisations to invest significant resources into the management of their Facebook page so that quality content is given the best chance of success. This may include developing a social media (including Facebook) strategy, ensuring resources are available to develop content, and having a dedicated staff member or team to design, implement, and evaluate all social media activity.

Our analysis showed that many traditional marketing elements were associated with lower levels of engagement. In particular, sponsorships and partnerships and use of persons of authority resulted in fewer likes, shares, and comments, compared to posts with no marketing elements at all. On the other hand, the use of celebrities and sportspeople resulted in higher levels of engagement on average, although this relationship was either not significant or reversed when accounting for reach and impressions. Some research from commercial marketing has suggested that celebrities can have significant impact on brand awareness and affinity[43] but that there is also a risk that the celebrity will overshadow the brand.[44] Given this, we recommend further research looking at the role of celebrity in public health marketing on social media, particularly in relation to why fans are more likely to engage with posts that contain celebrities or sportspeople and the effect the use of celebrity has on receptivity to the public health message being conveyed.

Results for the use of different communication techniques were less clear, however. Positive emotional appeal posts, for example, received on average more likes but fewer shares than call-to-action posts, suggesting that these posts prompt only minimal levels of engagement from fans. Humorous posts, however, attracted significantly fewer likes and shares but more comments. This is may be due to the highly subjective nature of humour; that is, what some fans would consider funny could differ wildly from other fans, leading to either no engagement with many fans or negative engagement. We speculate that the reason humorous posts (and also fear appeal posts) received more comments on average is due to their controversial nature. While we did not systematically examine the content of user comments, we did note in coding the posts that many of these types of posts contained negative comments or
comments that indicated behaviour in conflict with the intent of the post. For example, a humorous post aimed at discouraging excessive consumption of alcohol included many comments from fans bragging about how they regularly consumed alcohol in excess and would continue to do so.

Emotive posts, particularly positive emotional appeals, were the most common post types, perhaps reflecting research on public health messages disseminated through traditional mass media that shows emotive messages prompt the greatest response from viewers.\cite{30, 45} Research in commercial marketing on Facebook also supports this, with persuasive content, including content aimed at eliciting positive emotions, found to have a positive impact on engagement.\cite{46} The same research also found that informative content had a negative impact except if used in conjunction with persuasive content. However, our analysis found that informative posts provoked more engagement, being shared more than twice as often as call-to-action posts. It may be that posts that include new information about a public health issue prompt a higher level of interest and engagement from fans. Alternatively, it may be because public health organisations are creating emotive content that either fails to generate sufficient emotion in fans to encourage engagement beyond liking a post or is targeting the ‘wrong’ emotions. Another possible explanation could be that Facebook users engaging with public health-related pages do so for different reasons than they would with commercial pages. Understanding the emotions that people feel when exposed to public health-related content and what these emotions prompt them to do is therefore worthy of further research.

Generating a large amount of likes, shares, and/or comments, while an indication of interesting content, should not be seen as the most important outcome of a social media campaign.\cite{41} In theory, engagement with public health pages on Facebook will lead to the achievement of public health aims but this is yet to be proven. There is, however, some evidence from the commercial sphere that engagement with Facebook pages leads to increased sales and profitability,\cite{47, 48} with one study finding that likes are the strongest indicator of long-term sales.\cite{49} Although the generalisability of those findings is limited, together they suggest that simply being seen is not enough and that organisations should only be using Facebook where they are willing and able to invest sufficient resources to engage users. Further research could assist in understanding whether engagement with public health-related pages on Facebook (and social media more broadly) actually leads to the achievement of public health goals.

One issue that we could not explore in this study is the importance of the nature of the page itself. For instance, pages dedicated to, or with a strong focus on, mental health dominated our list of included pages. Furthermore, they made up four of the top five pages in terms of number of fans, suggesting that there is something about mental health that lends itself to the Facebook platform. Other issues, like physical activity and overweight and obesity, were conspicuous by their absence, as were government-run pages. To our knowledge, there is has been no investigation of the suitability and acceptability of particular health issues for Facebook communications. Future studies could sample more pages within each health issue to clarify the effect of health issue on engagement.

Limitations of this paper include using a previously untested coding framework for identifying the communication techniques used. We did, however, employ a rigorous development and testing regime to increase the chances of high inter-rater reliability between the two coders. Another limitation was that for practical reasons our analysis only considered pages with 10,000 or more fans, which was an arbitrary cut point. It is possible that pages with fewer fans operate in markedly different ways than the pages we considered here, which may contribute to them having fewer fans or there may other factors independent of content that account for the size of the fan base. We also could only obtain Insights data on less than half the pages eligible for our study, limiting our analysis of these fine-grained measures. Finally, it is worth
noting that our findings may not be generalizable to other social media platforms. This is due to users having differing motivations and expectations for using particular platforms. [11, 50] Additional research with other platforms is necessary to understand what works best and to explore whether there are commonalities across platforms.

Conclusions

Our results are a necessary first step in filling the knowledge gap on the effective use of Facebook by public health organisations. By critically examining the characteristics of Facebook posts created by Australian-based public health organisations, we have identified post types and marketing techniques that attract greater or lesser user engagement. Further research will be essential, particularly in relation to whether certain health issues (e.g. mental health) are better suited to Facebook. Our study has shown that in order to increase the chances of achieving public health goals, content providers must encourage engagement and adapt to the Facebook algorithm in order to maximise message exposure, while also ensuring that the content is of high quality. Our study will assist public health organisations to use this powerful platform more efficiently and effectively.

Supporting Information

S1 Data.
(XLSX)

S1 Table. Key characteristics of excluded pages.
(DOCX)

S2 Table. Associations between post type, social advertising techniques, and use of marketing elements with likes, with offsets for impressions and reach.
(DOCX)

S3 Table. Associations between post type, social advertising techniques, and use of marketing elements with shares per impression and unique user.
(DOCX)

S4 Table. Associations between post type, social advertising techniques, and use of marketing elements with comments per impression and unique user.
(DOCX)

S5 Table. Associations between post type, social advertising techniques, and use of marketing elements with post consumers per impression and unique user.
(DOCX)

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Author Contributions

Conceived and designed the experiments: JK BCF BF.

Performed the experiments: JK BCF BF.
Analyzed the data: JK AG.

Wrote the paper: JK BCF AG BF.

References


Chapter 6: Evaluation of the Make Healthy Normal campaign's Facebook page

6.1 Introduction
This chapter reports the results of a mixed methods evaluation of the MHN campaign’s Facebook page, including analysis of an online survey and focus groups with Facebook users and an analysis of the page’s Facebook analytics. This evaluation takes into account the review findings for MMCs broadly (Chapter 2) and for Facebook specifically (Chapter 5), as well as the findings from the evaluation of the broader MHN campaign (Chapters 3 and 4). The results of this study relate to research aims one and three: to identify and critique current practice in the design, implementation, and evaluation of overweight and obesity MMCs; and to identify the strengths and limitations of current practices on Facebook as a component of public health MMCs.

6.2 User perceptions of the Make Healthy Normal campaign Facebook page: a mixed methods study (published paper)

Link: http://journals.sagepub.com/doi/abs/10.1177/2056305118794639
User Perceptions of the Make Healthy Normal campaign Facebook Page: A Mixed Methods Study

James Kite1, Bronwyn McGill1, Becky Freeman1, John Vineburg2, Vincy Li3, Nathan Berton2, and Anne Grunseit1,4

Abstract
Facebook is used as part of public health communication efforts but little evidence is available on why people engage with health-related Facebook pages and what content appeals to them. This study aimed to investigate user perceptions of and experience with the Make Healthy Normal (MHN) Facebook page, part of a government campaign to address overweight and obesity in adults in New South Wales, Australia. This sequential mixed methods study comprised an online survey (n=591) and six focus groups (n=33) of Facebook users, including both fans (i.e., users who have “liked” the MHN page) and non-fans. We analyzed the online survey descriptively and employed inductive thematic analysis for the focus groups, integrating the two data sources at the stage of interpretation. Our results show that MHN and similar health pages are in demand but that there are a number of contextual and content-related factors that are critical in determining user engagement and over which page administrators have varying levels of influence. Contextual factors, including the drivers for user engagement and Facebook user practices, can be leveraged or managed to influence user engagement but they cannot be controlled. On the contrary, content factors, like the nature of posts, post presentation, and post subject, can be directly influenced by page administrators. Policymakers and practitioners can use these findings to inform the design and operation of their own Facebook pages and should look to conduct and disseminate robust evaluation of their pages to improve user satisfaction and engagement.

Keywords
Facebook, overweight and obesity, mass media campaign, social media, user experience

Introduction
The potential of Facebook and other social media platforms as a channel for health communication has been debated in the peer-reviewed literature over the last decade (Dooley, Jones, & Iverson, 2014; McNab, 2009; Moorhead et al., 2013; Thackeray, Neiger, Smith, & Van Wagenen, 2012). Yet little evidence has been generated that documents why people engage with health pages on Facebook and what content appeals to them. Moreover, what is available concerns small-scale experimental studies or pages with limited reach (Laranjo et al., 2015; Swindle, Ward, & Whiteside-Mansell, 2018; Woolley & Peterson, 2012) or is purely descriptive (Park, Rodgers, & Stemmele, 2011; Platt, Platt, Thiel, & Kardia, 2016). To our knowledge, no detailed evaluations of real-world social marketing campaign Facebook pages are available, despite their widespread use (Kite, Foley, Grunseit, & Freeman, 2016; Park et al., 2011). As the way people view and consume media is changing rapidly and the dominance of television as a communication platform wanes (Regional TAM, OzTAM, & Nielsen, 2016), such information will be critical in developing and implementing future health campaigns.

Facebook is the most widely used social media platform both globally and in Australia (Perrin, 2015; Sensis, 2015), making it an attractive communication channel for public health campaigns. Nearly two-thirds of Australian adults maintain a Facebook profile and almost 40% of users login...
The ubiquity of Facebook, coupled with its intense use, means messages may be disseminated to a large audience, rapidly, and often for comparatively little investment compared to traditional broadcast media like television (Kaplan & Haenlein, 2011). In addition, social media platforms such as Facebook offer unique opportunities for bidirectional interaction between campaign and audience, and among audience members, which are generally not possible when using more traditional channels (Freeman & Chapman, 2008). The interactive format facilitates “word-of-mouth” marketing, or marketing between consumers, one of the most trusted and powerful forms of marketing (Nielsen, 2013) because it can amplify a message and lend credibility and authenticity to a brand (Lang, 2013). Moreover, the available evidence suggests that the public is generally receptive to health messages on social media (Uhrig, Bann, Williams, & Evans, 2010; Zheng, 2014), although there is some evidence that motivations for engaging with health issues on social media are not always positive (Allem et al., 2017). There is otherwise very limited evidence available as to who engages with health issues on Facebook, why they engage, and what they expect from Facebook content. Addressing this gap will provide valuable insights into how Facebook can best be used as a communication platform for public health messages.

The Make Healthy Normal (MHN) Campaign

MHN is a multi-year Australian-based social marketing campaign launched by the New South Wales (NSW) Government in June 2015 as part of a state-wide strategy to address overweight and obesity (Centre for Population Health, 2013). It aims to challenge the normalization of being unhealthy and encourage NSW adults to adopt a healthier lifestyle. Phase 1 of the campaign (2015-2016) targeted all NSW adults, while Phase 2 (2016-2018) focused on males aged 35 to 54 years and parents with children aged 5 to 12 years. Although the majority of the campaign spend was allocated to advertising on two television commercials, the campaign also made use of a number of other communication channels, including out-of-home advertising (e.g., bus sides, billboards), online advertising, community events, and social media, particularly Facebook. More details on the campaign and its evaluation are available elsewhere (Kite et al., 2018).

The MHN Facebook Page

The MHN Facebook page has been operating since the beginning of the campaign and aims to provide engaging content aligned with the campaign’s key messages around healthy eating and active living. The page administrators aim for approximately three posts per week, some of which receive a paid boost to increase their reach. The tone of the content is intended to be conversational and supportive, highlighting ways to eat better and be more physically active as well as promoting related NSW Government programs, including the Get Healthy Information and Coaching Service (https://www.gethealthynsw.com.au/), a telephone support service for adults, and Go4Fun (https://go4fun.com.au/), a healthy lifestyle program for children above a healthy weight. As of February 2018, the page had over 31,000 page likes, and over 100,000 likes, comments, and shares across approximately 400 posts.

This study aimed to investigate user perceptions of and experience with the MHN Facebook page using mixed methods. Specifically, we sought to (1) gain insights into the characteristics of fans of the page, (2) explore Facebook users’ reasons for engaging with the page, and (3) investigate the user experience of and response to the page and its content.

Methods

This sequential mixed methods study (Leech & Onwuegbuzie, 2009) comprised an online survey and focus groups with Facebook users, including both fans (i.e., users who have “liked” the MHN page) and non-fans (i.e., users who had not, at the time of recruitment, “liked” the MHN page). It was approved by the University of Sydney’s Human Research Ethics Committee (Protocol number: 2017/145).

Online Survey

Participants for the online survey were recruited via Facebook advertising and posts on the MHN page. Paid advertisements used Facebook’s filtering options to target the posts at NSW adults, prioritizing those from low socioeconomic groups consistent with the campaign’s target audience. Participants needed to be aged 18+ years and living in NSW. Both fans and non-fans of the page were eligible to participate. Questionnaire content included why users have or have not liked the MHN page, whether they like any other health-related Facebook pages, how often they engage with the page, and their opinion on the quality of the content of the page, frequency of posting, and how the page could be improved.

Measures

Participants were shown a list of Facebook pages related to healthy eating, active living, or healthy weight, identified by the Ministry of Health as similar or “competing” pages to MHN, and asked whether they were fans of any of them, with multiple responses allowed. Participants who were fans of at least one of these non-MHN health page were then asked on average how frequently they engaged with the pages nominated, with responses on a 5-point Likert-type scale, where 0 = never, 1 = rarely, 2 = sometimes, 3 = somewhat frequently, and 4 = very frequently. Specifically, engagement was measured by asking participants to indicate how often they viewed the page or its content, “liked” content,
“shared” content, commented on content, and invited friends to like the page using a question adapted from Junco (2012). Fans of MHN were also asked how often they engaged with the MHN page specifically. We then calculated mean engagement with both MHN and non-MHN health pages across all of the above activities.

We asked fans why they had “liked” the page and what they thought were its best and worst features. Non-fans were asked why they had not “liked” the MHN page. All of these questions had open responses, which were post-coded (i.e., codes were derived iteratively following data collection, as opposed to being predefined) by the lead researcher (J.K.) to identify common categories of responses. N.B., J.V., and V.L. independently coded a randomly selected sub-sample of responses to examine coding reliability. Interrater reliability was between 72% and 80% across the different measures. Discrepancies were resolved through discussion and where appropriate, codes were modified to ensure their scope and boundaries were clear and consistently applied between coders.

MHN fans were also asked what they had done outside of Facebook in response to MHN content, including trying to change their behavior, discussing content with friends or family outside of Facebook, visiting the MHN website, calling the Get Healthy Service, or seeking advice or help from a health professional. Participants who indicated that they did one or more of these off-Facebook responses were coded as “any response,” with others coded as “no response.”

Participants’ self-reported postcode of residence was used to classify them into quintiles indicating area-level socioeconomic status according to the Socio-Economic Index for Areas (SEIFA) disadvantage scale (Australian Bureau of Statistics [ABS], 2013), and then coded as least (Quintiles 1-3) and most disadvantaged (Quintiles 4 and 5) for analysis. Participants’ postcodes were also used to classify their location using the Accessibility/Remoteness Index of Australia (ARIA) (Hugo Centre for Migration and Population Research, 2013), and dichotomized into urban versus regional, rural, and remote for analysis. Participant’s time spent on Facebook was measured through questions developed by Junco (2012). Participants self-reported height and weight, allowing us to calculate body mass index (BMI) in accordance with World Health Organization (WHO, 2016) classifications. BMI categories were then dichotomized into healthy weight versus overweight/obese for analysis.

Analysis. We conducted a t-test for differences in mean to compare the number of pages liked by MHN fans and non-fans to explore the profile of our survey sample and to examine the characteristics of fans of the page. Characteristics of our survey sample were compared to that of the general Facebook user base (Sensis, 2015) and to that of the MHN fan base, which was extracted from Facebook’s Insights data (Facebook, 2015). We also conducted linear regressions modeling mean engagement with MHN and mean engagement with non-MHN health pages. Logistic regression modeling was used to analyze off-Facebook activity to investigate how users were interacting with the MHN page and non-MHN health pages. Independent variables for all regression models included demographics (i.e., gender, age, socioeconomic status, and location) that have been shown to be associated with many different health outcomes, including in public health campaigns (see, for example, Durkin, Brennan, & Wakefield, 2012; Kite, Rissel, Greenaway, & Williams, 2014; O’Hara et al., 2016, Wakefield, Loken, & Hornik, 2010). As MHN is an overweight and obesity prevention campaign, we also included BMI category to explore any differences in engagement by weight status, while we included frequency of Facebook use as an indication of potential exposure to MHN content. In addition, we included children in the household (yes vs. no) as an independent variable because families with children aged 5 to 12 years is a key target audience for the campaign’s second phase. All analyses were conducted with SPSS Statistics 22, and a threshold of \( p<.05 \) was used for statistical significance.

Focus Groups

Survey participants were invited to participate in focus groups at the end of the survey. We conducted six groups, three each with fans and non-fans, segmented by age (18-30 years, 30-50 years, 50 years and over). The groups had between four and six people each and were conducted in Sydney, NSW. Participants were mostly women (26 women, 7 men), reflecting the profile of participants who completed the survey, and were all regular (mostly daily) users of Facebook. Groups were moderated by a market research agency, appointed by the NSW Ministry of Health. Discussion topics included how and why participants use social media in general and Facebook specifically, why people do or do not engage with public health-related pages like MHN on Facebook, what they expect from pages like MHN, and their experience with and opinion of the MHN page. In response to results from the online survey, questions for non-fans around their awareness of and exposure to MHN content were added. Groups were also shown a selection of MHN posts that have appeared on the page and asked for their reaction to the content, including how it influenced both their online (e.g., sharing or commenting on content and inviting friends to view the page) and offline behavior (e.g., eating habits, physical activity, etc.). A selection of these posts are shown in Figure 1.

Analysis. Focus groups were recorded and transcribed verbatim, with transcriptions imported into NVivo 11 for analysis. J.K. developed a coding frame through an inductive, iterative process, listening to the recordings and reviewing transcripts to identify common themes across the entire data set, using the approach described by Braun and Clarke (2006) whereby themes were generated from the content of the focus group.
discussions, rather than a priori. The final themes represent semantic (as opposed to latent) patterns in the data set, highlighting an important aspect of the data in relation to the research questions. B.M. independently coded one group to check validity of the coding frame and assisted in refining the final themes. Other authors were consulted on theme definitions and interpretations.

**Mixed Methods Integration**

While the survey results were used to refine the discussion guide for the focus groups, as described above, the two components of this study were predominately integrated at the stage of interpretation, as opposed to the analysis stage (Doyle, Brady, & Byrne, 2009). That is, data from the survey and focus groups were analyzed separately and then compared using a qualitative approach, giving equal emphasis to both components (Leech & Onwuegbuzie, 2009). The aim of the data integration was to expand the scope and depth of understanding of the issues to give a more complete picture of user perceptions of the MHN page (Fielding, 2012).

**Results**

**Online Survey**

**Characteristics of Fan Base.** A total of 591 participants completed the survey, which represented 35% of all unique visitors to the survey. This included 320 MHN fans (55%). Women and, to a lesser extent, younger adults were over-represented compared to the general Facebook user base, although to some degree this reflects the fan base of MHN, according to Facebook’s Insights data for the MHN page (Supplementary Table 1). Compared to non-fans, fans of MHN were more likely to be younger, have higher self-rated health, and be physically active and from more socioeco-
Table 1. Characteristics of Survey Sample.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Fan</th>
<th>Non-fan</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>39 (12%)</td>
<td>29 (11%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>276 (88%)</td>
<td>232 (89%)</td>
<td>.638</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>104 (33%)</td>
<td>66 (25%)</td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>114 (36%)</td>
<td>87 (33%)</td>
<td></td>
</tr>
<tr>
<td>35-54</td>
<td>82 (26%)</td>
<td>81 (31%)</td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>20 (6%)</td>
<td>31 (12%)</td>
<td>.024</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>212 (68%)</td>
<td>186 (73%)</td>
<td></td>
</tr>
<tr>
<td>Regional/remote</td>
<td>102 (32%)</td>
<td>69 (27%)</td>
<td>.160</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>242 (77%)</td>
<td>178 (70%)</td>
<td>.160</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>72 (23%)</td>
<td>77 (30%)</td>
<td>.050</td>
</tr>
<tr>
<td>Family with children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>131 (41%)</td>
<td>100 (38%)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>188 (59%)</td>
<td>163 (62%)</td>
<td>.455</td>
</tr>
<tr>
<td>Meal responsibility at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most responsibility</td>
<td>118 (90%)</td>
<td>82 (82%)</td>
<td></td>
</tr>
<tr>
<td>Little or no responsibility</td>
<td>13 (10%)</td>
<td>18 (18%)</td>
<td>.074</td>
</tr>
<tr>
<td>Self-rated health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent, very good, good</td>
<td>275 (86%)</td>
<td>206 (78%)</td>
<td></td>
</tr>
<tr>
<td>Fair, poor</td>
<td>43 (14%)</td>
<td>57 (22%)</td>
<td>.010</td>
</tr>
<tr>
<td>Weight status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>158 (52%)</td>
<td>116 (47%)</td>
<td></td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>148 (48%)</td>
<td>130 (53%)</td>
<td>.295</td>
</tr>
<tr>
<td>Mean days physically active per week (SD)</td>
<td>3.5 (2.0)</td>
<td>2.8 (2.2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean cups of soft drink per day (SD)</td>
<td>0.3 (0.8)</td>
<td>0.3 (0.9)</td>
<td>.761</td>
</tr>
<tr>
<td>Mean number of hours on Facebook per day (SD)</td>
<td>2.6 (1.59)</td>
<td>2.6 (1.96)</td>
<td>.938</td>
</tr>
<tr>
<td>Mean number of times logon to Facebook per day (SD)</td>
<td>12.4 (14.0)</td>
<td>12.6 (15.6)</td>
<td>.896</td>
</tr>
</tbody>
</table>

SD = standard deviation.

nomically advantaged areas (Table 1).

Almost all (85%) participants reported being fans of at least one healthy eating, active living, or healthy weight-related page (excluding MHN). On average, fans of MHN liked 2.6 health pages (range = 0-10), significantly more than non-fans, 1.7 (range = 0-8, mean difference = 0.9; 95% confidence interval [CI] = [0.6, 1.2]; p < .001).

Reasons for Engaging With MHN. Using the post-coded theme categories, the most commonly reported reason for liking the page was to get ideas, help, support, motivation, or inspiration (38%, n = 120). Other common themes included feeling that the campaign aligned with their personal values or interests (39%, n = 94); finding the content to be informative, practical, relevant, or helpful (17%, n = 53); and to support MHN (e.g., “[MHN] is a very important cause and I want to see it succeed.”) or raise awareness of the issue (14%, n = 44).

The most common reasons non-fans gave for not liking the page were being unaware that MHN had a Facebook page or that their exposure to the page had been very limited (39%, n = 21), had not thought to “like” it (19%, n = 10), and tend not to “like” anything on Facebook (e.g., “I don’t tend to like things on Facebook”; 11%, n = 6).

When fans were asked what they liked most about the page, 38% (n = 121) of responses conveyed that the MHN page provided sensible, practical, simple, or helpful tips to being healthy. The next most common category of response (15%, n = 48) was that the content was interesting, high quality, engaging, sharable, or inspiring. Other commonly expressed sentiments included that the page was informative (10%, n = 33), the values espoused by the campaign were laudable (10%, n = 33), that it was relatable or relevant (8%, n = 24), and that it was trustworthy, reputable, or evidence-based (6%, n = 19). With regard to aspects of the page least liked, the most common response was “nothing” (31%, n = 98), followed by that they do not see the posts often enough (17%, n = 53) and that the page needed more of particular content type, for example, videos, tips, testimonials, or links (7%, n = 23).

Experience With and Response to MHN. In general, participants did not interact frequently with the non-MHN health pages they had “liked” (Figure 2). When they did engage, this was most commonly viewing the page or its content and liking content. Patterns of engagement were similar for the MHN page and non-MHN health pages, with the exception that engagement with MHN occurred, on average, less frequently (p < .001 for all activities). For example, nearly half (46%) of fans reported never or rarely viewing MHN or its content, compared to 33% of participants when asked about the non-MHN health pages. Women engaged with MHN significantly less frequently than men, with the same direction of effect observed for other pages, although the result for non-MHN pages was non-significant (Table 2 and Supplementary Table 2). However, while there was strong evidence of a statistical difference between genders, on average, both men and women “rarely” engaged with the MHN page. Furthermore, participants who spent more time on Facebook per day engaged more frequently with MHN and with other pages (Supplementary Table 2).

Most fans reported an action outside of Facebook as a result of exposure to MHN content (Figure 3), most commonly “tried to change my behaviour or habits” and “visit the MHN website.” For every 1 year increase in age, participants were approximately 5% less likely to have done any of these off-Facebook actions, while participants who engaged more frequently with the MHN page were more than six times as likely to have done any of the actions (Table 3). No other significant differences were observed for any demographic or behavioral characteristics.
Our analysis gave rise to five main themes that could broadly be divided into those that relate to context and those that relate to content (Table 4 and Figure 4). Specifically, contextual factors are those that a user brings with them in engaging with the page, either through the reasons for engaging with MHN on Facebook (“Drivers”) or the way they use Facebook more generally (“User practices”). Content factors, on the contrary, are more closely related to the specific topics that were addressed in the posts (“Post subject”), to the look and feel of a page (“Presentation”), and the nature of the content

**Focus Groups**

Table 2. Generalized Linear Models Predicting an Increase in Mean Engagement With MHN and With Non-MHN Health Pages.

<table>
<thead>
<tr>
<th></th>
<th>MHN</th>
<th>Adjusted mean (95% CI)</th>
<th>Non-MHN health pages</th>
<th>Adjusted mean (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean engagement (SD)</td>
<td>Mean engagement (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.24 (0.63)</td>
<td>1.27 (0.78)</td>
<td>1.03 (0.69)</td>
<td>1.05 (0.98, 1.12)</td>
</tr>
<tr>
<td>Female</td>
<td>0.93 (0.59)</td>
<td>0.97 (0.89, 1.06)</td>
<td>1.08 (0.69)</td>
<td>1.08 (0.97, 1.19)</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>0.93 (0.59)</td>
<td>0.97 (0.89, 1.06)</td>
<td>1.03 (0.69)</td>
<td>1.08 (0.97, 1.19)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>1.09 (0.64)</td>
<td>1.21 (1.05, 1.37)</td>
<td>1.15 (0.76)</td>
<td>1.19 (1.05, 1.33)</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.92 (0.59)</td>
<td>1.08 (0.96, 1.20)</td>
<td>1.02 (0.68)</td>
<td>1.14 (1.03, 1.24)</td>
</tr>
<tr>
<td>Regional/rural</td>
<td>1.07 (0.62)</td>
<td>1.20 (1.05, 1.35)</td>
<td>1.15 (0.76)</td>
<td>1.14 (1.00, 1.28)</td>
</tr>
<tr>
<td>Family with children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.94 (0.58)</td>
<td>1.12 (0.99, 1.25)</td>
<td>1.00 (0.66)</td>
<td>1.08 (0.97, 1.20)</td>
</tr>
<tr>
<td>Yes</td>
<td>1.01 (0.64)</td>
<td>1.16 (1.03, 1.29)</td>
<td>1.15 (0.76)</td>
<td>1.19 (1.06, 1.31)</td>
</tr>
<tr>
<td>Weight status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy weight</td>
<td>0.94 (0.55)</td>
<td>1.15 (1.01, 1.28)</td>
<td>0.98 (0.68)</td>
<td>1.11 (0.98, 1.23)</td>
</tr>
<tr>
<td>Overweight</td>
<td>1.00 (0.66)</td>
<td>1.13 (1.00, 1.26)</td>
<td>1.15 (0.72)</td>
<td>1.17 (1.05, 1.28)</td>
</tr>
</tbody>
</table>

MHN = Make Healthy Normal; SD = standard deviation; CI = confidence interval.

Figure 2. Average frequency (0=never, 4 = almost always) of engagement with MHN page and other pages when using Facebook.
The utility of the content. These five main themes and 13 sub-themes are discussed in detail below.

**Contextual Factors**

**Drivers.** During the discussions, it became clear that participants had a number of reasons for engaging with MHN on Facebook that had little to do with the specific content or implementation of the MHN Facebook page. Rather, they came from established beliefs and norms about Facebook, health, and the role of government. We characterized this theme as having three subthemes: (1) centrality of social media, (2) trustworthiness, and (3) MHN as social benefit.

**Centrality of social media.** One of the major reasons participants engaged with MHN (and similar Facebook health pages) was because social media is central to their lives and represents a means to explore and connect with their interests. Integral to this was Facebook’s dominance as a social media platform, especially for older participants. Although some participants, particularly younger participants, preferred other platforms, especially Instagram, Facebook was commonly seen as essential to modern life because “everyone is on it.”

Participants reported always being connected to social media and seeing it as an integral part of how they communicate with friends and family, seek out news and information, and pursue their personal and professional interests. Many found it difficult to estimate the amount of time they spent each day on social media, explaining that they would look at social media whenever they had the opportunity. When
questioned further, some professed that they spent “too much” time on social media, which was usually met with laughter and agreement from other participants, underscoring the ubiquity and habitual nature of engagement with social media.

**Trustworthiness.** In order for participants to be willing to engage with MHN and similar pages on any level, they needed to perceive these pages and their administrators as trusted sources of information. The MHN page was perceived as “trustworthy” as it is government run; pages backed by government health departments were afforded trust based on a belief that the government’s motivation would be social benefit (see below), rather than private profits. Trustworthy pages gave a sense of authority or expertise, were evidence-based, and were perceived as balanced. Established or well-known brands, like the WHO and large media outlets, were also trusted, as were qualified professionals and experts (including celebrities like Jamie Oliver). Seeing that particular Facebook friends had engaged with a page also conferred trust in that page. Pages that presented unscientific or unrealistic advice or content or extreme or fringe views were considered untrustworthy, as were pages that appeared to have an ulterior motive, such as to sell something.

**MHN as a social benefit.** A key reason for engaging with MHN specifically was that it was seen as providing a social benefit. Although most participants, even the fans, professed to know little about MHN as a campaign, there was agreement that campaigns of this nature are important initiatives, worthy of government attention and public support. Many of the younger participants, in particular, expressed personal support for the aims of the campaign, particularly the desire to change what is considered “normal.” These participants firmly believed that, while they themselves were “healthy,” many people in the broader community needed to improve their lifestyles. In this way, participants indicated that their current (or potential) engagement with MHN was motivated by a desire to support what was considered a worthy initiative, rather than to improve their own health.

**User Practices.** The second contextual factor reflects users’ established habits and practices on Facebook. These were unrelated to MHN but were nonetheless critical in determining when and how users would engage with the page.

**Follow and Forget.** Fans of MHN could generally not recall the last time they had seen or engaged with MHN content or what had drawn them to like the page in the first place. This reflects a very influential Facebook practice, that of “follow and forget.” Participants explained that once they had become a fan of a page, they would rely on its content appearing in their newsfeeds, rather than actively seeking out content by visiting the page itself. Many commented that this behavior was related to the large amount of content in their feeds, which discouraged active searching of pages and
<table>
<thead>
<tr>
<th>Themes and subthemes</th>
<th>Illustrative quotes</th>
<th>Participant characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contextual factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drivers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centrality of social media</td>
<td>And I think that's the main reason why I got on Facebook, because everyone else is using it, and that's just the easiest way to get every single person . . . Yeah, I mean [Facebook's], it's always there. Like, it's just one click away. . . .</td>
<td>18- to 30-year-old non-fan</td>
</tr>
<tr>
<td></td>
<td>It's good because you can search whatever you're interested in. Whatever interest you have. You know, be it music, or an artist, or clothes, or tattoos, or whatever.</td>
<td>30- to 50-year-old fan</td>
</tr>
<tr>
<td>Trustworthiness</td>
<td>Say it's The Sydney Morning Herald or Fairfax or Al Jazeera or whatever, once I just see their name I'll stop to look at whatever they're posting about regardless of what the photo is. [MHN's] not some dodgy click-bait site that you're just scared to even look at. Yeah, so. I would totally trust it in that way.</td>
<td>50+ year-old fan</td>
</tr>
<tr>
<td></td>
<td>I just think that's the scary thing is what's the validity of this information [on Facebook]? Like, how much can we trust it?</td>
<td></td>
</tr>
<tr>
<td>MHN as a social benefit</td>
<td>Participant 1: I've always appreciated governments putting the resource back into making the population better. Participant 2: . . . I probably liked [MHN] straight away because yeah, similarly, I think that these campaigns are really helpful to the general population.</td>
<td>18- to 30-year-old fans</td>
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<td>I think it's a great idea. Yeah. I think that's good that they do really push that. Just personally, myself, I'm pretty happy with my diet, and the way I live my life is pretty healthy. So, I'm pretty happy, in that respect, so I probably won't be looking for that sort of stuff on [Facebook]. But just actually pushing the message and getting it out there about healthy lifestyle I'm really, really impressed that they're doing something like that and hopefully it's a success.</td>
<td>30- to 50-year-old fan</td>
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<td><strong>User practices</strong></td>
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<td>Follow and forget</td>
<td>Participant: Sometimes I'll save quite a few of the little videos that come up on Facebook that are like the super quick, 30 second [recipe] videos that actually would probably take 15 minutes [to prepare]. Moderator: And which pages are you getting those videos from, typically? Participant: I wouldn't even be able to tell you. No idea. Moderator: So how do you go about finding them? Participant: They just pop up. I'd like seeing [MHN content] come up more often. I feel like some things come up in newsfeed all the time, certain pages.</td>
<td>18- to 30-year-old, non-fan</td>
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<td>I actually don't go back to pages I've “liked”. I just kind of like seeing what the latest news is.</td>
<td>30- to 50-year-old fan</td>
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<td>(Continued)</td>
<td>50+ year-old non-fan</td>
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<tr>
<td>Themes and subthemes</td>
<td>Illustrative quotes</td>
<td>Participant characteristics</td>
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<td>Selective sharing</td>
<td>I’d describe myself as a lurker. As bad as that sounds. I very rarely post anything. Very rarely comment on much, on other people’s stuff. It’s more just literally tagging people in memes or responding to people tagging me in memes. Very rarely anything else. Sometimes I share the health [Facebook pages] . . . I’ll share that, like if it’s a health message I thought people might wanna hear. Cause they might be hearing a lot that says, “Isn’t alcohol fantastic?,” and “Isn’t Jim Beam your best friend?,” and all that. You’ve got to counter it a bit.</td>
<td>18- to 30-year-old non-fan</td>
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|                      | Moderator: What makes the cut when it comes to sharing something?  
|                      | Participant: Inspirational, meaningful. Something that they think they’re gonna get something out of.                                                                                                                                                                        | 30- to 50-year-old fan      |
| Content factors      | Recipes                                                                                                                                                                                                              | 50+ year-old non-fan        |
| Post subject         | sauces give you good ideas, like how to organize and sort of cook for the week [but] in a way that is healthy and cheap, and just being more involved with what you’re eating.  
|                      | I think practical advice, not just, like, “eat more vegetables.” Okay, “how do I do that?” . . . Or, like, something where you could type in, “I have these products in my fridge and pantry, what could I make with this?” It’s kind of like, it’s interactive, and it’s kind of then tailored to you, as well.  
|                      | Recipes. Ideas. You know, healthy foods. . . . And so when something pops up and you just “oh! That’s a good idea. I might try that.” So it’s kind of refreshing.                                                                 | 18- to 30-year-old fan      |
|                      | 30- to 50-year-old non-fan                                                                                                                                                                                           | 50+ year-old fan            |
|                      | Active events                                                                                                                                               | 18- to 30-year-old non-fan  |
|                      | [Figure 1b is] promoting activity. It’s promoting people doing things together. It’s promoting events that encourage doing things in a fun way. I guess it’s showing that exercise doesn’t have to be horrible.  
|                      | [MHN’s] missing that link isn’t it, between you engage with the social media and you think “I wanna do that. I wanna make a change.” And then it’s like, taking that first step. Like, that link is kind of missing, to either engage you with a group that you—a local group—or something that you could join, or “here’s what’s available in your community.” Know what I mean?  
|                      | And also perhaps a way for people to formulate small community groups. For example, there might be an area on the page where people are interested in forming a walking group in Parramatta or Bondi Beach or wherever and they can put their names up and someone can say “okay, well I’ll organise it.”                                                                 | 30- to 50-year-old fan      |
|                      | 50+ year-old non-fan                                                                                                                                                                                                | 50+ year-old non-fan        |
|                      | Presentation                                                                                                                                               | 18- to 30-year-old fans     |
|                      | Personal relevance                                                                                                                                                                                                 | 30- to 50-year-old fan      |
|                      | Participant 1: [MHN]’s going to be for literally everyone, from your mums to your 60-year-olds to your 20-year-olds to your, even—I would expect 15-year-olds. . . .  
|                      | Participant 2: And even advice across the lifespan, because you need different things, different exercises are suitable.  
|                      | The name [MHN] spoke to me. I could relate to it . . . I’ve got a two year old and I just wanna understand how to teach her to eat well, to eat better, to have better habits than I have, basically.  
|                      | I like that there’s no natural photo of someone [as the banner image on the MHN page] because then it’s hard to relate to it for everybody so the fact that it’s a drawing rather than a photo is good.                                                                                                                                  | 50+ year-old non-fan        |
Table 4. (Continued)

<table>
<thead>
<tr>
<th>Themes and subthemes</th>
<th>Illustrative quotes</th>
<th>Participant characteristics</th>
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<tr>
<td><strong>Positivity</strong></td>
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<td>Participant 1:</td>
<td>[The MHN page is] open and relaxed.</td>
<td>18- to 30-year-old fans</td>
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<td>Participant 2:</td>
<td>Yeah, positive and suggestive, not forceful.</td>
<td>30- to 50-year-old fan</td>
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<td>[Figure 1c] is almost like it’s a bit backwards. . . . It’s quite negative. . . . I want something that’s going to say to me “go out for a walk.” Not “normal says just drive.”</td>
<td>50+ year-old non-fan</td>
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<td>I like to look at articles or posts from people who inspire me, like Depak Chopra, or, you know. . . . Something I’m gonna learn. And it’s gonna make my life better.</td>
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<tr>
<td><strong>Importance of visuals</strong></td>
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<td>I feel like the video [Figure 1d] looks a little bit low quality. It looks like it’s been filmed on a phone. . . . the lighting isn’t that great. . . . ‘cause “medium heat—spray lightly with oil” doesn’t really tell me about what I’m going to watch, so . . . It could be anything. Lots of colours [in Figure 1a] . . . Lots of yummy looking food.</td>
<td>18- to 30-year-old non-fan</td>
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<td>The photo’s [not good] . . . You’ve got to be really careful with photos you choose.</td>
<td>30- to 50-year-old non-fan</td>
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<tr>
<td><strong>Nature of content</strong></td>
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<td><strong>Responsiveness</strong></td>
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<td>18- to 30-year-old fan</td>
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<td>I think as well [MHN] might’ve done a thing a while ago that was about correct portion sizing, and again, it was something interactive. . . . I guess there’s a big misconception about what is overweight, what’s obese, and actually, most of the population is overweight. . . . so it was kind of saying instead of your plate being half meat, half vegetable—no. It should be maybe, what? A quarter or less meat, majority should be salad, vegetables. There should be a small amount of carbs. I guess those are things that people would think are obvious but they’re not because so many people get it so wrong. . . . [pages like MHN should be] separating fact and fallacy with nutrition, because there is so much stuff out there at the moment that it’s just . . . getting mixed messages.</td>
<td>30- to 50-year-old fan</td>
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<td>I think it would be very good if a page like that was tuned into the stuff that’s coming through the general media on a daily basis. And . . . gets onto it quickly. So, the next morning you’ve seen a show that’s talked about the coffee and the 75,000 person study that they did for 25 years that proves that four cups of coffee increases your life expectancy by five years. Amazingly. But to have that introduced and available the next day as an area of discussion.</td>
<td>50+ year-old non-fan</td>
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<td><strong>Novelty</strong></td>
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<td>18- to 30-year-old fan</td>
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<td>I feel like [MHN] needs to be informative, but I guess a balance of not an overload of information that’s also not one sentence. Like, I’ve seen ones that are like, “Drink water everyday,” and it’s like, “okay, knew that, moving on.”</td>
<td>30- to 50-year-old non-fans</td>
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<tr>
<td>Participant 1: Variety is engaging.</td>
<td>50+ year-old fan</td>
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<tr>
<td>Participant 2: Because we’re more likely to stay and look at it if [there’s variety].</td>
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<td>[MHN’s] a bit limited and a bit boring . . . [sarcastic tone] Yeah but who would ever have thought that, you know, I should have fruit and vegetables. “Wow, I never thought of that! Bigger me.” You know?</td>
<td></td>
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<tr>
<td><strong>Simplicity with depth</strong></td>
<td></td>
<td>18- to 30-year-old non-fan</td>
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<td>With the Facebook videos, when they put up little recipes and stuff, if they haven’t put the recipe in the first comment . . . I wouldn’t bother to click on links and then filter through searches and stuff. It’s really practical, it looks nice, and I go, “Oh, that’s really easy, I could actually make that.”</td>
<td>30- to 50-year-old non-fans</td>
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<td>The perfect diet, to me, for me to prepare it—because I cook and everything—is telling me what I’ve got to have for breakfast, lunch, and dinner. But . . . some diets tell you to do all of these exotic foods and you know, just basic things. . . . Keep it simple.</td>
<td>50+ year-old non-fan</td>
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made it easy to miss content that did not immediately stand out. Regular exposure to content from a particular page was seen as important as, without this, pages are forgotten and are perceived as stale and out-of-date, making their messages easier to dismiss.

Selective Sharing. Participants talked about being very discerning with what they would share on Facebook. This was driven partly by privacy concerns, partly by concerns of being seen as an “over-sharer” (someone who disclose too much information about themselves), and partly by the type of Facebook user participants were. With regard to the latter, most participants considered themselves to be “lurkers”; users who did not post much of their own content but preferred to simply scroll through their newsfeed and see what others had posted. These users preferred to tag specific friends in posts rather than share a post to everyone in their network. Active users, on the contrary, were more willing to share posts where they felt strongly that there was a communal benefit for doing so; that is, they had a strong feeling that the information they were sharing would be of use or interest to everyone.

In summary, the reasons participants gave for engaging with the MHN page and in assessing its utility were backgrounded by general modes of interacting with Facebook. It appears that government health pages have a pre-existing attraction which is grounded in trustworthiness and social benefit, a context which primes participants for engaging with pages such as MHN. Once a page has been noticed, further interaction with that page is partly dependent on the user’s habitual ways of interaction with Facebook, in terms of passive or active seeking of that page’s content and their comfort with sharing content.

Content Factors. The contextual factors described above formed the backdrop for how and why participants engage with MHN or other similar health pages. Their explanations also made reference to more specific details about the content they expect and respond to on health pages. Our analysis has divided these elements into three themes, each with its own subthemes: (1) the nature of the content, (2) presentation, and (3) post subject.

Nature of Content. The nature of the content was important in maintaining participant interest. This reflects stylistic features of content that relate to what is conveyed, as opposed to presentation, which relates to how it is conveyed. We identified three subthemes to this theme: (1) responsiveness, (2) novelty, and (3) simplicity with depth. These represented the underlying essence or composition of the content.

Responsiveness. As mentioned above, participants used Facebook as a news source and therefore wanted health-related pages to respond quickly to emerging information and issues. This was expressed as an interest in hearing about the latest scientific evidence and what it meant for them and their lifestyle and a desire to have controversial or unscientific advice explained, challenged, or debunked in real time. There was also a perception that guidelines and evidence were constantly changing, leading to confusion as to what is and is not healthy. For example, both 50+ year-old groups raised the issue in the context of knowing how much physical activity they should do, which was prompted by the recent heart attack death of a prominent 47-year-old former athlete. These participants were concerned that they could do “too much” physical activity and might therefore be putting themselves at greater risk of heart attack.

Novelty. The discussions suggested that pages and content had to be informative while also being new or different to attract and maintain interest and engagement. Participants wanted ideas and inspiration for what they could do so messages that were perceived as being “old news” (e.g., that people should drink more water) would be ignored or dismissed easily. It was also important to see this new content regularly. “New” did not necessarily mean a new message; it could be the same message presented in a different way. While MHN content was felt to have potential, its novelty was often thought to be lacking.

Simplicity with depth. According to participants, messages and ideas posted on a health page needed to be simple and easy-to-understand. “Good” content was that which conveyed a clear message in as few words as possible or with no words at all (e.g., Figure 1a and b). Most participants felt they would quickly dismiss anything that required them to think too long or hard to understand it. Such content might have contradictory messages or messages that required decoding or additional reading to interpret (e.g., Figure 1c and d).

At the same time, if their initial interest was stimulated, participants also wanted the option of being able to find out more about the message or idea in a post (e.g., written recipes, links to further information, etc.). There was, however, disagreement across the groups as to whether this additional information needed to be in the post itself or accessible via a link. Older participants preferred a link while younger participants (18- to 30-year-olds) were less inclined to click on links and leave Facebook.

Presentation. Participants also discussed stylistic features that related to how content was presented: (1) personal relevance, (2) positivity, and (3) appealing visuals. These reflected the tone, feel, and appearance of posts and were influential in grabbing and maintaining interest in a piece of content.

Personal relevance. Participants needed to be able to relate to the page and its content to maintain their interest. This meant that the content should be relevant to their...
lifestyle, taking into account competing priorities and demands on their time and balancing the needs of the individual against the needs of their family, for example. Some suggested this could be achieved through personal stories from individuals who were “just like them” and had managed to make changes for the better. Others emphasized the importance of having images and messages that were appropriate to the intended audience and did not patronize or shame them. For instance, the image used in Figure 1c was felt by some participants to be stigmatizing and more likely to discourage action.

**Positivity.** Participants wanted the tone or feel of content to be upbeat, light, and positive. There was a general consensus across all age groups that pages needed to be positive to be inspiring and motivating, which participants believed would help them to achieve their personal health goals. Pages that focused on the consequences of unhealthy lifestyle were dismissed as being uninteresting or unappealing because they were seen as demotivating, unhelpful, and potentially patronizing. Related to this, a few participants suggested that some people may want to connect with other users for social support but this did not seem to be of personal interest to the participants.

**Importance of visuals.** Participants reported needing appealing and eye-catching (still) images in order for them to stop scrolling through their newsfeed and pay attention to content, including the thumbnail image used for videos. The thumbnail for an instructional recipe video (Figure 1d), for instance, was thought to be unlikely to grab the attention of participants because the finished product is not shown and the text in the thumbnail was deemed uninteresting and not revealing. Bright colors, appealing food, and well-composed photos were mentioned as important features of still images. Videos also needed to be well-produced, with consideration given to lighting and the composition of each shot, including the background. Participants described such videos as appearing “professional.” Videos without high production values were less likely to be watched because they were considered unimpressive and lacking authority or authenticity.

**Post Subject.** In addition to the stylistic features, we found that there were two particular subject areas about which participants were interested in receiving information or instruction from a page like MHN: (1) recipes and (2) active events.

**Recipes.** Recipes and meal planning were often the first mentioned by participants when asked what kind of posts they engaged with or wanted from health-related Facebook pages. Many participants professed to be followers of recipe-generating pages (e.g., Tasty, Taste, Jamie Oliver) but were aware that such pages often did not have health as an underlying goal. Participants wanted recipes that were healthy while also being appealing and simple, which meant being tasty, using commonly available ingredients, and being relatively quick and easy to make. At the same time, they also wanted variety in the types of meals and snacks that were shown, a driving factor in many participants’ decisions to engage with multiple recipe-generating pages. Participants responsible for preparing and cooking meals for a household, particularly for children, were the most interested in recipes and meal planning advice.

**Active events.** Although mentioned by fewer participants than recipes, there was some interest in being kept up to date on local events and classes that involved physical activity. “Local” was a relatively fluid concept: events could take place near where participants lived or worked (e.g., small yoga or exercise classes) or be large-scale, city- or state-wide events (e.g., fun runs like City2Surf; http://city2surf.com.au/). In addition, some participants discussed having a place on Facebook for users to organize walking or exercise groups with other users with whom they had no pre-existing relationship. However, this tended to be discussed as something that might interest other people, rather than something of personal interest. A small number of participants mentioned the possibility of including videos of exercise routines but, again, this was generally discussed as being of interest to others, rather than themselves.

In summary, if a Facebook user has an underlying interest in health pages making him or her receptive to the broad idea of campaigns with a Facebook presence such as MHN, this does not translate to steady engagement with posts, even when the user is following the page. According to our focus groups, the content needs to be presented and formulated to pique users’ attention, be applicable in their everyday life, and address topical concerns in health.

**Discussion**

To our knowledge, this study is the first to report on users’ experience and satisfaction with a public health campaign Facebook page and therefore provides new and useful insights for public health policymakers and practitioners. Our findings show that health pages like MHN are in demand but that there are critical contextual and content factors that will influence the level of engagement users have with a page. Public health organizations, including government health departments, are well placed to meet this demand as the contextual factors are, in part, working in their favor: they are generally seen to be conducting campaigns to benefit society and as trustworthy sources of health information and advice, which is consistent with available evidence (Grunseit et al., 2018). However, our findings also indicate that this trust is not sufficient for maintaining engagement; the content also needs to be of a high standard, meeting user
expectations of nature, presentation, and subject. This highlights the need for sufficient, ongoing investment in the page and its content.

Our results suggest that users attracted to MHN and similar pages are generally very interested in health and value health highly, with survey participants tending to be fans of several health-related pages and many participants in both the survey and focus groups expressing personal support for the campaign’s aims. Although we cannot be sure of the sample’s representativeness, users attracted to this content appear to be healthier than the general population (Australian Institute of Health and Welfare [AIHW], 2016), particularly MHN fans who were on average more physically active and more likely to have a higher self-rated health compared to non-fans. Overweight and obese participants also appeared to be underrepresented in our survey sample, compared to the general population (AIHW, 2016). This might reflect the opt-in nature of Facebook pages, which means that users have greater control over what content they see, compared to traditional broadcast media (Smith, Niederdeppe, Blake, & Cappella, 2013), making it easier to avoid what might be challenging content. Alternatively, it could be that those who are already healthy are more attracted to health-related content on Facebook. Future research could explore if and how pages like MHN could attract different populations, including understanding who does not engage with health-related content on Facebook and why.

Page administrators for MHN and similar health-related pages can use our findings to guide their decisions about where and how to invest their resources. Both our survey and focus groups results highlighted a number of influential contextual and content factors that are important in generating and maintaining engagement with a page like MHN. It is important that practitioners consider both of these factors when designing and managing their own Facebook pages as they appear to be influential in determining the relative success or failure of a page. However, the level of influence over which page administrators have on these factors varies, with more influence able to be exerted over content factors than contextual factors (illustrated in Figure 4). For instance, our results suggest that MHN could look to introduce a direct link between the campaign and active events, similar to that seen in Sport England’s (2016) This Girl Can campaign, and to focus on creating and sharing high quality, varied, and simple healthy recipes. Recipes in particular appear to be an opportunity to meet a major consumer demand and, potentially, influence nutrition through Facebook. Participants were interested in accessing recipes despite the fact that recipes are available on myriad high-profile Facebook pages and through other online sources already. This finding may in part reflect confusion among consumers around how to apply dietary advice and guidelines in everyday life (Boylan, Louie, & Gill, 2012), and also a dearth of trusted, health-focused recipe pages (Kite et al., 2016).

Contextual factors, on the contrary, cannot be controlled directly by page administrators. It may be possible, however, to leverage or manage these factors to build or maintain engagement. For example, we found that it was rare for people to initiate an unprompted visit to the MHN page or similar pages, consistent with previous research (Woolley & Peterson, 2012). Participants instead preferred to encounter content in their newsfeeds. However, a key complaint about MHN from both survey and focus group participants was that they did not see the content often enough. Administrators could therefore look to manage this user practice of “follow and forget” by focusing on creating visually appealing content that will grab attention and by regularly paying for boosts to maximize reach. Similarly, MHN could look to create novel and sharable content to leverage the general support for MHN’s aims and its perceived trustworthiness and to capitalize on the practice of selective sharing. Our results suggest that one possible avenue for such content is to respond to current issues and controversies as it would likely be considered interesting and relevant to users’ networks, increasing its likelihood of being shared (Syn & Oh, 2015). There is also evidence showing that exposure to conflicting or confusing nutrition information is associated with confusion as to what constitutes a healthy diet and a loss of trust in health experts and their recommendations (Nagler, 2014).

Therefore, this is an avenue that would not only address a clear need but also help to build and maintain trust in public health experts and organizations. It would also take advantage of social media’s unique ability to connect promptly and directly with the audience, something that cannot be done through traditional broadcast media (Freeman & Chapman, 2008). However, providing such responsive content would likely mean investing additional resources to be able to respond quickly and accurately to events and audience requests. Failure to invest sufficient resources would present a significant risk as errors or a failure to respond in a timely fashion would likely undermine the perceived trustworthiness of a page.

A major gap in this research is that we were unable to explore adequately the impact of exposure to MHN on Facebook on knowledge, attitudes, and behaviors. In the survey, most fans reported doing something outside of Facebook in response to MHN content, most commonly that they tried to change their own behavior. While at face value this is encouraging, it is unclear what this might mean in practice. Participants, for instance, might have answered “yes” to this question when they had tried to make one recipe or when they had made a permanent change to their dietary habits, two behavioral changes that have vastly different implications for population health. However, a robust evaluation of the impact of a Facebook page on population health would be difficult in the current fractured media environment (Regional TAM et al., 2016). Indeed, our focus group participants generally could not remember their last interaction with the MHN page or its content and otherwise had trouble
identifying the source of “good” and “bad” content. This would make it difficult for any evaluation to attribute campaign effects to a specific Facebook page, highlighting the need for comprehensive evaluations of entire social marketing campaigns and broader health strategies (Kite et al., 2015) and for exploring innovative approaches to evaluating future campaigns (Niederdeppe, 2016).

This study had a number of additional limitations. First, the recruitment strategy meant that participants may not be representative of the broader NSW adult population, Facebook users generally, or fans of the MHN page specifically. However, given the evaluation was focused on users’ experience and satisfaction with the MHN page, rather than population-level impact, this bias does not discount our findings, but rather limits it to the subgroup who participated. In addition, the survey sample size achieved was significantly below expectations, reducing the power to detect differences between groups. For practical reasons, we could not collect data and conduct analysis simultaneously, therefore sampling was not based on theme saturation. This may mean that some themes remain unidentified, requiring further research. Furthermore, as the results relate predominately to one specific page that targets overweight and obesity, they may not be generalizable to other pages. Further research with similar pages and with pages addressing different health issues is necessary to identify consistent challenges and effective solutions. Finally, our findings relate specifically to Facebook and may not be relevant to other social media platforms.

Conclusion

Our findings make it clear that Facebook, and social media more generally, will continue to be a key channel for health communication because of its centrality to modern life. There is demand for the content and information that MHN aims to provide, although there is room for the page to improve its reach and the appeal of its content to better meet this demand. Page administrators may be able to directly and/or indirectly influence contextual and content factors to improve a page’s appeal and its reach. In particular, there is scope to produce responsive, novel, and sharable content through timely posting of evidence-based information on health and lifestyle in response to current events. Ongoing evaluation will be necessary to further explore these contextual and content factors and to refine content to ensure relevance and attractiveness. This includes considering ways to determine the relative contribution of the Facebook page to the overall impact of the broader MHN campaign.

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Supplemental Material

Supplemental material for this article is available online.

References


Supplemental Material


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6.3 Generating engagement on the Make Healthy Normal campaign Facebook page (published paper)


Link: [https://publichealth.jmir.org/2019/1/e11132/](https://publichealth.jmir.org/2019/1/e11132/)
Generating Engagement on the Make Healthy Normal Campaign Facebook Page: Analysis of Facebook Analytics

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Abstract

Background: Facebook is increasingly being used as part of mass media campaigns in public health, including the Make Healthy Normal (MHN) campaign in New South Wales, Australia. Therefore, it is important to understand what role Facebook can play in mass media campaigns and how best to use it to augment or amplify campaign effects. However, few studies have explored this.

Objective: This study aimed to investigate usage of and engagement with the MHN Facebook page and to identify influential factors in driving engagement with the page.

Methods: We examined both post-level and page-level analytic data from Facebook from the campaign’s launch in June 2015 to September 2017. For post-level data, we conducted a series of negative binomial regressions with four different outcome measures (likes, shares, comments, post consumers), including some characteristics of Facebook posts as predictors. We also conducted time series analyses to examine associations between page-level outcomes (new page likes or “fans” and number of engaged users) and different measures of exposure to the page (number of unique users reached and total count of impressions) and to television advertising.

Results: Of the 392 posts reviewed, 20.7% (n=81) received a paid boost and 58.9% (n=231) were photo posts. We found that posts that received a paid boost reached significantly more users and subsequently received significantly more engagement than organic (unpaid) posts (P<.001). After adjusting for reach, we found the effect of being paid was incremental for all outcome measures for photos and links, but not videos. There were also associations between day of the week and time of post and engagement, with Mondays generally receiving less engagement and posts on a Friday and those made between 8 AM and 5 PM receiving more. At the page level, our time series analyses found that organic impressions predicted a higher number of new fans and engaged users, compared to paid impressions, especially for women. We also found no association between television advertising and engagement with the Facebook page.

Conclusions: Our study shows that paying for posts is important for increasing their reach, but that page administrators should look to maximize organic reach because it is associated with significantly higher engagement. Once reach is accounted for, video posts do not benefit from being paid, unlike the other post types. This suggests that page administrators should carefully consider how they use videos as part of a Facebook campaign. Additionally, the lack of association between television advertising and engagement suggests that future campaigns consider how best to link different channels to amplify effects. These results highlight the need for ongoing evaluation of Facebook pages if administrators are to maximize engagement.

https://publichealth.jmir.org/2019/1/e11132/
social media; Facebook; overweight and obesity; mass media campaign; evaluation

Introduction

Background

Facebook is the largest social media platform in the world, with more than 1.4 billion daily users on average in December 2017 [1]. In Australia, nearly two-thirds of adults have a Facebook profile, making it the most popular social media platform in the country [2]. It is also the most intensively used social media platform; around 40% of Australian Facebook users log in 20 times or more per week. Further, Facebook is one of the most commonly used social media platforms for engaging with health issues [3]. It is not surprising then that public health organizations are using Facebook to communicate their messages, either as stand-alone campaigns or as an additional channel in a broader mass media campaign [4,5]. In both cases, organizations are seeking to capitalize on the wide reach of Facebook, the ability to engage directly with their target audiences, and the potential for generating marketing directly between consumers (word-of-mouth marketing), which lends credibility to a brand and is known to be one of the most trusted forms of marketing [6-8]. Within mass media campaigns specifically, the intention is that Facebook posts will augment or amplify campaign messages and, in so doing, increase the impact of the campaign [9].

The theory behind Facebook use for public health communication places “engagement” as a critical first step in achieving change. Creating engagement, defined as users “liking,” sharing, commenting, or clicking on any content, is important for two main reasons: it demonstrates that the content is attention grabbing and it directly influences the reach of the content and of future content through the Facebook algorithm [10]. The algorithm determines the amount of exposure a post receives and to whom it is shown, although it should be noted that Facebook has revealed little on the specific parameters it uses to prioritize posts. However, what is clear is that the characteristics of the post and the engagement it receives are factors in the algorithm’s calculations [4], making it essential to investigate what drives engagement in order to maximize Facebook’s marketing potential for public health campaigns. Facebook also allows page administrators to pay to increase the reach of a post, making it important to investigate the interaction between paying for posts and other post characteristics.

Despite the potential of Facebook and other social media for public health and health communication being well recognized [11-14], there is limited evidence available to guide practice. The evidence we do have is often either descriptive or based on small-scale trials [5,15-18], with suggestive but modest evidence that social media can be effective in changing health outcomes [19,20]. How to build engagement with health content on Facebook has been recognized as one area in particular need of more evidence given the role it plays in the theory of health communication on social media [21]. Currently, there is some evidence that testimonials, positive emotional appeals, and informative posts are associated with higher engagement, whereas posts that evoke negative emotions, use conventional marketing techniques (eg, sponsorships), or are posted during or after work hours are associated with lower engagement [4,22-24]. Similarly, posts that use photos and videos appear to generate higher engagement, although this is most likely due to the Facebook algorithm preferring such content over other post types. In addition, one study that examined 20 public health Facebook pages covering a range of health issues speculated that particular health issues may be more suitable to Facebook [4]. However, they lamented that they were unable to test this, highlighting it as an area worthy of further research.

In addition, the available evidence has limited relevance to mass-reach campaigns, creating the risk that social marketers will use Facebook without considering what strategy they should employ to best use the platform in a broader campaign [25,26]. It is therefore important to investigate associations between Facebook engagement and traditional communication channels such as television. To our knowledge, no study has examined these associations. The evaluation of the Tips From Former Smokers (Tips) antismoking campaign in the United States did provide some insights into the relationship between online and traditional television marketing for public health purposes, although how relevant this is to Facebook is uncertain. Tips showed an association between television advertising and online behaviors, including increased visits to the campaign website and other cessation-related websites and searches for cessation information [27,28]. The evaluation also found that digital video was more cost-efficient at generating awareness compared to television, although the authors note that television advertising is still important because it reaches more people [29]. Another study compared the cost-effectiveness of three media formats (television, online video, and online display advertising) for delivering an antismoking campaign [30]. This study found that online display advertising was the most cost-effective way of achieving Web page views, calls to the Quitline, online registrations for a cessation support service, and requests for the smoking cessation information pack. This was followed by a combination of online video and online display, with television alone the least cost-effective. Collectively, these studies suggest that online media present a potentially useful contribution to the reach and effectiveness of antismoking campaigns, but its role in other campaigns is yet to be explored.

To our knowledge, no population-level mass media campaign has reported specifically on their use of Facebook for public health purposes. Such information is only going to become more valuable as media consumption habits are changing rapidly [31], creating questions about the accuracy of conventional wisdom on “what works” in mass media campaigns. It will also help to understand how to optimize the use of Facebook as part of a wider mass media campaign. Here we report an evaluation of the Facebook page component of an obesity prevention lifestyle campaign, Make Healthy Normal (MHN).
The Make Healthy Normal Campaign
The MHN campaign was launched in New South Wales (NSW), Australia, in 2015, with the aim of challenging the normalization of being unhealthy and promoting physical activity, healthy eating, and healthy weight. The campaign initially targeted all adults but focused on parents with children aged 5 to 12 years and men aged 35 to 54 years from May 2017. The bulk of the advertising expenditure was directed toward television, but the campaign also made use of other channels, including Facebook. More details on the campaign are available elsewhere [32].

Briefly, the campaign was centered on two television commercials that juxtaposed unhealthy and healthy choices relating to nutrition and physical activity, while also making use of a number of other support channels, of which Facebook was one. The television commercials and most other campaign materials included the MHN website address but did not mention the Facebook page.

The MHN Facebook page had, at the time of writing, posted more than 400 times, generating over 100,000 likes, comments, and shares, and had over 32,000 page “likes” (hereafter “fans”). The page style is intended to be conversational and supportive, highlighting easy ways to eat healthier and increase physical activity, and promoting relevant NSW Government programs. The page uses both paid and organic posts (ie, content that is and is not paid advertising). The Ministry employed a strategy of paying for boosts on all posts during a specific period, as opposed to selectively boosting some posts and not others. This decision was based largely on practical considerations, especially the availability of funding.

This study aimed to investigate usage of and engagement with the MHN Facebook page as part of a broader multichannel campaign since its inception in 2015. Our research questions were: (1) What post characteristics influence the level of engagement a post receives and to what extent? (2) What page-level factors influence the number of fans, the characteristics of fans, and the engagement of fans with the MHN page over time? and (3) Is there a relationship between television advertising for the broader campaign and page-level engagement?

Methods
Study Overview
Facebook provides analytics (called “Insights”) to page administrators to help them monitor and understand usage of their page. In this study, we analyzed the Insights data for the MHN page since June 2015 (when the campaign launched) through to September 2017. This study was approved by the University of Sydney’s Human Research Ethics Committee (protocol number: 2017/145).

Measures
Post-Level Data
We explored the characteristics of posts and their associations with engagement metrics (Table 1). Characteristics of posts included the post type, the date and time of the post, whether the post included a paid boost (paid posts tend to have a much greater increase in their reach), and the targeted behaviors. We also coded the content of the post using a modified version of the communication technique code frame developed in an earlier study [4]. The code frame was modified by collapsing some categories due to the relatively small number of posts compared to the original study. Engagement metrics were operationalized through the number of likes, shares, comments, and post consumers. Although likes technically include other Facebook “reactions” (eg, “love” and “haha”), we refer to this metric as “likes” because reactions were only introduced by Facebook a year into the campaign and the number of other reactions per post after that time was very low, typically zero.

Communication technique and target behavior were coded manually. Two coders independently coded each post, with interrater agreement for the communication techniques and target behaviors of 70% and 91%, respectively. Differences were resolved by discussion or referral to a third coder.

Page-Level Data
We used page-level data to examine the associations between the number of fans, the characteristics of fans, and the engagement of fans with campaign activity using the measures described in Table 2. Campaign activity was operationalized through weekly page impressions, separated by whether they were paid or organic, and weekly Target Audience Rating Points (TARPs). TARPs are an estimate of reach and frequency of exposure to television advertising, which is calculated by an external television ratings agency.
Table 1. Post-level measures and descriptions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of post</td>
<td>Day of the week the post first appeared</td>
</tr>
<tr>
<td>Time of post</td>
<td>Time post first appeared</td>
</tr>
<tr>
<td>Type</td>
<td>Whether the post is a photo, video, link, or text only</td>
</tr>
<tr>
<td>Paid/organic</td>
<td>Whether the post received a paid boost to its reach (“paid”) or not (“organic”)</td>
</tr>
<tr>
<td>Reach</td>
<td>The total number of unique users to whom the post was shown. Available in aggregate, as well as broken down by paid and organic reach</td>
</tr>
<tr>
<td>Consumers</td>
<td>The total number of unique users who clicked anywhere on the post</td>
</tr>
<tr>
<td>Likes</td>
<td>The number of “likes” and other “reactions” on a post. These are simple methods for users to indicate their response to a post, including to “like” the post, as well as other emotional reactions, including “love,” “haha,” “wow,” “sad,” and “angry”</td>
</tr>
<tr>
<td>Comment</td>
<td>The number of user comments (excluding replies) on the post</td>
</tr>
<tr>
<td>Share</td>
<td>The number of shares a post receives. The “share” button allows users to share the content with their Facebook friends</td>
</tr>
</tbody>
</table>

**Communication technique**

- **Informative**: Provides information on a health issue, its associated behaviors, and/or associated consequences or benefits
- **Call-to-action/instructive**: Either provides instruction on how to do a behavior or encourages users to undertake a specific action (e.g., call a helpline, make an appointment, register for a program or event). These were given coding precedence over informative messages
- **Emotional**: Aims to elicit positive (e.g., hope, excitement) or negative (e.g., fear) emotions in users. Also includes posts that aim to generate a positive feeling about the brand. Emotional appeals took coding precedence over informative and call-to-action/instructive, reflecting evidence that emotive content is more powerful than nonemotive content [33]

**Target behavior**

- **Eat**: Information and encouragement to eat healthy food portions
- **Drink**: Information and encouragement to make water the drink of choice and decrease sugar-sweetened beverage consumption
- **Act**: Information and encouragement to be active daily and increase movement
- **Other**: Posts that did not relate explicitly to one of the above categories, including changes to the profile picture and page banner image and posts that shared stories about fans and stakeholders

Table 2. Page-level measures and descriptions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly new fans</td>
<td>The number of new page likes per week, overall and by gender</td>
</tr>
<tr>
<td>Weekly engaged users</td>
<td>The number of unique users who have engaged with the page per week, overall and by gender. This includes any click on the page or one of its post or any story(^a) created by users</td>
</tr>
<tr>
<td>Weekly viral reach</td>
<td>The number of unique users who saw MHN or one of its posts from a story shared by a Facebook friend</td>
</tr>
<tr>
<td>Weekly paid impressions</td>
<td>Number of times a sponsored story or ad pointing to the page appeared in users’ News Feeds(^b). These impressions can be for fans and nonfans</td>
</tr>
<tr>
<td>Weekly organic impressions</td>
<td>Number of times MHN posts were displayed in News Feeds or on visits to the page. These impressions can be for fans and nonfans</td>
</tr>
<tr>
<td>Target Audience Rating Points (TARPs)</td>
<td>An estimate of the reach (how many people were exposed) and frequency (how often they were exposed) of the MHN television commercials per week, provided by an external ratings agency. This was used as an indicator of campaign advertising outside of Facebook</td>
</tr>
</tbody>
</table>

\(^a\)A user creates a “story” by liking the page, posting to the page’s timeline, liking, commenting on, or sharing one of the page’s posts, answering a question posted by the page, responding to an event, mentioning the page, or tagging the page in a photo.

\(^b\)News Feed refers to the constantly updating list of stories in the middle of a user’s home page, including status updates, photos, videos, links, app activity, and likes from friends, pages, and groups that they follow.
Statistical Analysis

**Post-Level Data**

We conducted independent samples t tests to compare the means of engagement metrics (reach, likes, shares, comments, and post consumers) between paid and organic posts. In addition, we conducted a series of (separate) negative binomial regressions (the data were overdispersed), generating incidence rate ratios (IRRs) with the count of likes, comments, shares, and post consumers as the outcome variables, and post type, communication technique, and target behavior as categorical independent variables. The reference category for post type was photos (as this was the most populous category) and for communication technique was call-to-action/instructive because it represented a concrete action for users to take, as opposed to the other categories, which aimed to either inform or evoke emotion. For post day, each day was compared to the grand mean of all days, and for time of post during the day (8 am-5 pm; the most populous category) was used as the reference category. “Other” was used as the reference category for target behavior because these posts did not relate to specific behaviors. To examine whether the post being organic or paid interacted with other characteristics of the post, we entered two-way interaction terms for all covariates with paid/organic. Only significant two-way interactions were retained to generate the most parsimonious model. All models controlled for users’ exposure to the post by including an exposure or “offset” variable to estimate engagement with a post (ie, likes, comments) while accounting for the number of people each post was delivered to [34]. The relationship between post characteristics and engagement therefore becomes a rate per person reached.

**Page-Level Data**

To examine engagement with the MHN page over time as opposed to individual posts, we conducted time series analyses with page analytics. Time series analysis was used to account for the likely autocorrelation between observations (weekly counts) as Facebook users can view and react to content over an extended time. Further, prior engagement with content is a factor in the Facebook algorithm. Separate models were conducted for (1) new likes of the MHN page and (2) the number of unique users who “engaged” with the page for all users and for female and male users separately. In this context, “engagement” included any click on the MHN page or one of its posts or any “story” created, which would include actions such as liking the page; posting to the page’s timeline; liking, commenting on, or sharing a post; mentioning the page in one of their own posts; or tagging the page in a photo.

In addition to lag terms, each model initially included paid impressions, organic impressions, viral reach, a term for trend, and the number of TARPs as predictors. Paid impressions, organic impressions, and viral reach were rescaled to the change in the outcome variable per 10,000 because the mean weekly counts were 167,857, 29,750, and 16,781, respectively. We used backward elimination (threshold of variable retention of $P=.10$). Modeling was preceded by tests for stationarity (Dickey-Fuller and Phillips-Perron) to ensure time series modeling was appropriate [35]. We examined autocorrelation with q tests and correlograms for each model [36].

To capture the impact of changing the post content in May 2017 to target men aged 35 to 54 years and families with children aged 5 to 12 years (operationalized as women aged 25-54 years), we conducted two interrupted time series (ITS) analyses with these subpopulations only, with weekly engaged users as the outcome. The same procedure as previously described was followed for the ITS analyses, only two terms were added to the models; namely, level change and change in trend [37]. These terms and the overall trend term were retained in the final models to examine whether there were significant effects of the change in campaign approach adjusted for other significant covariates.

Post- and page-level analyses were conducted using SPSS version 22.0 (t tests) and Stata version 15.0 (negative binomial regression, time series, and ITS analyses).

**Results**

**Post-Level Data**

In total, MHN posted 392 times during our analysis period, with 20.7% (n=81) of those posts receiving a paid boost (Table 3). The majority of posts (58.9%, n=231) were photos, whereas none were text only.

Posts that received a paid boost reached significantly more users and received significantly more likes, shares, comments, and post consumers than organic posts (Table 4). Across all measures, paid posts received at least 18 times the engagement compared to organic posts.

The significant interaction ($P<.001$) between organic/paid and post type indicated that the effect of paying was not the same across the three different types of posts (Table 5). Specifically, there was an incremental effect on likes, shares, comments, and post consumers for photos and links, but not for videos once adjusted for reach. For example, after adjusting for reach, both photo and link posts were predicted to receive more likes when paid (563 compared to 325 and 445 compared to 172, respectively), whereas paid video posts were predicted to receive only 53 likes compared to 211 for organic videos (Figure 1). A similar pattern was evident for all other engagement outcomes.
### Table 3. Frequencies of post characteristics (N=392).

<table>
<thead>
<tr>
<th>Post characteristic</th>
<th>Frequency, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paid or organic</strong></td>
<td></td>
</tr>
<tr>
<td>Paid</td>
<td>81 (20.7)</td>
</tr>
<tr>
<td>Organic</td>
<td>311 (79.3)</td>
</tr>
<tr>
<td><strong>Communication technique</strong></td>
<td></td>
</tr>
<tr>
<td>Instructive/call-to-action</td>
<td>204 (52.0)</td>
</tr>
<tr>
<td>Emotional</td>
<td>133 (33.9)</td>
</tr>
<tr>
<td>Informative</td>
<td>55 (14.0)</td>
</tr>
<tr>
<td><strong>Post day</strong></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>36 (9.2)</td>
</tr>
<tr>
<td>Monday</td>
<td>51 (13.0)</td>
</tr>
<tr>
<td>Tuesday</td>
<td>69 (17.6)</td>
</tr>
<tr>
<td>Wednesday</td>
<td>56 (14.3)</td>
</tr>
<tr>
<td>Thursday</td>
<td>69 (17.6)</td>
</tr>
<tr>
<td>Friday</td>
<td>60 (15.3)</td>
</tr>
<tr>
<td>Saturday</td>
<td>51 (13.0)</td>
</tr>
<tr>
<td><strong>Post type</strong></td>
<td></td>
</tr>
<tr>
<td>Photo</td>
<td>231 (58.9)</td>
</tr>
<tr>
<td>Link</td>
<td>69 (17.6)</td>
</tr>
<tr>
<td>Video</td>
<td>92 (23.5)</td>
</tr>
<tr>
<td><strong>Target behavior</strong></td>
<td></td>
</tr>
<tr>
<td>Act</td>
<td>118 (30.1)</td>
</tr>
<tr>
<td>Drink</td>
<td>67 (17.1)</td>
</tr>
<tr>
<td>Eat</td>
<td>139 (35.5)</td>
</tr>
<tr>
<td>Other</td>
<td>68 (17.3)</td>
</tr>
<tr>
<td><strong>Post time</strong></td>
<td></td>
</tr>
<tr>
<td>6 am to 8 am</td>
<td>111 (28.3)</td>
</tr>
<tr>
<td>8 am to 5 pm</td>
<td>202 (51.5)</td>
</tr>
<tr>
<td>After 5 pm</td>
<td>79 (20.2)</td>
</tr>
</tbody>
</table>

### Table 4. Comparison of mean engagement for paid and organic posts using independent sample t tests.

<table>
<thead>
<tr>
<th>Engagement metric</th>
<th>Paid mean (SD)</th>
<th>Organic mean (SD)</th>
<th>Mean difference (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reach</td>
<td>107,764 (176,267)</td>
<td>3115 (2448)</td>
<td>104,649 (85,062-124,235)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Likes</td>
<td>886 (1175)</td>
<td>32 (33)</td>
<td>854 (723-985)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Shares</td>
<td>109 (205)</td>
<td>6 (8)</td>
<td>103 (80-126)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Comments</td>
<td>88 (137)</td>
<td>4 (6)</td>
<td>84 (68-99)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Consumers</td>
<td>1891 (3257)</td>
<td>86 (104)</td>
<td>1805 (1442-2167)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Table 5. Associations between post characteristics and engagement metrics per person reached calculated using negative binomial regressions adjusted for post reach.

<table>
<thead>
<tr>
<th>Post characteristic</th>
<th>Likes, IRR(^a) (95% CI)</th>
<th>Shares, IRR (95% CI)</th>
<th>Comments, IRR (95% CI)</th>
<th>Post consumers, IRR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paid or organic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>Ref(^b)</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Paid</td>
<td>1.51 (1.17, 1.97)</td>
<td>0.84 (0.64, 1.09)</td>
<td>1.46 (1.05, 2.03)</td>
<td>1.02 (0.74, 1.39)</td>
</tr>
<tr>
<td><strong>Post type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Link</td>
<td>0.53 (0.44, 0.64)</td>
<td>0.67 (0.52, 0.86)</td>
<td>0.61 (0.44, 0.84)</td>
<td>0.72 (0.59, 0.88)</td>
</tr>
<tr>
<td>Video</td>
<td>0.65 (0.52, 0.81)</td>
<td>0.84 (0.63, 1.11)</td>
<td>0.85 (0.60, 1.21)</td>
<td>1.14 (0.91, 1.43)</td>
</tr>
<tr>
<td><strong>Post day</strong>(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>0.93 (0.75, 1.15)</td>
<td>0.90 (0.69, 1.18)</td>
<td>0.92 (0.65, 1.29)</td>
<td>0.93 (0.74, 1.16)</td>
</tr>
<tr>
<td>Monday</td>
<td>0.73 (0.61, 0.88)</td>
<td>0.64 (0.51, 0.81)</td>
<td>0.81 (0.61, 1.09)</td>
<td>0.72 (0.60, 0.87)</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1.06 (0.91, 1.23)</td>
<td>1.18 (0.98, 1.42)</td>
<td>0.90 (0.70, 1.14)</td>
<td>0.83 (0.71, 0.98)</td>
</tr>
<tr>
<td>Wednesday</td>
<td>1.00 (0.84, 1.18)</td>
<td>0.90 (0.73, 1.11)</td>
<td>1.01 (0.77, 1.33)</td>
<td>2.01 (1.67, 2.43)</td>
</tr>
<tr>
<td>Thursday</td>
<td>1.01 (0.87, 1.18)</td>
<td>1.15 (0.95, 1.39)</td>
<td>0.96 (0.75, 1.22)</td>
<td>0.88 (0.75, 1.03)</td>
</tr>
<tr>
<td>Friday</td>
<td>1.21 (1.02, 1.43)</td>
<td>1.08 (0.87, 1.35)</td>
<td>1.33 (1.01, 1.75)</td>
<td>1.08 (0.91, 1.29)</td>
</tr>
<tr>
<td>Saturday</td>
<td>1.05 (0.88, 1.25)</td>
<td>1.14 (0.91, 1.41)</td>
<td>1.14 (0.87, 1.49)</td>
<td>0.94 (0.78, 1.13)</td>
</tr>
<tr>
<td><strong>Time of post</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 am to 5 pm</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>6 am to 8 am</td>
<td>0.68 (0.57, 0.81)</td>
<td>0.91 (0.74, 1.12)</td>
<td>0.69 (0.53, 0.90)</td>
<td>0.62 (0.52, 0.74)</td>
</tr>
<tr>
<td>After 5 pm</td>
<td>0.72 (0.58, 0.89)</td>
<td>0.91 (0.72, 1.14)</td>
<td>0.85 (0.64, 1.13)</td>
<td>0.61 (0.50, 0.73)</td>
</tr>
<tr>
<td><strong>Communication technique</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructive/call-to-action</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Emotional</td>
<td>1.18 (1.00, 1.39)</td>
<td>1.00 (0.81, 1.24)</td>
<td>0.58 (0.45, 0.75)</td>
<td>1.03 (0.84, 1.27)</td>
</tr>
<tr>
<td>Informative</td>
<td>1.05 (0.85, 1.30)</td>
<td>0.90 (0.69, 1.17)</td>
<td>1.00 (0.72, 1.41)</td>
<td>0.98 (0.77, 1.24)</td>
</tr>
<tr>
<td><strong>Target behavior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Act</td>
<td>0.87 (0.69, 1.08)</td>
<td>1.23 (0.92, 1.64)</td>
<td>1.11 (0.77, 1.58)</td>
<td>0.36 (0.28, 0.45)</td>
</tr>
<tr>
<td>Drink</td>
<td>0.96 (0.73, 1.25)</td>
<td>1.53 (1.09, 2.15)</td>
<td>0.84 (0.56, 1.27)</td>
<td>0.32 (0.24, 0.42)</td>
</tr>
<tr>
<td>Eat</td>
<td>0.81 (0.64, 1.01)</td>
<td>1.14 (0.85, 1.53)</td>
<td>0.92 (0.65, 1.31)</td>
<td>0.47 (0.36, 0.60)</td>
</tr>
<tr>
<td><strong>Interactions with paid or organic</strong>(^d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid link</td>
<td>1.49 (0.98, 2.26)</td>
<td>1.37 (0.83, 2.25)</td>
<td>0.69 (0.36, 1.29)</td>
<td>0.83 (0.53, 1.28)</td>
</tr>
<tr>
<td>Paid video</td>
<td>0.15 (0.09, 0.23)</td>
<td>0.32 (0.19, 0.53)</td>
<td>0.25 (0.13, 0.48)</td>
<td>0.46 (0.29, 0.74)</td>
</tr>
<tr>
<td><strong>Time of post</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid 6 am to 8 am</td>
<td>1.45 (0.94, 2.24)</td>
<td>NS(^e)</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Paid after 5 pm</td>
<td>1.62 (1.06, 2.48)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Paid or organic/communication technique interaction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paid emotional</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>0.64 (0.43, 0.96)</td>
</tr>
<tr>
<td>Paid informative</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>0.62 (0.34, 1.10)</td>
</tr>
</tbody>
</table>

\(^a\)IRR: incident rate ratio.

\(^b\)Ref: reference category.
Post day is in comparison to the mean of all days.

Only two-way interactions that were significant for at least one outcome are shown. Where the overall test of the interaction was nonsignificant, it was dropped from the final model.

NS: nonsignificant.

**Figure 1.** Predicted number of likes, shares, comments, and consumers by paid/organic status and post type, adjusting for reach. Note: marginal means calculated for post type by paid/organic (mean values for other covariates) based on negative binomial regressions presented in Table 5.

Posts made on Monday received 27% fewer likes, 36% fewer shares, and 28% fewer post consumers compared to the mean, whereas posts on a Tuesday received 17% fewer post consumers. On the other hand, posts on a Wednesday received more post consumers and posts on a Friday received more likes and shares. A significant interaction (P=0.045) between organic/paid and time of post indicated that paying for posts before 8 am and after 5 pm had a greater incremental effect on likes than paying for posts between those hours. Posts made before 8 am received fewer comments and post consumers compared to posts made between 8 am and 5 pm irrespective of whether the post was paid or organic (ie, the interaction was nonsignificant). Similarly, posts made after 5 pm received fewer post consumers. The communication technique did not influence likes, shares, and comments, with the exception of emotional posts receiving fewer comments than instructive/call-to-action posts. However, the effect of paying for a post on post consumers differed across the three different types of communication techniques (P=0.049), such that the effect was decremental on emotive posts but not for information posts relative to instructive/call-to-action posts. Finally, drink posts received significantly more shares compared to other posts (by 53%), but act, drink, and eat posts all received between 53% and 68% fewer post consumers compared to other posts.

**Page-Level Data**

Final time series models for all outcomes included only paid impressions, organic impressions, and viral reach, with all other initially included variables nonsignificant. There were three exceptions to this: organic impressions were nonsignificant in the model predicting weekly engaged male users, viral reach was nonsignificant in the model predicting weekly engaged female users, and TARPs was marginal (P=0.07) in the model for engaged female users (Table 6).

In all models except weekly engaged males, organic impressions predicted a higher number of new fans and engaged users, compared to paid impressions. Viral reach similarly predicted a higher number of new fans and engaged users compared to paid impressions, but usually not as high as organic impressions. Organic impressions, compared to paid impressions, were considerably more influential for female users than for male users.

For the ITS analyses, none of the trend variables were significant in any of the models (Table 7). As may be expected given that the change in campaign strategy did not seem to change the trend in engagement either acutely or over time, the effect of paid and organic impressions and viral reach were similar in these subgroups to that seen in the models with the full sample and not including these trend terms.
Table 6. Time series results (beta coefficients with 95% CI) showing significant factors in the number of new weekly fans and engaged users (overall and by gender).

<table>
<thead>
<tr>
<th>Per 10,000...</th>
<th>Weekly new fans, β (95% CI)</th>
<th>Weekly engaged users, β (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>Male (95.38, 7.42)</td>
</tr>
<tr>
<td></td>
<td>Paid impressions</td>
<td>8.81 (7.55, 10.09)</td>
</tr>
<tr>
<td></td>
<td>Organic impressions</td>
<td>58.02 (45.30, 70.74)</td>
</tr>
<tr>
<td></td>
<td>Viral reach</td>
<td>22.05 (15.42, 28.67)</td>
</tr>
<tr>
<td></td>
<td>TARPs a</td>
<td>NSb</td>
</tr>
</tbody>
</table>

Table 7. Interrupted time series results showing significant factors in the number of new weekly fans and engaged users (by gender).

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Weekly new fans, β (95% CI)</th>
<th>Weekly engaged users, β (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male aged 35-54</td>
<td>Female aged 25-54</td>
</tr>
<tr>
<td>Per 10,000 paid impressions</td>
<td>0.96 (0.49, 1.43)</td>
<td>4.75 (4.05, 5.46)</td>
</tr>
<tr>
<td>Per 10,000 organic impressions</td>
<td>21.05 (13.20, 28.91)</td>
<td>NS</td>
</tr>
<tr>
<td>Per 10,000 viral reach</td>
<td>4.84 (2.60, 7.08)</td>
<td>23.33 (12.82, 16.55)</td>
</tr>
<tr>
<td>Overall trend</td>
<td>–0.01 (–1.32, 1.31)</td>
<td>–0.08 (–8.13, 9.38)</td>
</tr>
<tr>
<td>Trend change</td>
<td>–0.69 (–5.81, 4.43)</td>
<td>0.63 (–8.13, 9.38)</td>
</tr>
<tr>
<td>Level change</td>
<td>20.03 (–76.55, 116.63)</td>
<td>–67.91 (–150.34, 14.52)</td>
</tr>
</tbody>
</table>

Discussion

Principal Findings

This study examined usage of and engagement with the MHN Facebook page, identifying influential factors at both the post and page level. We found that paying for posts significantly increases reach of posts, but that the effect was not the same across post characteristics, most notably post type. At the same time, we found that organic impressions predicted higher engagement with the MHN page compared to paid impressions, particularly for female users. Together, these findings provide an important insight into the relative value of paid and organic posts: paying for posts is useful in increasing the reach of a page but the content itself must be engaging to capitalize on word-of-mouth marketing through organic reach. In addition, we found no association between television advertising and engagement with the page, suggesting that future campaigns should consider the role of Facebook within broader mass media campaigns and how different channels can complement one another to amplify campaign effects.

Our post-level results showed that paying for posts dramatically increased their reach. This is important because, as the hierarchy of effects predicts, exposure to a message is the first step in bringing about the desired change in behavior [38]. However, the time series analyses clearly showed that organic impressions and viral reach were of critical importance in driving engagement, especially among women. This is likely due to the very high-level of trust placed in peer-to-peer communication [7] and that women are more likely to engage with health on social networking sites such as Facebook [39]. Collectively, our findings suggest that effective engagement through Facebook requires both maximizing the reach of posts through paid boosts and delivering content that users want to engage with and share in order to capitalize on word-of-mouth marketing [8]. However, how to strike a balance between the two is as yet unclear [40]. Current evidence shows that users will share content when they perceive it will be of benefit to their social network and where the risk of reputational damage is low [41], but what makes public health content “shareable” needs further investigation. This includes understanding why these results are strongest in women.

We also found that the effect of paying for posts on engagement was not the same across the different post types. Specifically, the effect of being paid on video posts appeared to be detrimental once reach was adjusted with and share in order to capitalize on word-of-mouth marketing [8]. However, when coupled with the fact that Facebook seems to give preferential treatment to video posts. This may be due to videos requiring more effort on behalf of the user in that they need to watch and, usually, listen for an extended period. The increased effort may then mean that users will more readily scroll past a video if it does not immediately grab their attention, especially considering they will generally will share content when they perceive it will be of benefit to their social network and where the risk of reputational damage is low [41], but what makes public health content “shareable” needs further investigation. This includes understanding why these results are strongest in women.
must therefore give careful consideration of how best to use videos within their campaigns on Facebook. This is particularly important given recent changes to the Facebook algorithm, particularly a promise to prioritize content generated by friends and family (ie, organic content) [43].

Day and time of post appear to have had some influence on engagement, with posts made on Mondays generally leading to lower engagement, whereas Fridays led to higher engagement. This finding might reflect users readying themselves for the working week and for the weekend, respectively. That is, on Monday users are focusing on the “serious” tasks of work, subsequently spending less time on Facebook, whereas on Friday they are preparing for more social events and activities of the weekend, reflecting a key motivation for using social media [44]. In addition, posts made outside of working hours generally led to lower levels of engagement, which was unexpected given usage patterns show the most popular times to look at social media are first thing in the morning and in the evening [2]. It is also partly in conflict with a Canadian study that found a negative association between posts made during working hours and engagement, although that study also found a negative association between engagement and posts made after work [23]. Our finding might reflect the fact that more content from larger international markets (eg, the United States and Europe) would be posted at these times, meaning the MHN content would face more competition for users’ attention, but this would not explain the Canadian finding. Alternatively, these seemingly contradictory findings suggest that the more effective time of post might vary depending on the topic of the post.

Other post characteristics, however, appeared to be less influential. That emotional posts did not generate higher levels of engagement is of particular note and largely in line with a previous study [4]. This is surprising given that these types of messages have been shown to be more effective on other media channels [45] and are often presented as being more engaging on social media [46]. The question then is whether emotional appeals are simply not what users want when engaging with health on Facebook, page administrators are not delivering content of sufficient quality, or content is not appealing to the “right” emotions. It was also noteworthy that specific behaviors generally did not generate more (or less) engagement. The exception to this was drink posts receiving more shares, suggesting that users find this content to be more novel, relevant, and interesting [47]. Further research is needed to explore these characteristics in more detail, underscoring the importance of evaluating Facebook campaigns and disseminating the results.

With regards to the page-level analyses, we found that there was no link between Facebook engagement and television advertising, in contrast to the Tips evaluation [27,28]. This is likely because the MHN television advertisements do not specifically mention a Facebook page, but rather direct people to the MHN website that also does not invite visitors to follow the campaign on Facebook. That means that the Facebook page essentially operates independently from the other campaign elements because the only way users can find the page is by searching for it within Facebook or through incidental exposure to MHN content on Facebook. It is likely that stronger linkages between the campaign components would lead to greater engagement with the Facebook page. However, it is unclear how best to synergize the campaign components, highlighting the need for robust evaluations of all components of mass media campaigns within public health. In addition, we found no evidence that the campaign narrowing its target audience led to any changes in the demographic profile of users who engaged with the Facebook page. This might be because the change in target audience occurred late in our analysis period and more time is needed to see an effect. Alternatively, it may have been because the content did not change appreciably or did not change in the right way to appeal to the new target audience. Campaign managers must therefore consider the role of each channel within a mass media campaign so that they complement one another. Some corporate brands, for instance, use Facebook as a way to associate particular events and values with their brand, as opposed to using it simply as another channel to sell their product [48]. Comprehensive formative and process evaluation would help to address these issues and help to bring about stronger linkages between the different campaign elements. However, formative and process evaluation are frequently overlooked and underreported in campaign evaluations [49].

A major limitation of our study is that we were limited to one campaign Facebook page covering just one health issue (overweight and obesity); tests with more pages that address different health issues are needed to strengthen our findings and increase their generalizability. In addition, our results should only be considered in relation to Facebook, rather than as relevant to other social media platforms given the reasons for using different platforms varies [47,50]. Our post-level analysis was also limited by a relatively small sample size of only 392 posts; more posts would have given us greater power to detect differences between the post characteristics. Finally, our interpretation of the results is based on the assumption that generating engagement is a necessary precursor to population-level impacts but, as yet, there is little evidence available to support this assumption within public health [51]. Outside of Facebook, there is suggestive evidence that skin cancer prevention messages disseminated on Twitter increased knowledge and reduced preference for a tan [52], but the impact of social media-disseminated messaging on health otherwise remains unknown. Investigating this link should be a priority for research, especially as recent changes in media consumption habits have necessitated a rethink in the relative value of different communication channels within mass media campaigns [53].

**Conclusion**

Our study shows the importance of paying to boost the reach of posts on Facebook while also demonstrating the value of maximizing organic reach, particularly in relation to videos. Therefore, page administrators should give careful consideration to their marketing strategy on Facebook as sole reliance on paid or organic posts could undercuts the ability of a page to generate engagement and potentially influence health at a population level. Further, our results highlight the need for campaign managers to think strategically about the role of different campaign channels and how they can amplify and complement one another. These results also underscore the importance of ongoing evaluation of campaigns on social media, especially...
on Facebook where the algorithm determining who sees what, when, and how often is adjusted regularly.

Acknowledgments

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Conflicts of Interest

None declared.

References


Abbreviations

IRR: incident rate ratio
ITS: interrupted time series analysis
MHN: Make Healthy Normal
NSW: New South Wales
TARPs: Target Audience Rating Points
Surveillance, is properly cited. The complete bibliographic information, a link to the original publication on http://publichealth.jmir.org, as well as this copyright and license information must be included.
Chapter 7: Discussion

7.1 Introduction
The research presented in my thesis aimed to further understanding of best practice in the planning, implementation, and evaluation of MMCs and provide evidence regarding the impact of MMCs on NCD prevention, particularly for overweight and obesity. The findings provide insights into the conduct and evaluation of modern public health MMCs and raise questions as to the role of MMCs in public health and the role of social media within such campaigns. The difficulty of conducting rigorous evaluations, coupled with the rapidly changing media environment, means that research like that presented in this thesis is necessary if public health is to make best use of MMCs as a tool to address NCDs, especially considering their enduring popularity as a strategy.

In this chapter, I build on the discussions presented earlier, considering the overall implications of the findings for policy, practice, and research. These are discussed in relation to ‘wicked problems’ in public health, particularly poor nutrition, physical inactivity, and overweight and obesity. These have been described as ‘wicked’ because they have multiple aetiologies across society, continually evolve, and resist simple solutions. Instead, they require multiple, complementary solutions, the implementation of which usually requires cooperation across multiple disciplines and industries, often in the face of competing priorities. Such problems can appear intractable but could be overcome with appropriate planning and reform.

Specifically, I discuss four major implications for my research: public health must reconsider the role of MMCs in addressing public health issues; the need to look beyond television and consider the strategic use of social media; the need for new approaches to evaluation of MMCs; and theories related to MMCs need to be tested empirically and refined appropriately if they are to be of use.

7.2 Changing the focus of MMCs
In the last 100 years, ideologies that emphasise individual responsibility, such as liberalism and neoliberalism, have been particularly prominent in public health discourse. These ideologies position individual liberty as paramount and prioritise free markets over state intervention. Although much of the general public has at least an implicit awareness of the social determinants of health and their impact, the belief in individual responsibility is strongly held in many societies, including Australia. This is reflected in my own research (Chapter 3). Consequently, the design of public health MMCs has reflected this emphasis on the individual. Indeed, William McGuire contended in 1984 that issues like obesity were, by their nature, not conducive to regulatory or environmental solutions but rather to those that focus on the individual. MMCs, he argued, are a suitable strategy for addressing such issues precisely because they involve “convincing individuals to exercise personal responsibility for their health by altering their lifestyles.”

It is in this context that many MMCs, including MHN, have been typified by a focus on awareness raising and increasing knowledge, in the belief that these will empower individuals to change their behaviour. This is despite the fact that, four decades on from McGuire, public health has been infused with socio-ecological thinking and a focus on the social and structural determinants of health for addressing complex behavioural patterns. There is a wealth of literature that shows that targeting knowledge alone is not enough, with Kelly and Barker describing such a belief as
“wrong and unscientific.” A knowledge driven approach to communication is known as the ‘information deficit model of behaviour change’; the idea that the lack of behaviour change in a given population is due simply to a lack of knowledge and that, consequently, the provision of more information would lead to the desired change. Such an approach has been widely criticised across many different disciplines, including public health. Arguably, it is this flawed logic that has led to the development of social marketing and related theories and frameworks that recognise the need for comprehensive approaches to wicked problems.

Despite the criticisms and mounting evidence, the research in this thesis shows that the knowledge deficit model continues to hold sway, at least in overweight and obesity campaigns. It also adds to the evidence showing that a focus on knowledge acquisition in MMCs is not sufficient for meaningful change. In fact, my research suggests that it may not be a necessary inclusion in campaigns where baseline knowledge is already high, as appears to be the case with overweight and obesity. The evidence presented in Chapter 2 shows that MMCs targeting overweight and obesity prevention are generally good at influencing intermediate outcomes such as knowledge. However, the evidence for a direct subsequent effect on obesity and its antecedent behaviours is mixed, consistent with research on most other health issues. The MHN campaign similarly showed effects on knowledge but had no discernible impact on distal outcomes, despite reasonable campaign recognition, as shown in Chapters 3 and 4. This does not accord with conventional understandings of the HOEM. In fact, testing the HOEM that underpinned the MHN campaign raised questions as to whether knowledge even needed to be included in the campaign’s hierarchy, given the far stronger associations between understanding of the campaign and relevant attitudes. These results likely reflect both high baseline knowledge, as found in Chapter 2, and the complex causal pathway of obesity. This pathway demonstrates it as a wicked problem and makes it exceedingly difficult for individuals to successfully implement and sustain the recommended changes in their behaviour without supportive systemic changes. As shown in Chapter 3, this appears to be the case even when people are aware of the consequences of ‘unhealthy’ behaviours, know the benefits of changing, and recognise potential opportunities to make such changes.

These results raise an important question regarding the dominant paradigm for MMCs targeting wicked problems in public health: if knowledge does not lead to behaviour change, what role do MMCs have in addressing public health issues? Evidence from tobacco control is instructive here, which, as mentioned above, is the public health issue with the strongest evidence showing a link between MMCs and behaviour change. While it could be argued that anti-tobacco campaigns have a simpler message to convey (i.e. ‘quit smoking’) compared to the many and varied messages possible in overweight and obesity campaigns and a better understood and accepted link between behaviour and morbidity and mortality, campaigns have not been the only initiative used. Over the last 60 years, incremental steps have been taken to de-normalise smoking and gradually bring down smoking prevalence. MMCs have certainly played a role in this public health success story but they have not been implemented in isolation; legislation creating and expanding smoke-free environments, advertising bans for tobacco products, regular and substantial tax increases, and other strategies have all been implemented and helped to create a supportive environment in which the messages of MMCs are far easier to act upon.

Moreover, it is only in the past two decades that tobacco control MMCs have been able to conclusively demonstrate an impact on smoking prevalence, despite being a feature of tobacco
control since at least the 1980s. Doubtless this is in part due to improvements in the design and implementation of campaigns but perhaps more important has been the shifts in the political, cultural, and physical environments that have been created through a comprehensive approach to tobacco control. This includes having an internationally enforced treaty in the form of the WHO Framework Convention on Tobacco Control. It is in this context that tobacco control MMCs have been able to demonstrate very strong associations with quitting behaviours and smoking prevalence, with the supportive environment allowing individuals to act on the information provided in MMCs.

In obesity prevention, and other health issues, it appears that practitioners and policymakers are expecting MMCs to do too much too soon, underscoring the importance of comprehensive, long-term, multi-sectoral strategies, including environmental and policy-based measures, for all wicked problems, in line with existing evidence. That MHN did not result in behaviour changes at a population-level does not necessarily reflect a poorly executed campaign. To be clear, my research highlighted some executional flaws in the campaign and the very low unprompted recall suggests that the campaign lacked the ability to cut-through competing advertising clutter. Nonetheless, the lack of behaviour change more likely reflects the fact that it is addressing a difficult problem that will take time to overcome because of its complex causal pathways. The challenge for obesity prevention and other similar health issues is then to implement a comprehensive approach with sustained investment, similar to what has been done in tobacco control. This will be difficult, especially given the prevailing emphasis on individual responsibility and the associated narratives around ‘nanny statism’ – the characterisation of government intervention as paternalistic and placing unnecessary restrictions on individual choice and enjoyment. In this environment, support from various sectors (e.g. the general public, industry, politicians, community groups etc.) for different strategies varies greatly depending on the nature of the strategy and its potential impact on each sector. Education-based strategies, like MMCs, tend to enjoy the widest support precisely because they place considerable emphasis on individual responsibility and tend not to challenge the status quo. On the other hand, strategies that require less conscious effort from the individual, such as taxation and legislation, attract lower levels of support even though they are generally recognised as being more efficient and effective.

Thus, MMCs can be a great way to give the appearance of public health action without actually challenging the underlying determinants of health and ill-health. MMCs that focus heavily on knowledge and awareness also risk reinforcing the belief in individual responsibility, potentially disempowering the target audience as they are unable to act on the campaign’s recommendations and see this as a personal failing. My research has added to the evidence demonstrating this and reinforces the need to think strategically about the role of MMCs within a comprehensive response to public health issues like overweight and obesity. Inevitably, this will mean addressing the notion of individual responsibility in some way. Some have argued that failing to acknowledge individual responsibility when addressing NCDs is likely to result in political backlash and rejection of the associated strategies. Others have argued that campaigns must consider the political climate and look to capitalise when it is in their favour. In either case, the findings presented in my thesis, coupled with existing evidence, suggest that practitioners must consider the role of MMCs in broader strategies and look to design campaigns that go beyond simple awareness-raising and knowledge-generation. Instead, campaigns could engage with the principles of social marketing, such an integrated marketing mix, and systems thinking to go beyond individual behaviour focus

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that typifies so many MMCs.\textsuperscript{45} Within this approach, campaigns could aim to build public support for environmental and regulatory changes or act as reminder of the existence of such changes, as has occurred with alcohol-related campaigns.\textsuperscript{27, 46} Alternatively, campaigns could seek to explicitly challenge social norms, rather than target behaviour change directly.\textsuperscript{47} This latter approach would be distinctly different from MHN, which ostensibly aimed to challenge social norms around overweight and obesity but still established the solution as the individual’s responsibility.

Practitioners also need to allow campaigns sufficient time to have an impact. Ensuring a sufficient duration of campaign is highlighted in many best practice guidelines relating to MMCs\textsuperscript{36, 48, 49} but it remains unclear exactly what constitutes ‘sufficient’. MHN itself ran for just over two years, which places it among the longest overweight and obesity prevention campaigns evaluated in the literature, but even this may not be long enough. As well as increasing exposure, long-term campaigns have other potential benefits, including allowing more effective use of branding strategies.\textsuperscript{50} Such strategies may lead to audiences developing an affinity for the brand that has lasting value beyond the immediate goals of the campaign. It is here that public health can learn from the commercial sector. As Jones argues: “Effective campaigns have consistent and clear branding. There’s a reason Coca-Cola comes in a red can and McDonald’s doesn’t change the colour of the arches each year.”\textsuperscript{51} Short-term political cycles make such consistency in government-led campaigns difficult.\textsuperscript{52} Policymakers and practitioners should always be looking for ways to improve their campaigns, but this does not necessarily mean an entirely new campaign is needed every time. Existing evidence suggests that long-term commitment to consistent campaigns is essential if they are to have any chance of being successful and positively influencing health outcomes.

Thorough formative evaluation is therefore essential as it is particularly valuable for message design.\textsuperscript{17, 36, 49} Quality formative evaluation assists to determine what role MMCs could play within a comprehensive strategy, as well as identify appropriate outcomes for MMCs. That said, many campaigns already appear to conduct at least some formative evaluation, as shown in Chapter 2, but it is often limited in scope, focusing on concept development.\textsuperscript{53} These are important aspects of formative evaluation but it should also include problem definition and identification and assessment of appropriate solutions. Moreover, such evaluations are very rarely published, meaning practitioners’ understanding and insight into the health issue may be constrained and they must relearn important lessons each time a new campaign is planned. Adopting more comprehensive methods and sharing the results of formative evaluation will broaden understanding and enable progress in campaign development and implementation.\textsuperscript{54} This is increasingly important as the media landscape changes and MMCs have move from unidirectional communication to more complex interactions between campaign and audience; in so doing they have also become more difficult to evaluate.\textsuperscript{47, 55, 56} Finally, practitioners should also use formative evaluation to avoid the transfer of the information deficit model from traditional MMCs to new MMCs and make best use of new media, including social media as discussed in further detail below.

7.3 Going beyond television: the strategic use of social media in MMCs

The research presented in Chapters 2, 5, and 6 shows that social media, including Facebook, is being used widely in public health and has considerable potential as a communication channel, as has been argued elsewhere.\textsuperscript{57-60} This has added importance given social media is also commonly used to market unhealthy products, as well as to spruik biased or misleading information and unproven products.\textsuperscript{61} It is clear that public health must have a presence on social media but, as noted many
times throughout my thesis, there are considerable gaps in our understanding of how best to generate engagement on social media. My research has helped to further our understanding of what makes engaging content on Facebook, the most widely used social media platform.62

As discussed in the introduction to this thesis, engagement is, in theory, key to success in social media marketing. This makes it important to understand what drives engagement with public health content. My research has provided some insights to address this need. Specifically, while there is evidence from elsewhere that tailoring content increases engagement,63 my research has shown how relevant public health content could be tailored to appeal to users interested in healthy eating and active living. This would involve creating content that is positive and provides practical advice on healthy eating, as well as providing direct links with physical activity opportunities. It has also reinforced the preference for high quality and visually appealing imagery.64-66 At the same time, it has provided new insights into the value of videos on Facebook, finding that they benefit from the Facebook algorithm (at least in its current iteration) and so reach more people than other post types. At the same time, they do not seem to benefit from receiving a paid boost, unlike other post types. On a cautionary note, videos may be a risky proposition if resources are limited because of the expectation that they be of a very high quality; a perception that videos are not meeting that standard would reduce the likelihood of engagement. Collectively, these findings provide practical information that practitioners can use to improve their use of Facebook and increase engagement with their campaigns.

Chapter 6 of my thesis describes one of the first evaluations of the use of Facebook as part of a broader MMC. These innovative studies showed that the users attracted to the MHN page have a very keen interest in health and may be healthier than the general population. In addition, the noted contextual factors, such as the trustworthiness and perceived value of MHN and the practice of ‘follow and forget’, should be addressed by page administrators in their planning and implementation. Further, results from my focus group research suggested that the link between the MHN Facebook page and the broader campaign was limited, and this was reinforced through the examination of the Facebook analytics. In other words, it seems that those who were exposed to the television campaign were unaware of MHN’s Facebook presence, and vice versa. Collectively, these results suggest that the different communication channels used in the campaign were not working together to increase the potential impact of the campaign. This research has also reinforced existing evidence that the public is interested in engaging with health issues on social media and will actively seek out information on issues of interest to them.67-69 However, with MHN at least, this seems to be the principal method of encountering the campaign on social media; that is, users are not looking to engage with the campaign per se but rather happen across it in their more general searches. Future research should explore whether this is consistent with other public health campaigns. While this pathway is not inherently undesirable, it does mean that engagement with the campaign could be increased with greater integration of the communication channels.

This highlights the imperative for campaign planners to determine the strategic role of social media within such campaigns. In particular, planners must consider how social media can contribute synergistically to the campaign’s objectives, the platforms that are most appropriate for that contribution, and what content types and styles would be best suited to that platform and the campaign’s objectives. Better integration may mean that users would also be inclined to seek out the campaign specifically and, in turn, may then take more notice of the campaign on other
channels. Complete integration of the MHN campaign’s various channels would have likely meant an amplification of the associated messages and, potentially, a larger impact on health-related outcomes.

My research also highlighted that there are also elements of posts and pages that are in need of further investigation. This includes the role of celebrities and sportspeople, the influence of the day and time that posts are made, and whether particular health issues (e.g. mental health) are more suited to social media campaigns than others. Of particular note, though, is the mixed evidence on the role of emotion. When reviewing Facebook pages run by Australian public health organisations, we found positive emotional appeals were linked with engagement, consistent with other evidence.64, 70, 71 However, the association was only evident in relation to the most basic form of engagement, likes, and was not found when examining MHN specifically. Further, even though my mixed methods research found that positive content is what users want, it may be that this reflects a desire to avoid challenging or uncomfortable content, rather than this content necessarily being more effective. In tobacco control MMCs, for instance, negative emotional appeals have been found to be more effective than positive appeals in some contexts.72, 73 It may be that such messages do work on Facebook as well but that, to date, they have not been well executed. Alternatively, it may be that negative emotional appeals have not been used frequently enough to be able to definitively measure and gauge their impact, as my research suggested. These findings provide avenues for further research into the role of emotion in generating engagement.

Any further research into social media for public health campaigns must also consider ethical issues. Although some of these issues have been debated in relation to ‘old campaigns’, including criticisms of the use of negative emotional appeals as potentially harmful,74, 75 there may be greater or at least different concerns that apply more particularly to social media than other communication channels. For example, privacy and security are worthy of particular attention given social media allows for greater monitoring and surveillance of personal data, often surreptitiously collected and vulnerable to unauthorised access.76 Thus, while social media has potential as part of MMCs, it is important that the socio-political implications of its use are investigated and campaigns adapted accordingly.

With regards to execution, the evidence presented in this thesis and elsewhere shows that it is not simply a case of ‘build it and they will come’ on social media.77 The potential benefits, including the ability to engage directly with audiences and capitalise on word-of-mouth marketing,78 will not be realised if practitioners are not mindful of what they want to accomplish on social media and how those achievements will contribute to the overall aims of a campaign. In doing so, practitioners must avoid simply adopting the focus on individual responsibility that typify ‘old’ MMCs; that is, focusing on the individual and ignoring or diverting attention from the social determinants of health.76 As my research and the research of others has shown, campaigns of this nature have largely been ineffective at changing behaviours that relate to wicked problems26, 46, 79, 80 and there is no indication that social media will be the magic bullet that changes this.81, 82 Instead, social media elements of campaigns should be designed in a way that is community-focused, rather than individual-focused, in order to make the most of social media’s potential.77, 83 That is, social media can be used to facilitate conversation and interaction with and between members of the target audience, creating the opportunity for social support and grassroots movements that complement the aims of the broader MMC.59, 84, 85
It is evident from my analysis that the way social media is used in campaigns must be different to that of ‘old’ media. My research has shown that users expect current and timely information on social media. Meeting this expectation requires flexible messaging and a willingness to engage in unscripted conversations directly with users. This differs from ‘old’ media, where messages are prepared in advance, usually following careful pre-testing and/or piloting. Social media does not always allow for such preparation, creating risk and uncertainty, something that governments tend to work to avoid or minimise as much as possible. Public health must take social media more seriously, which means proper resourcing and strategic planning such that flexibility can be managed appropriately. At present, however, it appears that it is somewhat neglected in the planning, implementation, and evaluation stages of campaigns, possibly because it is relatively cheap, compared to traditional channels like television. While the advertising costs are relatively low, the cost of ongoing, dedicated, specialist personnel, who would be needed to be responsive to users and current events, must be considered. Failure to be responsive may mean that users lose interest in the campaign quickly and disengage from it, as suggested by my findings. Given the theoretical importance of engagement on social media, this is a significant, but often overlooked, risk to the success of the campaign and reinforces the need to consider the strategic role of social media whenever it is used.

The rapid change in the media environment and consumption habits also reinforces the need for formative evaluation as it can inform channel selection. This is particularly important for modern campaigns as it is clear that MMCs can no longer rely on commercial television to carry the campaign. Australian households now average 6.4 screens each, which means consumers have many different opportunities to view content. Coupled with the rapid uptake of social media, this highlights the importance of understanding the best channels for communicating with an audience. Increased use (and reporting) of formative evaluation would be beneficial here. It could identify what social media would best suit the target audience, inform the types of content and messages best conveyed through this platform, and highlight important contextual information that might influence the way the audience engages with the campaign on social media. Such information would allow campaigns to tailor their communication strategies accordingly.

### 7.4 New media, new evaluation

As my research has shown, Facebook and other social media are potentially very useful channels for MMCs but it is critical that they are used and resourced appropriately. However, MMC evaluation methods and measures need to improve if we are to understand what ‘appropriate’ use and resourcing actually means. To do this, process and impact/outcome evaluation methods need to adapt to the rapidly changing media landscape to capture contributions of various channels and better determine the effectiveness of campaigns. With regards to process evaluation, there needs to be a shift from the focus on television that typified most campaign evaluations described in Chapter 2. Exposure and engagement measures should be reported for other channels, such as reach, impressions, and cost-per-click in the case of social media. At the same time, it is also critical to go beyond these quantitative measures and evaluate and report on all campaign activities, including financial and resourcing information and qualitative assessments of audience and stakeholder satisfaction with the campaign. As shown in Chapters 3 and 6, process evaluation can provide insights into why a campaign is or is not working and facilitate changes that should improve the impact that the campaign has. Using and reporting on the process evaluation of campaigns will
help to address a previously identified issue with campaign evaluations: that in general there is insufficient information on design and implementation issues (e.g. cost and issues of generalisability) to translate evidence in the peer-reviewed literature into action. However, it is also important that process evaluation metrics are not seen as evidence of impact. Reach and engagement indicators are only useful in so far as they allow for a more nuanced understanding of the results of impact and outcome evaluation.

There are also implications for impact and outcome evaluation arising from my findings. The evaluation of MHN’s Facebook page undertaken as part of my thesis is unique in that it is, to my knowledge, the first comprehensive evaluation of a MMC Facebook page. As mentioned above, this provided important insights into who, how, and why users engage with MHN and similar pages on Facebook and what content is most likely to be engaging. However, while this evaluation was able to give an indication of population-level reach and engagement, it was not able to explore the impact that this might have outside of Facebook, such as on attitudes, self-efficacy, and other behaviour-related outcomes. Rigorous impact evaluations are undoubtedly difficult on social media because, although most people have a social media presence, not every person is on every platform. Moreover, as campaigns use more communication channels, people have difficulty recalling the source of their exposure, making it difficult to attribute any changes to a particular channel or combination of channels. All of this necessitates a re-consideration of evaluation methods typically used for MMC evaluation, especially as the way social media is used for marketing purposes changes rapidly and new techniques are introduced, such as the use of ‘influencers’ (users who have established credibility and attract a large audience on social media), as deployed in the recent Girls make your move campaign in Australia.

More must be done to determine what contribution social media has to broader campaigns and strategies. To do this, time series designs could be used more widely to capture exposure and engagement metrics on social media. Equally, we must determine the value of engagement, which is theorised as being critical to behaviour change but, to date, has not been proven as such. This may mean adapting quasi-experimental designs to better balance the evaluation of effectiveness and reach on social media. My results also highlight the need to consider the role that social media is theorised to play within a campaign. Is it expected, for instance, to have a direct influence on behaviour change or is its role more indirect, shifting social norms in favour of environmental and policy responses to health issues like obesity? To my knowledge, there have been no attempts to formalise the theory of social media within campaigns. Understanding the relationship between engagement and behaviour change necessitates understanding the mechanism(s) of effect; that is, determining not only what the effect is but how this effect comes about by testing the theories and frameworks, explicit and implicit, that underpin the use of MMCs in public health.

7.5 The use and testing of theories and frameworks

As noted earlier, many best practice guidelines for MMCs recommend the use of theories and frameworks but thus far there have been very few attempts at testing their accuracy and usefulness for campaigns. In my review of overweight and obesity prevention campaigns, I found that many campaigns reported using theory but it was not always clear how the theory had been incorporated into the campaign and no campaign reported testing the theory itself. This means that there is no way of distinguishing campaigns based on how well the theories were integrated into the campaign’s design or evaluation. It is possible that some simply paid lip-service to using theories,
without making any genuine attempt to use theory to underpin the campaign. As others have argued, theories can only be useful if they are constantly reviewed and refined, which necessitates regular and explicit testing. Testing of the Theory of Planned Behaviour, for example, has shown it to be an inaccurate and impractical tool for understanding health behaviour change but is still being used by campaign planners, as the research presented in Chapter 2 showed. Theories and frameworks are potentially very useful in campaign planning and evaluation but inappropriate or incomplete use of theory is likely to lead to erroneous conclusions.

In this light, the testing of the HOEM that underpinned MHN is innovative in a public health research context, especially considering it is one of the most common frameworks that implicitly underpins campaigns, both in public health and in commercial advertising. My research has supported existing evidence showing that HOEM has some value for campaign planning and evaluation. However, the HOEM has been criticised within commercial advertising as being a poor reflection of reality. Critics argue that its popularity as a conceptual framework relates more to the ease at which particular constructs (e.g. awareness) can be measured rather than because of rigorous testing and validation. Others have countered that this simply means that more testing needs to be done, rather than representing a fundamental flaw in the framework itself. Within public health, Hornik and Yanovitzky have argued that assumptions that awareness of campaigns will always lead directly to behaviour change are flawed because the routes of effect are not always direct or obvious. Future evaluation and research designs must look beyond the individual, they continue, or else we will inevitably miss the true value of MMCs. The implication is that campaign planners and evaluators must engage with the HOEM, testing and refining it as appropriate and expanding it beyond the individual. For example, there is evidence that campaigns have an indirect effect on behaviour change through interpersonal pressure; that is, they encourage family and friends to pressure their loved ones into changing their behaviour. Such effects are not routinely explored in campaign evaluations, however. There is also a need to expand the range of health issues for which HOEM has been tested as almost all of the available studies testing HOEM, including that presented in this thesis, have been done in relation to physical activity. While my research included a test of a nutrition-related outcome and found comparable results to those of the physical activity model, more tests are needed in order to refine and validate the HOEM within public health MMCs.

Similarly, the inclusion of knowledge as an integral step of public health HOEMs may reflect popular individual-level theories like the Health Belief Model. Such theories place a strong emphasis on knowledge of the consequences of inaction and the benefits of action. If baseline knowledge is such that it becomes an inappropriate target for campaigns, as discussed above, then it may be that theories such as the Health Belief Model should be eschewed in favour of others that emphasise socio-environmental factors. For instance, community level theories, like Diffusion of Innovations and Community Organization could be used in combination with interpersonal theories like Social Cognitive Theory to guide MMC development and implementation. If nothing else, using such theories together may force a re-conceptualisation of the classical HOEM such that a single MMC is not expected to push the audience through the hierarchy on its own but rather that progression requires complementary strategies. Such a conceptual model could also take into account the indirect ways a MMC can influence behaviour, such as through creating media attention or influencing interpersonal relationships. There is also the reciprocal relationship between campaigns and supportive environments that the classical HOEM does not consider but a revised model may. Of course, such combinations and alterations to established theories and
frameworks would require ongoing testing and refinement to ensure their applicability and practicality as tools for informing and strengthening MMCs.

Testing should include an exploration of the role of social norms in MMCs, especially in light of the calls for MMCs to focus on socio-environmental factors, as mentioned above.\textsuperscript{17, 18} Social Norms Theory positions the gap between perceived norms (or what is seen as normal beliefs and behaviours) and actual norms (the actual beliefs and behaviours) as having a significant influence on how individuals think and act in a given situation, with individuals altering their own behaviour to reflect the perceived norms.\textsuperscript{110} Within overweight and obesity prevention, however, few campaigns have engaged directly with this theory, despite recognition that campaigns may indirectly influence behaviour change by shifting social norms.\textsuperscript{111} In fact, such an approach is seldom applied outside of alcohol campaigns.\textsuperscript{112-114} Social norms have been positioned as the ultimate outcome of such campaigns, rather than as an intermediate step towards behaviour change within individuals, as seen in MHN. Such an approach recognises that social norms are, by their nature, communal phenomena; they shape behaviour through the pressure to conform to community expectations.\textsuperscript{110} When viewed through this prism, it does not make sense to target social norms on an individual level.

MHN was a relatively unique campaign in that it did explicitly aim to change social norms around healthy eating and active living, unlike most other overweight and obesity campaigns examined in my review. Nonetheless, it did not make use of Social Norms Theory or other social models (e.g. social diffusion and social determinants) in its design, implementation, or evaluation, even though engaging with such models may help to improve their effectiveness and efficiency in addressing social norms.\textsuperscript{115} Consequently, the campaign positioned social norms as an intermediate outcome along the pathway to behaviour change for individuals. Given this, it is perhaps unsurprising that the evaluation of MHN showed no changes in social norms over time, which would appear at first glance to be a failure for MHN. Further, testing of the HOEM for the campaign suggested that social norms were not an integral step in our models and may not have been required. However, the strong associations between social norms and obesity shown in other research make it unlikely that social norms are not important.\textsuperscript{116, 117} Rather, a more likely explanation for these results is that trying to address a social issue by targeting individual behaviours, as MHN did, is difficult and perhaps impossible. Again, this begs a reconsideration of MMCs targeting wicked problems and how they are theorised to work. It also reinforces the need for campaign planners and evaluators to explicitly engage with, and test, the theories that underpin MMCs. It is only through doing this that we can improve the design, implementation, and evaluation of MMCs.

7.6 Strengths and limitations
A number of strengths and limitations were evident across the work presented in this thesis. Firstly, the comprehensive nature of the evaluation of the MHN campaign was a strength; covering multiple components, using a range of methods for data collection and analysis, it is likely to be one of the most comprehensive evaluations of any obesity-related MMC ever published in the public health literature. This helps address one of the most common issues identified in MMC evidence: that of a lack of dissemination of evaluation results.\textsuperscript{48}

Similarly, the methods employed in all of the studies were rigorous relative to other campaign evaluations, again something that has been identified as a shortcoming of many campaign
evaluations. The variety of methods, both quantitative and qualitative, means it provides answers beyond simply assessing impact on intermediate and distal outcomes. Further, many campaign evaluations focus on the impact on intermediate and distal outcomes, with little information provided to illustrate why particular results were observed. The application of mixed methods designs in Sections 3.4 and 6.2 is therefore a significant strength as it provided critical information on why we observed the results that we did.

At the same time, the use of a cohort study in Section 3.3 and Chapter 4 is both a strength and a limitation, as discussed in Section 3.4. In particular, this choice of study design allows for an assessment of causality and an assessment of the sequence of events. Cross-sectional designs, such as that used in Section 3.5, preclude such assessments. A significant limitation inherent in cohort designs when evaluating campaigns is priming but the similarity of the estimates obtained in the cohort surveys and in the cross-sectional surveys suggested any priming effects were limited. Further, the high loss-to-follow-up and the limited number of follow-up surveys also raises questions as to the strength of the findings reported in these chapters.

The reviews conducted in Chapter 2 and Chapter 5 were limited by the fact that we did not systematically search the grey literature or include publications or Facebook pages in a language other than English. This may mean that eligible campaigns or Facebook pages were excluded. Similarly, the generalisability of the findings in all of the studies may be limited. In the case of Chapter 2, almost all campaigns were from high income countries, while for Chapter 5, an arbitrary minimum of 10,000 fans was applied for practical reasons. Campaigns from other countries and pages with fans below this cut-point may operate in markedly different ways, meaning that the conclusions drawn here may not apply to those countries or pages. The focus on one overweight and obesity prevention MMC in Chapters 3, 4, and 6 also reduces the generalisability of the findings. Evaluations of campaigns targeting other health issues and populations and conducted in other settings and/or using different implementation strategies are needed to grow the evidence base.

There were also inherent limitations in some of the measures used in the research presented in this thesis. Chapters 3 and 4 reported on measures that are yet to be validated, meaning we cannot be sure that they accurately reflect the latent concepts assigned to them. Similarly, the coding framework for Facebook posts developed for the study in Chapter 5 and also used in Chapter 6 was new and therefore untested. Future research should look to validate these measures before applying them.

Related to this is the fact that MHN was part of the wider NSW HEAL Strategy, as is recommended by many best practice guidelines. However, my research did not explore the impact of this broader strategy or MHN’s role or contribution within it. Integrated, cross-government strategies of this nature have been recognised as necessary to tackle problems like obesity but it is unclear what impact such strategies have and what constitutes an “effective strategy”. While it is necessary to evaluate individual components of a strategy, separating these from the context of the overall strategy will mean that the benefit of it as a whole remains unclear. It also potentially hides the impact of campaigns if, as seems likely, they do not always have a direct effect on behaviour change. This limitation is particularly relevant for the research conducted in Chapter 3 and Chapter 4; the analyses in these chapters did not account for the impact of any external factors, such as the implementation of other HEAL Strategy initiatives.
Further, my research into social media in Chapters 5 and 6 only examined Facebook. Although Facebook remains the most widely-used social media, other platforms are increasing in popularity, especially among younger people. \(^{62}\) The generalisability of my results to other platforms is not known given the differences between platforms in their design and use. \(^{121, 122}\) In addition, all of the Facebook studies (Chapters 5 and 6) were based on the assumption that engagement is critical in achieving any campaign impact. At present, there is very limited evidence available to demonstrate that this theory of change is accurate. It was beyond the scope of this thesis to examine such issues but they are nonetheless important and worthy of further exploration.

7.7 Conclusions

In 1981, Wallack complained that, despite the increasing popularity of MMCs, very little was known about the effects of campaigns. \(^{123}\) He attributed this largely to a lack of published high-quality evaluations. Almost four decades on there remain several gaps in our understanding of campaigns. However, the research presented in my thesis has helped to address a number of these, providing valuable insights into how MMCs can be improved, including social media components. Specifically, this thesis has four main implications for practice and evaluation of MMCs, outlined in more detail below:

1. The role of MMCs in a comprehensive approach to addressing NCDs must change;
2. Social media has potential to contribute to successful campaigns but practitioners must carefully plan its role and resource its implementation appropriately;
3. Evaluation practices need to be re-considered to capture the effects and contribution of social media within campaigns; and
4. The theories and frameworks that underpin campaign thinking must be explicitly tested and validated through evaluation.

Firstly, the research shows that campaigns continue to be designed and implemented with the expectation that knowledge alone will be sufficient to bring about behaviour change. This is despite the fact that it is well known that such an approach does not work. This finding highlights the need to re-consider the role MMCs can and should play in addressing NCDs. I have posited here that perhaps the better target for obesity MMCs is social norms themselves, seeing them as an outcome of an MMC rather than intermediate for behaviour change.

The lessons from tobacco control are apparent: MMCs play an important role in addressing wicked problems, like overweight and obesity, but only when they are both well designed and supported by complementary regulatory, policy, and environmental strategies. It is the latter complementary elements that seem to be consistently forgotten or ignored in current practice. Policymakers and practitioners must be realistic about what they expect MMCs to do and by when; otherwise, there is a real risk of further wasting resources and effort in designing and implementing campaigns that are ultimately little more than window dressing. This means going beyond awareness raising and knowledge generation and designing campaigns that aim to build public support for environmental and regulatory changes or genuinely challenge entrenched social norms. Making greater use of social and community theories to inform campaign design and evaluation may help achieve this. Further, exactly what MMCs should address, and how they should address it, requires thorough formative evaluation; this requires engaging in problem definition, as well as concept development.
and testing. It also requires greatly increased reporting of formative evaluation so that knowledge can be shared and embedded in practice more readily than is currently the case.

Secondly, social media could play a potentially useful role within MMCs, but practitioners must define its purpose in each campaign and select the most appropriate platform for achieving that purpose. At present, it appears that too many campaigns fail to undertake sufficient planning; instead, it seems they are hoping that simply being on social media and adopting the same strategies and styles from ‘old’ MMCs will be enough. My evaluation of the MHN Facebook page demonstrated that this is not the case. There is clear demand for content relating to health, including overweight and obesity. Public health organisations are well-placed to meet this demand but they must ensure that the content they deliver is appropriate to social media. This means making better use of the communal nature of social media and being prepared to be flexible and responsive in how content is delivered. It also means considering how the social media components relate to the overarching aims of the campaign and ensuring that a sufficient level of resources is available to deliver on those aims. Resourcing includes the provision of skilled and dedicated staff wherever possible. In these ways, the full potential of social media in preventive health campaigns may be realised.

Thirdly, greater commitment to comprehensive evaluation extends to the role that social media is expected to play in NCD-prevention campaigns. This means refining and re-imagining traditional evaluation methods for MMCs. Evaluation of MMCs has become more difficult in a fragmented media environment where television no longer dominates. Practitioners need to know the relative contribution of different communication channels to a campaign if they are to make informed decisions about the design and implementation. Therefore, evaluators need to include rigorous process evaluation, including collecting and reporting exposure and engagement metrics like impressions and shares or comments, as well as other measures such as audience satisfaction. It also means reconsidering impact and outcome evaluation methods so that we capture both population reach and engagement and the impact on health-related outcomes. Additionally, a priority for social media MMC components is determining the relationship between engagement with content online and behaviour change. At present, generating engagement is thought to be critical to achieving behaviour change through social media but there is very limited evidence to demonstrate this. Evaluators must allocate resources to determining what this relationship is and whether it varies between different types of engagements (e.g. ‘likes’ vs shares) and on different social media platforms. Evaluators must be innovative in their choice of methods to balance both rigor and feasibility. It is only through conducting more comprehensive and rigorous evaluations that we will be able to unpack the how best to use social media within MMCs.

Finally, more broadly evaluators must remember it is not sufficient to focus on the effects of campaigns; we need to understand their implementation and reach, explore how campaigns work, identify factors that make some (more) effective or ineffective. Critically, this means developing, refining, and empirically testing the theoretical underpinnings of campaigns and their mechanisms of effect. The linear and sequential process of the classical HOEM in particular should be a focus for evaluators so that its usefulness and accuracy can be further determined.

In the modern world, advertising and promotion are pervasive. We in public health must understand the role of MMCs in addressing NCDs so that we can ensure our campaigns are able to cut through the communications clutter if we are to progress towards a healthier society.
References


57. Freeman, B., et al., *Social media campaigns that make a difference: what can public health learn from the corporate sector and other social change marketers?* Public Health Research & Practice.


Appendices

Appendix 1: Supplementary material

Chapter 2.2
SEARCH STRATEGY

Databases

Pubmed, Medline, Web of Science, PsycInfo, and Scopus

Search terms

((weight control) OR (weight loss) OR (weight gain) OR (obesity)) AND ((social marketing) OR (mass media) OR (advertising) OR (telecommunications)) AND ((health promotion) OR (health education) OR (health behavior))

Terms were used as MESH headings in search engines where that function can be used. Exceptions: ‘Advertising’ was used as a keyword with MESH term ‘Advertising as topic’ joined with Boolean operator ‘or’; ‘Weight control’ was used as a keyword.

Inclusion/exclusion criteria

Inclusions:

- adult-targeted (aged 18+ years), population-level overweight and obesity campaigns that used mass media
- results published between 1 January 2000 and 19 April 2017
- describes evaluation methodology, using a post-evaluation design as a minimum

Exclusions:

- children/adolescent-targeted campaigns
- campaigns that target clinical populations
- campaigns that focus exclusively on physical activity or nutrition
- Systematic reviews, narrative reviews, and meta-analyses
- published in a language other than English

Strategy of initial cull

We searched within Endnote, our reference management software, for keywords (listed below) to identify literature not of relevance. In the first instance, titles were reviewed for relevance using the keyword searches; where unsure, the abstract was read to determine relevance. If still unsure, the reference was left in the library for review by additional authors.
Keywords used:
surgery, HIV, arthritis, asthma, pregnancy, osteoporosis, eating disorder, (school and television), randomized control [in title], cancer [title], cigarette, treatment [title], anorexia, depression, sexual, anxiety, body image, drug, psychiatric, serum, carotid, kidney, injury, alcohol, breastfeed, infant, stress, crime, diary, preschool, tobacco, mammography, legal, longitudinal, sampling, menopause, childhood obesity [title], logo, branding, middle-school, television watching, recruitment, purchas*, teen, hemoglobin, RCT, randomized [title], predict, security, pediatric, syndrome, prevalence [title, key word], policy, junk food, ban, law, cohort, primary school, clinical, regression
**Chapter 3.3**

**Supplementary Table 1: Planned and delivered Target Audience Rating Points (TARPs)* for television advertising bursts, November 2015-June 2016**

<table>
<thead>
<tr>
<th>Dates (week commencing)</th>
<th>Planned TARPs</th>
<th>Delivered TARPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 Nov to 6 Dec 2015</td>
<td>930</td>
<td>454</td>
</tr>
<tr>
<td>13 Dec 2015 to 10 Jan 2016</td>
<td>600</td>
<td>1,017</td>
</tr>
<tr>
<td>17 Jan to 14 Feb 2016</td>
<td>525</td>
<td>560</td>
</tr>
<tr>
<td>17 Apr to 15 May 2016</td>
<td>1,200</td>
<td>1,159</td>
</tr>
<tr>
<td>15 May to 5 Jun 2016</td>
<td>480</td>
<td>557</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,735</strong></td>
<td><strong>3,747</strong></td>
</tr>
</tbody>
</table>

* TARPs are a measure of reach and frequency of exposure, approximately equivalent to Gross Rating Points (GRPs)
**Supplementary Table 2: Statements used in principal component analyses and component loadings**

<table>
<thead>
<tr>
<th>First PCA</th>
<th>Component 1 loadings*</th>
<th>Component 2 loadings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  <em>I am confident I could increase my physical activity to improve my health</em></td>
<td>0.815</td>
<td>-</td>
</tr>
<tr>
<td>2.  <em>I am confident I could decrease the amount of fast food or snack food I eat to improve my health</em></td>
<td>0.758</td>
<td>-</td>
</tr>
<tr>
<td>3.  <em>I am confident I could maintain any changes I make to improve my health</em></td>
<td>0.675</td>
<td>-0.439</td>
</tr>
<tr>
<td>4.  <em>I know that I should change my lifestyle so it is healthier</em></td>
<td>0.509</td>
<td>0.647</td>
</tr>
<tr>
<td>5.  <em>My lifestyle is increasing my risk of getting a chronic disease</em></td>
<td>-</td>
<td>0.796</td>
</tr>
<tr>
<td>6.  <em>Others would say that I have a very healthy lifestyle</em></td>
<td>-</td>
<td>-0.773</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second PCA</th>
<th>Component 1 loadings*</th>
<th>Component 2 loadings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  <em>More people are avoiding fast food and takeaway snacks to be healthier</em></td>
<td>0.823</td>
<td>-</td>
</tr>
<tr>
<td>2.  <em>More people are avoiding too many sugar-sweetened soft drinks to be healthier</em></td>
<td>0.822</td>
<td>-</td>
</tr>
<tr>
<td>3.  <em>More of those people who are overweight or obese are trying to have a healthier weight</em></td>
<td>0.743</td>
<td>-</td>
</tr>
<tr>
<td>4.  <em>Most people I know accept that being overweight or obese is normal and not something to worry about</em></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5.  <em>Most people I know don’t worry that much about healthy eating</em></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6.  <em>Most of my family members walk for at least 30 minutes on almost every day</em></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7.  <em>Most people I know walk for at least 30 minutes on almost every day</em></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* A dash (-) indicates that the component loading for the variable did not exceed 0.3
Supplementary Table 3: Missingness by demographic factors at Wave 1, comparing those who completed all three waves against those that did not

<table>
<thead>
<tr>
<th>Category</th>
<th>Non Completers</th>
<th>Completers</th>
<th>P-value for Chi-Square test for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>581 (44%)</td>
<td>444 (47%)</td>
<td>0.124</td>
</tr>
<tr>
<td>Female</td>
<td>739 (56%)</td>
<td>495 (53%)</td>
<td></td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-39</td>
<td>562 (43%)</td>
<td>211 (23%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>40+</td>
<td>758 (57%)</td>
<td>728 (77.5%)</td>
<td></td>
</tr>
<tr>
<td>SEIFA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>979 (74%)</td>
<td>695 (74%)</td>
<td>0.888</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>339 (26%)</td>
<td>244 (26%)</td>
<td></td>
</tr>
<tr>
<td>REGION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater Sydney</td>
<td>701 (53%)</td>
<td>480 (51%)</td>
<td>0.351</td>
</tr>
<tr>
<td>Rest of NSW</td>
<td>619 (47%)</td>
<td>459 (49%)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Weight</td>
<td>488 (43%)</td>
<td>300 (36%)</td>
<td>0.007</td>
</tr>
<tr>
<td>Overweight or Obese</td>
<td>660 (57%)</td>
<td>523 (64%)</td>
<td></td>
</tr>
<tr>
<td>Risk Index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>Mean=2.0</td>
<td>Mean=1.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STD=0.95</td>
<td>STD=0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=1266</td>
<td>N=910</td>
<td></td>
</tr>
</tbody>
</table>
Supplementary Table 4: Missingness by outcome at Wave 1, comparing those who completed all three waves against those that did not

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Category</th>
<th>Non Completers</th>
<th>Completers</th>
<th>P-value for Chi-Square test for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition of the MHN tagline</td>
<td>Yes</td>
<td>148 (11%)</td>
<td>71 (8%)</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1146 (89%)</td>
<td>859 (92%)</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>Correctly recalled the physical activity recommendations</td>
<td>Yes</td>
<td>586 (46%)</td>
<td>427 (46%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>695 (54%)</td>
<td>497 (54%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “excess belly fat is a sign of toxic fat inside your body”</td>
<td>Agree</td>
<td>672 (51%)</td>
<td>495 (53%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>635 (49%)</td>
<td>432 (47%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “making small changes to what you eat will decrease your risk of chronic disease”</td>
<td>Agree</td>
<td>1082 (83%)</td>
<td>762 (82%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>226 (17%)</td>
<td>171 (18%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “making small changes how physically active you are will decrease your risk of chronic disease”</td>
<td>Agree</td>
<td>1119 (85%)</td>
<td>789 (84%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>192 (15%)</td>
<td>145 (16%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “losing just a few kilos on the outside will remove toxic fat from inside your body” if you are overweight</td>
<td>Agree</td>
<td>672 (52%)</td>
<td>502 (54%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>623 (48%)</td>
<td>427 (46%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “drinking sugar-sweetened soft drinks is a cause of overweight and obesity”</td>
<td>Agree</td>
<td>1080 (83%)</td>
<td>786 (84%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>226 (17%)</td>
<td>145 (16%)</td>
</tr>
<tr>
<td></td>
<td>Agree that “it’s alright to be a bit overweight”</td>
<td>Agree</td>
<td>251 (19%)</td>
<td>175 (19%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not agree</td>
<td>1051 (81%)</td>
<td>754 (81%)</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Mean susceptibility score (max 15.)</td>
<td>Mean=9.5</td>
<td>Mean=9.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD=2.6</td>
<td>STD=2.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=1290</td>
<td>N=924</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean self-efficacy score (max 15.)</td>
<td>Mean=11.4</td>
<td>Mean=11.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD=2.3</td>
<td>STD=2.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=1297</td>
<td>N=920</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean lifestyle behavior norms score (max 15.)</td>
<td>Mean=9.6</td>
<td>Mean=9.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STD=2.1</td>
<td>STD=2.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=1301</td>
<td>N=930</td>
<td></td>
</tr>
<tr>
<td>Agree that “most people I know have no sympathy for people who are overweight or obese”</td>
<td>Agree</td>
<td>515 (39%)</td>
<td>361 (39%)</td>
<td>0.738</td>
</tr>
<tr>
<td></td>
<td>Not agree</td>
<td>791 (61%)</td>
<td>571 (61%)</td>
<td></td>
</tr>
</tbody>
</table>

**Intentions**

| Intends to increase the amount of physical activity they do in the next month | Yes | 563 (43%) | 310 (33%) | <0.0001 |
| | No | 743 (57%) | 625 (67%) |

| Intends to reduce consumption of sugar-sweetened beverages in the next 6 months | Yes | 425 (33%) | 266 (29%) | 0.039 |
| | No | 862 (67%) | 655 (71%) |

**Behaviour Change**

| Tried to increase physical activity in the last 6 months | Yes | 828 (63%) | 508 (54%) | <0.0001 |
| | No | 480 (37%) | 426 (46%) |

**Current Behaviour**

| Meeting physical activity recommendations | Adequate | 823 (64%) | 551 (59%) | 0.027 |
| | Inadequate | 472 (36%) | 381 (41%) |

| Meeting fruit consumption recommendations | Sufficient | 620 (48%) | 456 (49%) | 0.516 |
| | Insufficient | 673 (52%) | 468 (51%) |

| Meeting vegetable consumption recommendations | Sufficient | 108 (8%) | 87 (9%) | 0.404 |
| | Insufficient | 1184 (92%) | 841 (91%) |

| Less than 1 cup of soft drink per day | Less than 1 | 1030 (79%) | 769 (83%) |
| | 1 or more | 269 (21%) | 159 (17%) |

| Mean ratio of cups of water per day to cups of soft drink per day | Mean=4.4 | Mean=4.4 |
| | STD=2.9 | STD=3.0 |
| | N=1215 | N=855 |
**Chapter 3.5**  
Supplementary Table: Statements used in principle component analyses and component loadings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Component 1 loadings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Component 2 loadings&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>First PCA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. <em>I am confident I could increase my physical activity to improve my health</em></td>
<td>0.812</td>
<td>-</td>
</tr>
<tr>
<td>8. <em>I am confident I could decrease the amount of fast food or snack food I eat to improve my health</em></td>
<td>0.787</td>
<td>-</td>
</tr>
<tr>
<td>9. <em>I am confident I could maintain any changes I make to improve my health</em></td>
<td>0.762</td>
<td>-0.315</td>
</tr>
<tr>
<td>10. <em>I know that I should change my lifestyle so it is healthier</em></td>
<td>0.517</td>
<td>0.649</td>
</tr>
<tr>
<td>11. <em>My lifestyle is increasing my risk of getting a chronic disease</em></td>
<td>-</td>
<td>0.807</td>
</tr>
<tr>
<td>12. <em>Others would say that I have a very healthy lifestyle</em></td>
<td>0.333</td>
<td>-0.725</td>
</tr>
<tr>
<td>Second PCA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. <em>More of those people who are overweight or obese are trying to have a healthier weight</em></td>
<td>0.839</td>
<td>-</td>
</tr>
<tr>
<td>9. <em>More people are avoiding too many sugar-sweetened soft drinks to be healthier</em></td>
<td>0.826</td>
<td>-</td>
</tr>
<tr>
<td>10. <em>Most people I know accept that being overweight or obese is normal and not something to worry about</em></td>
<td>-</td>
<td>0.892&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>11. <em>Most people I know don’t worry that much about healthy eating</em></td>
<td>-</td>
<td>0.889&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> A dash (-) indicates that the component loading for the variable did not exceed 0.3  

<sup>b</sup> This component was not included to maintain comparability with the Phase 1 evaluation
Chapter 4
Supplementary Table 1 Direct and fully adjusted effects for all outcome variables in the physical activity model

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Outcome variable</th>
<th>Direct effect</th>
<th>Effect after adjusting for all interim variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Odds ratio (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>Recognition</td>
<td>Understanding</td>
<td>3.49 (2.54, 4.79)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>1.22 (0.96, 1.55)</td>
<td>0.103</td>
</tr>
<tr>
<td></td>
<td>Attitude</td>
<td>1.49 (1.07, 2.08)</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>Family norms</td>
<td>1.01 (0.79, 1.29)</td>
<td>0.947</td>
</tr>
<tr>
<td></td>
<td>Community norms</td>
<td>1.07 (0.81, 1.42)</td>
<td>0.628</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>1.45 (1.13, 1.87)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.27 (0.98, 1.63)</td>
<td>0.067</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.39 (1.06, 1.83)</td>
<td>0.018</td>
</tr>
<tr>
<td>Understanding</td>
<td>Knowledge</td>
<td>1.46 (1.12, 1.89)</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Attitude</td>
<td>6.74 (4.85, 9.36)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Family norms</td>
<td>1.61 (1.22, 2.12)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Community norms</td>
<td>1.50 (1.08, 2.07)</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>3.25 (2.49, 4.24)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.33 (1.00, 1.77)</td>
<td>0.047</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.25 (0.94, 1.68)</td>
<td>0.130</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Attitude</td>
<td>1.40 (1.04, 1.90)</td>
<td>0.029</td>
</tr>
<tr>
<td></td>
<td>Family norms</td>
<td>0.78 (0.61, 0.98)</td>
<td>0.036</td>
</tr>
<tr>
<td></td>
<td>Community norms</td>
<td>0.69 (0.53, 0.91)</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>1.32 (1.04, 1.68)</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.08 (0.84, 1.38)</td>
<td>0.545</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.33 (1.02, 1.72)</td>
<td>0.032</td>
</tr>
<tr>
<td>Attitude</td>
<td>Family norms</td>
<td>2.88 (2.00, 4.17)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Community norms</td>
<td>2.47 (1.61, 3.80)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>7.77 (5.54, 10.91)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.53 (1.10, 2.15)</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.74 (1.24, 2.45)</td>
<td>0.001</td>
</tr>
<tr>
<td>Family norms</td>
<td>Community norms</td>
<td>12.23 (8.80, 16.99)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>1.57 (1.22, 2.02)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.46 (1.14, 1.88)</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.03 (0.78, 1.34)</td>
<td>0.845</td>
</tr>
<tr>
<td>Community norms</td>
<td>Family norms</td>
<td>12.22 (8.80, 16.99)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>1.53 (1.14, 2.06)</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>Behaviour change</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>1.55 (1.17, 2.06)</td>
<td>1.42 (1.04, 1.95)</td>
<td>2.72 (2.05, 3.60)</td>
</tr>
<tr>
<td></td>
<td>0.002</td>
<td>0.027&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>1.32 (0.95, 1.83)</td>
<td>1.54 (1.05, 2.26)</td>
<td>1.85 (1.39, 2.47)</td>
</tr>
<tr>
<td></td>
<td>0.103</td>
<td>0.029&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<sup>a</sup> Becomes non-significant after Holm adjustment.

<sup>b</sup> All results for family norms and community norms are adjusted for the other norms variable.
Supplementary Table 2 Direct and fully adjusted effects for all outcome variables in the fast food model

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Outcome variable</th>
<th>Direct effect</th>
<th>Effect adjusting for all interim variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Odds ratio (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>Recognition</td>
<td>Understanding</td>
<td>3.49 (2.54, 4.79)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>1.42 (1.04, 1.93)</td>
<td>0.028 a</td>
</tr>
<tr>
<td></td>
<td>Attitude</td>
<td>2.14 (1.53, 3.00)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Social norms</td>
<td>1.38 (1.09, 1.76)</td>
<td>0.099 a</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>1.70 (1.32, 2.17)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.51 (1.19, 1.92)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.41 (1.06, 1.86)</td>
<td>0.016 a</td>
</tr>
<tr>
<td>Understanding</td>
<td>Knowledge</td>
<td>1.61 (1.11, 2.35)</td>
<td>0.013 a</td>
</tr>
<tr>
<td></td>
<td>Attitude</td>
<td>6.12 (4.47, 8.40)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Social norms</td>
<td>1.97 (1.49, 2.61)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>3.14 (2.40, 4.12)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>1.42 (1.09, 1.86)</td>
<td>0.010 a</td>
</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>1.28 (0.94, 1.72)</td>
<td>0.113</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Attitude</td>
<td>2.27 (1.41, 3.64)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Social norms</td>
<td>1.45 (1.06, 1.97)</td>
<td>0.020 a</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Attitude</td>
<td>Social norms</td>
<td>2.18 (1.57, 3.01)</td>
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</tr>
<tr>
<td></td>
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<td>5.65 (4.06, 7.85)</td>
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<tr>
<td></td>
<td>Intention</td>
<td>1.83 (1.34, 2.50)</td>
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</tr>
<tr>
<td></td>
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<td>1.57 (1.11, 2.23)</td>
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<tr>
<td>Social norms</td>
<td>Self-efficacy</td>
<td>1.68 (1.32, 2.14)</td>
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<td></td>
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<td>1.47 (1.16, 1.86)</td>
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<tr>
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<tr>
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<td>Intention</td>
<td>3.53 (2.74, 4.55)</td>
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</tr>
<tr>
<td></td>
<td>Behaviour change</td>
<td>2.51 (1.90, 3.33)</td>
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</tr>
<tr>
<td>Intention</td>
<td>Behaviour change</td>
<td>4.64 (3.48, 6.18)</td>
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</table>

a Becomes non-significant after Holm adjustment.
Supplementary Table 3 Sensitivity analysis for physical activity model, including only participants not meeting Australian physical activity guidelines at baseline

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Outcome variable</th>
<th>Direct effect</th>
<th>Effect after adjusting for all interim variables</th>
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<td>P value</td>
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<td>1.30 (0.81, 2.08)</td>
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<td>1.56 (1.06, 2.27)</td>
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<td></td>
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<td>0.92 (0.60, 1.40)</td>
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</tr>
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<tr>
<td></td>
<td>Intention</td>
<td>1.77 (1.09, 2.88)</td>
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<tr>
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<td>Intention</td>
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<td>Family norms</td>
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<tr>
<td>Intention</td>
<td>3.79 (2.38, 6.04)</td>
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</tbody>
</table>
| Behaviour change | 2.24 (1.47, 3.40) | <0.001 | 1.72 (1.10, 2.68) | 0.017
| **Intention**    |                  |         |         |         |
| Behaviour change | 3.84 (2.38, 6.21) | <0.001 |         |         |

*a* Becomes non-significant after Holm adjustment.

*b* All results for family norms and community norms are adjusted for the other norms variable.
<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Outcome variable</th>
<th>Direct effect</th>
<th>Effect adjusting for all interim variables</th>
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<td>P value</td>
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<td></td>
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<td>Knowledge</td>
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<td>Attitude</td>
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<td>Knowledge</td>
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<td>Attitude</td>
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<tr>
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<td>Intention</td>
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<td>Intention</td>
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<td>3.35 (2.08, 5.38)</td>
<td>&lt;0.001</td>
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</table>

* Becomes non-significant after Holm adjustment.
# Chapter 5

Table S1: Key characteristics of excluded pages

<table>
<thead>
<tr>
<th>Page name</th>
<th>Public health issue</th>
<th>Number of Australian fans (total fans)</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>McGrath Foundation</td>
<td>Cancer treatment</td>
<td>281,529 (304, 404)</td>
<td>Not primary prevention</td>
</tr>
<tr>
<td>Bowel Cancer Australia</td>
<td>Cancer screening</td>
<td>54,075 (55,129)</td>
<td>Not primary prevention</td>
</tr>
<tr>
<td>Close the Gap</td>
<td>Aboriginal health</td>
<td>10,583 (11,004)</td>
<td>Not primary prevention</td>
</tr>
<tr>
<td>8700.com.au</td>
<td>Nutrition</td>
<td>9,678 (10,623)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Live_lighter</td>
<td>Overweight/obesity</td>
<td>8,782 (9,191)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Australian Drug Foundation</td>
<td>Illicit drugs</td>
<td>6,573 (6,890)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Odd Socks Day</td>
<td>Mental health</td>
<td>5,535 (5,815)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Melanoma Institute Australia</td>
<td>Skin cancer</td>
<td>4,953 (5,809)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>TeamUp Victoria</td>
<td>Physical activity</td>
<td>4,948 (5,114)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Make Healthy Normal</td>
<td>Overweight/obesity</td>
<td>4,898 (4,984)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Yeah! Youth Empowerment Against HIV/AIDS</td>
<td>Sexual health</td>
<td>4,319 (5,726)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Ending HIV Queensland</td>
<td>Sexual health</td>
<td>N/A (3,879)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Australian Cervical Cancer Foundation (ACCF)</td>
<td>Cancer screening</td>
<td>3,080 (3,648)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Walk to Work Day</td>
<td>Physical activity</td>
<td>2,477 (2,801)</td>
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</tr>
<tr>
<td>Heart Foundation Walking</td>
<td>Physical activity</td>
<td>2,126 (2,346)</td>
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</tr>
<tr>
<td>Healthy Together Geelong</td>
<td>Overweight/obesity</td>
<td>1,891 (1,932)</td>
<td>Less than 10,000 Australian fans</td>
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<td>Healthy Together Mildura</td>
<td>Overweight/obesity</td>
<td>1,710 (1,762)</td>
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<tr>
<td>Drug Aware</td>
<td>Illicit drugs</td>
<td>1,665 (1,942)</td>
<td>Less than 10,000 Australian fans</td>
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<tr>
<td>Active Melbourne</td>
<td>Physical activity</td>
<td>1,630 (1,813)</td>
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</tr>
<tr>
<td>Ending HIV Victoria</td>
<td>Sexual health</td>
<td>1,572 (1,650)</td>
<td>Less than 10,000 Australian fans</td>
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<tr>
<td>Australian Federation of AIDS Organisations (AFAO)</td>
<td>Sexual health</td>
<td>1,518 (9,448)</td>
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<tr>
<td>Alcohol. Think again</td>
<td>Alcohol</td>
<td>N/A (1,505)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Eat Well Tasmania</td>
<td>Nutrition</td>
<td>1,397 (1,441)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Australian Council on Smoking and Health</td>
<td>Smoking</td>
<td>1,213 (1,423)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>MOVE it Bundaberg</td>
<td>Physical activity</td>
<td>1,268 (1,291)</td>
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<tr>
<td>Page name</td>
<td>Public health issue</td>
<td>Number of Australian fans (total fans)</td>
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<td>------------------------------------------</td>
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<td>---------------------------------------</td>
<td>---------------------------------------</td>
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<td>Obesity Policy Coalition</td>
<td>Overweight/obesity</td>
<td>1,196 (1,608)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
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<td>Smoking</td>
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<td>Less than 10,000 Australian fans</td>
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<tr>
<td>Your move</td>
<td>Physical activity</td>
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<tr>
<td>Healthy Together Wodonga</td>
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<td>N/A (928)</td>
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</tr>
<tr>
<td>Aboriginal Quitline</td>
<td>Smoking</td>
<td>N/A (744)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Drinkwise Australia</td>
<td>Alcohol</td>
<td>N/A (666)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>Get moving Tasmania</td>
<td>Physical activity</td>
<td>N/A (621)</td>
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<td>Healthy Together Greater Dandenong</td>
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<td>N/A (517)</td>
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<tr>
<td>AVN</td>
<td>Immunisation</td>
<td>N/A (402)</td>
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</tr>
<tr>
<td>Physical Activity Foundation</td>
<td>Physical activity</td>
<td>N/A (388)</td>
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</tr>
<tr>
<td>Healthy together Cardinia Shire</td>
<td>Overweight/obesity</td>
<td>N/A (325)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>My health balance &amp; get on track</td>
<td>Overweight/obesity</td>
<td>N/A (322)</td>
<td>Less than 10,000 Australian fans</td>
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<tr>
<td>challenge</td>
<td>Alcohol</td>
<td>N/A (312)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>FARE Australia</td>
<td></td>
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</tr>
<tr>
<td>Obesity Australia Ltd</td>
<td>Overweight/obesity</td>
<td>N/A (310)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
<tr>
<td>CO-OPS Collaboration</td>
<td>Overweight/obesity</td>
<td>N/A (254)</td>
<td>Less than 10,000 Australian fans</td>
</tr>
</tbody>
</table>

NB: The number of Australian fans was not available for pages some pages
## Table S2

Associations between post type, communication techniques, and use of marketing elements with likes, with offsets for impressions and reach (n=1,563 posts)

<table>
<thead>
<tr>
<th>Offset</th>
<th>No offset</th>
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<th>Per unique user</th>
<th>Per fan impression</th>
<th>Per unique fan</th>
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<td>IRR (95% CI)</td>
<td>IRR (95% CI)</td>
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<tr>
<td>Links</td>
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Table S3 Associations between post type, communication techniques, and use of marketing elements with shares per impression and unique user (n=1,563 posts)

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**Post type**

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<th>0.69 (0.57-0.84)</th>
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<td>0.36 (0.26-0.50)</td>
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**Communication technique**

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<th>1.31 (0.76-2.24)</th>
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<th>1.06 (0.60-1.87)</th>
<th>0.85 (0.47-1.54)</th>
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<tbody>
<tr>
<td>Fear appeal</td>
<td>0.37 (0.22-0.62)</td>
<td>0.63 (0.43-0.93)</td>
<td>0.61 (0.41-0.90)</td>
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<td>0.19 (0.11-0.32)</td>
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<td>Humour</td>
<td>1.96 (1.41-2.72)</td>
<td>1.35 (1.07-1.71)</td>
<td>1.37 (1.08-1.75)</td>
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<td>0.83 (0.58-1.20)</td>
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<td>Positive emotional appeal</td>
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<td>0.61 (0.49-0.77)</td>
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**Marketing elements**

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<th>1.03 (0.88-1.21)</th>
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<td>Sponsorships and partnerships</td>
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Table S4 Associations between post type, communication techniques, and use of marketing elements with comments per impression and unique user (n=1,563 posts)

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Table S5 Associations between post type, communication techniques, and use of marketing elements with post consumers per impression and unique user (n=1,563 posts)

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<td>Call-to-action</td>
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<td>0.72 (0.49-1.06)</td>
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<td>0.73 (0.51-1.04)</td>
<td>1.05 (0.88-1.24)</td>
<td>0.99 (0.83-1.18)</td>
<td>0.51 (0.37-0.71)</td>
<td>0.38 (0.27-0.54)</td>
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<td>Informative</td>
<td>1.57 (1.29-1.96)</td>
<td>1.12 (1.01-1.24)</td>
<td>1.11 (1.00-1.24)</td>
<td>0.94 (0.76-1.16)</td>
<td>0.76 (0.61-0.95)</td>
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<td>Instructive</td>
<td>1.08 (0.84-1.40)</td>
<td>1.07 (0.95-1.21)</td>
<td>1.04 (0.91-1.17)</td>
<td>0.59 (0.47-0.75)</td>
<td>0.46 (0.35-0.59)</td>
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<td>1.10 (1.00-1.21)</td>
<td>1.08 (0.99-1.19)</td>
<td>1.38 (1.15-1.66)</td>
<td>1.10 (0.90-1.34)</td>
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<td>Testimonial</td>
<td>1.97 (1.60-2.43)</td>
<td>1.38 (1.25-1.52)</td>
<td>1.30 (1.17-1.43)</td>
<td>1.19 (0.98-1.45)</td>
<td>0.91 (0.74-1.12)</td>
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<td><strong>Marketing elements</strong></td>
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<td>Ref</td>
<td></td>
<td></td>
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<td>Branding elements</td>
<td>0.80 (0.69-0.93)</td>
<td>0.85 (0.79-0.91)</td>
<td>0.80 (0.75-0.86)</td>
<td>1.39 (1.20-1.60)</td>
<td>1.50 (1.29-1.74)</td>
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<td>Sponsorships and partnerships</td>
<td>1.23 (1.01-1.50)</td>
<td>0.97 (0.88-1.06)</td>
<td>0.97 (0.89-1.06)</td>
<td>0.78 (0.65-0.93)</td>
<td>0.74 (0.61-0.90)</td>
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<tr>
<td>Celebrities and sportspeople</td>
<td>0.93 (0.68-1.26)</td>
<td>1.02 (0.88-1.17)</td>
<td>0.97 (0.83-1.12)</td>
<td>0.87 (0.64-1.17)</td>
<td>0.83 (0.61-1.13)</td>
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<td>Category</td>
<td>Lower Bound</td>
<td>Upper Bound</td>
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<tr>
<td>Person of Authority</td>
<td>0.62 (0.37-1.03)</td>
<td>1.14 (0.89-1.47)</td>
<td>1.15 (0.89-1.49)</td>
<td>0.51 (0.32-0.83)</td>
<td>0.52 (0.32-0.86)</td>
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<td>Competitions, prizes, or giveaways</td>
<td>1.13 (0.73-1.75)</td>
<td>0.86 (0.70-1.06)</td>
<td>0.82 (0.66-1.01)</td>
<td>0.87 (0.59-1.30)</td>
<td>0.72 (0.48-1.10)</td>
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<tr>
<td>Characters or mascots</td>
<td>1.14 (0.73-1.77)</td>
<td>1.40 (1.13-1.73)</td>
<td>1.42 (1.14-1.77)</td>
<td>0.73 (0.49-1.07)</td>
<td>0.64 (0.43-0.96)</td>
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<tr>
<td>Vouchers, offers, or rebates</td>
<td>0.54 (0.26-1.14)</td>
<td>0.86 (0.61-1.26)</td>
<td>0.90 (0.62-1.30)</td>
<td>0.52 (0.26-1.04)</td>
<td>0.48 (0.23-0.98)</td>
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Chapter 6.2

Supplementary Table 1: MHN Fan age and gender profile as of 5 February, 2018, according to Facebook Insights data

<table>
<thead>
<tr>
<th>Gender</th>
<th>Proportion of all fans</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>16%</td>
</tr>
<tr>
<td>Female</td>
<td>83%</td>
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</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 24</td>
<td>19%</td>
</tr>
<tr>
<td>25 to 34</td>
<td>33%</td>
</tr>
<tr>
<td>35 to 54</td>
<td>37%</td>
</tr>
<tr>
<td>55+</td>
<td>9%</td>
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</table>

Supplementary Table 2: Adjusted differences in mean engagement with MHN and with non-MHN health pages

<table>
<thead>
<tr>
<th></th>
<th>MHN</th>
<th>Non-MHN health pages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted difference in mean engagement (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Ref</td>
<td>-0.34 (-0.54, -0.13)</td>
</tr>
<tr>
<td>Female</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Age (per 1 year increase)</td>
<td>0.01 (0.00, 0.01)</td>
<td>0.050</td>
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<tr>
<td>Socio-economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least disadvantaged</td>
<td>Ref</td>
<td>0.13 (-0.03, 0.30)</td>
</tr>
<tr>
<td>Most disadvantaged</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>Ref</td>
<td>0.11 (-0.04, 0.26)</td>
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<tr>
<td>Regional/rural</td>
<td>Ref</td>
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<tr>
<td>Family with children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>0.04 (-0.10, 0.18)</td>
</tr>
<tr>
<td>Yes</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Time on Facebook per day (per hour increase)</td>
<td>0.05 (0.01, 0.10)</td>
<td>0.023</td>
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<tr>
<td>Weight status</td>
<td></td>
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<tr>
<td>Healthy weight</td>
<td>Ref</td>
<td>-0.01 (-0.16, 0.13)</td>
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<tr>
<td>Overweight</td>
<td>Ref</td>
<td></td>
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Appendix 2: Data collection instruments
Make Healthy Normal campaign phase one evaluation questionnaire

INTRODUCTION
We are conducting a study on behalf of the NSW Ministry of Health into health issues affecting Australians. Your answers will provide important information which will help us plan health services.

The survey will take about 15 minutes to complete.

Please be assured that your answers are completely confidential and you can refuse to answer any question.

S1 Record GENDER

Male 1
Female 2

S2 AGE GROUP

To which of the following age groups do you belong?

Under 18 years 1 TERMINATE
18-24 years 3
25-34 years 4
35-44 years 5
45-49 years 6
50-54 years 7
55-65 years 8
66+ years 9 TERMINATE

KNOWLEDGE, ATTITUDES, BEHAVIOUR – CURRENT STATUS / PERSONAL EXPERIENCE

The next few questions are about physical activity and health

Q01 To maintain good health, how many minutes of moderate or vigorous physical activity do you think you should do every day? Moderate physical activity can be anything you do that causes a slight increase in your breathing and heart rate for a sustained period such as a brisk walk.

TYPE IN: _______ (minutes per day)

Q02 In the past 6 months, have you tried to change the amount of moderate or vigorous physical activity that you do?
Yes, tried to increase amount  1
Yes, tried to decrease amount  2
No, haven’t tried to change  3

**IF YES [TRIED TO INCREASE AMOUNT OF PHYSICAL ACTIVITY]**

**Q03** What influenced you to try and be more active? You can select as many options as apply.
MULTI RESPONSE ALLOWED [OPTIONAL: USE OPEN RESPONSE; RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]

1. Advertising campaigns (specify _____ )
2. TV program (specify__________)
3. To lose / control weight
4. Improve health in general
5. To improve fitness
6. To look better/ appearance
7. To feel better physically
8. To feel better about self/ mentally
9. My doctor advised me
10. Another health professional advised me
11. I got advice from the Get Healthy Service
12. Influence of friends or family members
13. I was/am trying to influence my family/others to exercise more
14. I was/am trying to decrease risk of cancer
15. I was/am trying to decrease risk of heart disease
16. I was / am trying to decrease my risk of Type 2 Diabetes
17. I was/ am trying to decrease my risk of chronic diseases
18. Other (specify)

**Q04** What have you done to try to increase the amount of moderate or vigorous physical activity that you do? You can select as many options as apply. RANDOMISE  MULTI RESPONSE ALLOWED

1. I have made time for more activity or exercise (walking/ swimming/ riding /running etc.)
2. I have joined a gym / fitness / exercise group
3. I got a personal trainer
4. I have made an effort to get outside of the house more
5. I have used an App on a mobile device or computer to track what I do
6. I have used a wearable device (Fitbit/ Jawbone etc.) to track what I do
7. I have made an effort to watch less TV
8. I have used a bicycle or walked instead of car/ motor vehicle to get to places
9. I have made an effort to reduce the amount of time I sit down at home or at work
10. I have used public transport instead of car/ motor vehicle to get to places
11. I have gotten off public transport early so I can walk the rest of the way
12. Other (Specify_)

Q05  Do you intend to increase the amount of physical activity you do in the next six months?
SINGLE RESPONSE
   1. Yes, in the next month
   2. Yes, probably in the next 6 months
   3. No

Q06  In the last week, how many times have you walked continuously for at least 10 minutes for recreation, exercise or to get to or from places?
TYPE IN: _____ (number of times)

Q07  What do you estimate was the total time you spent walking in this way in the last week? (In hours and or minutes)
TYPE IN: _____ (total time per week)

Q08  In the last week, how many times did you do any vigorous physical activity which made you breathe harder or puff and pant? (e.g. football, competitive tennis, netball, squash, athletics, cycling, jogging, keep-fit exercises and vigorous swimming
TYPE IN: _____ (number of times)

Q09  What do you estimate was the total time you spent doing this vigorous physical activity in the last week? (In hours and / or minutes)
TYPE IN: _____ (hours) _____ (minutes)

Q10  In the last week, how many times did you do any other more moderate physical activity that you haven't already mentioned? (e.g. gentle swimming, golf, social tennis, lawn bowls, tai chi, sailing)
TYPE IN: _____ (number of times)

Q11  What do you estimate was the total time that you spent doing these activities in the last week?
Q12 How do you usually get to work? You can select as many options as apply
RANDOMISE [MULTI RESPONSE ALLOWED]

1. Train
2. Bus
3. Ferry
4. Tram (including light rail)
5. Taxi
6. Car (as driver)
7. Car (as passenger)
8. Truck
9. Motor bike or motor scooter
10. Bicycle
11. Walk only
12. Walk part of the way
13. Walking
14. Running/Jogging
15. Other
16. I work from home

Q13 Do you intend to make any changes to the way you usually get to work to become more physically active in the next six months?

1. Yes, in the next month
2. Yes, probably in the next 6 months
3. No

The next question is about sitting. Think about time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing coursework, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

Q14 During the last 7 days, how much time did you usually spend sitting on a weekday?

SINGLE RESPONSE

TYPE IN: _______ (hours per day) [Range 0-16]
TYPE IN: _______ (minutes per day) [Range 0-960]

I’m now going to ask a few questions about food and health

Q15 How many serves of vegetables do you usually eat each day?
Q16  How many serves of fruit do you usually eat each day?

NOTE: A serve is 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces. [SHOW GRAPHIC OF SERVE OF FRUIT]

TYPE IN: ______ (serves per day)

Q17  How often do you have meals or snacks such as burgers, pizza, chicken or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster, or local take-away places?

SINGLE RESPONSE

Times per week     ______

Times per month    ______

Rarely/Never       ______

Q18  Approximately, how many items of fast food or snack foods do you have each day? An “item” means a slice of cake, a soft drink, a packet of chips, serve of hot chips, small burger, a chocolate bar, slice of pizza etc. You should count large portions as 2 items. [SHOW GRAPHIC OF ITEMS – DISTINGUISH ‘SMALL’ vs ‘LARGE’ BURGER]

SINGLE RESPONSE

1. Less than 1
2. 1 item
3. 2 items
4. 3 items
5. More than 3 (Specify number_)
6. I don’t eat fast food

Q19  In the last six months, have you tried to choose smaller portions or lower kilojoule foods in the meals that you eat?

SINGLE RESPONSE

1. Yes, I have tried to choose smaller potions or lower kilojoules
2. No, I haven't tried to change
IF YES [TRIED TO CHOOSE SMALLER PORTIONS OR LOWER KILOJOULES]

Q20 What influenced you to choose smaller portions or lower kilojoule foods in the meals that you eat? You can select as many options as apply. MULTI RESPONSE RANDOMISE [OPTIONAL: USE OPEN RESPONSE; RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]

1. An advertising campaign (specify______)
2. A TV program (specify__________)
3. To lose or / control my weight
4. Improve health in general
5. To improve fitness
6. To look better/ appearance
7. To feel better physically
8. To feel better about myself/ mentally
9. My doctor advised me to
10. Another health professional advised me to
11. Advice from the Get Healthy Service
12. Influence of friends or family members
13. To influence others / family to exercise more
14. To decrease my risk of cancer
15. To decrease my risk of heart disease
16. To decrease my risk of Diabetes / Type 2 Diabetes
17. To decrease my risk of chronic disease
18. Other (specify – ALWAYS LAST IF RANDOMISED)

IF YES [TRIED TO EAT SMALLER PORTIONS OR LOWER KILOJOULES]

Q21 Can you indicate what you have done to try to choose smaller portions or lower kilojoule foods in the meals that you eat? Please select all that apply. MULTI RESPONSE RANDOMISE

1. I have limited the amount of alcohol I drink
2. I have chosen healthy snacks like fruit and vegetables
3. I have made an effort to cook or prepare food at home more often
4. I have used Menu Board information to select meals with less Kilojoules or Calories
5. I have eaten smaller portions by using a smaller dinner plate
6. I have used an App or a mobile device or computer to track what I eat
7. I have changed fried foods for fresh foods
8. I have changed soft drinks for water
9. Other (specify – ALWAYS LAST IF RANDOMISED)

Q22 In the last six months, have you tried to decrease the amount of fast food or snack foods that you eat?
SINGLE RESPONSE

1. Yes, I have tried to decrease the amount of fast food or snack foods that I eat
2. No, I haven’t tried to change

IF YES [TRIED TO DECREASE AMOUNT OF UNHEALTHY FOOD]

Q23 What influenced you to decrease the amount of fast food or snack foods that you eat? You can select as many options as apply. MULTI RESPONSE RANDOMISE

1. An advertising campaign (specify _____)
2. A TV program (specify__________)
3. To lose or / control my weight
4. Improve health in general
5. To improve fitness
6. To look better/ appearance
7. To feel better physically
8. To feel better about myself/ mentally
9. My doctor advised me to
10. Another health professional advised me to
11. Advice from the Get Healthy Service
12. Influence of friends or family members
13. To influence others / family to exercise more
14. To decrease my risk of cancer
15. To decrease my risk of heart disease
16. To decrease my risk of Diabetes / Type 2 Diabetes
17. To decrease my risk of chronic disease
18. Other (specify) [ALWAYS LAST]

IF YES [TRIED TO DECREASE AMOUNT OF UNHEALTHY FOOD]

Q24 Can you indicate what you have done to try to decrease the amount of fast food or snack foods that you eat? MULTI RESPONSE RANDOMISE EXCEPT LAST ITEM

1. I have bought or eaten less fast food or snack foods
2. I have reduced my portion or meal size
3. I have made an effort to cook or prepare food at home more often
4. I have used Menu Board information to select meals with less Kilojoules or Calories
5. I have selected lighter or lower calorie fast foods or snack foods
6. I have used an App on a mobile device or computer to track what I eat
7. I have changed fried foods for fresh foods
8. I have changed soft drinks for water
9. Other (specify what you did) ALWAYS LAST ITEM
Q25  To what extent do you think you are likely to decrease or increase your consumption of fast food or snack foods in the next six months?

RESPONSE FRAME

1. Likely to decrease a lot
2. Likely to decrease a bit
3. Likely to stay the same
4. Likely to increase a bit
5. Likely to increase a lot

The next few questions ask about soft drinks, firstly sugar-sweetened soft drinks and then separately about diet or low calorie/joule soft drinks

Q26  How many cups of sugar-sweetened soft drink, cordials or sports drink, such as cola, lemonade or Gatorade, do you usually drink in a day?

NOTE:

1 cup=250ml. One can of soft drink = 1.5 cups.

One 500ml bottle of Gatorade = 2 cups.

___ Cups per day
___ Cups per week
___ I do not drink soft drink

Q27  How many cups of diet, low calorie/joule or sugar free soft drinks, do you usually drink in a day?

NOTE:

1 cup=250ml. One can of soft drink = 1.5 cups.

One 500ml bottle of Gatorade = 2 cups.

___ Cups per day
___ Cups per week
___ I do not drink soft drink

Q28  How many cups of fruit juice do you usually drink in a day?

NOTE:
1 cup=250ml, a household tea cup

___ Cups per day
___ Cups per week
___ I do not drink fruit juice

Q29  How many cups of water do you usually drink in a day?

NOTE:

1 cup=250ml or a household tea cup.
1 average bottle of water = 1.5 cups.

___ Cups per day
___ Cups per week
___ I do not drink water

Q30  To what extent do you think you are likely to decrease or increase your consumption of sugar-sweetened soft drinks, cordials or sports drinks in the next six months?

RESPONSE FRAME

1. Likely to decrease a lot
2. Likely to decrease a bit
3. Likely to stay the same
4. Likely to increase a bit
5. Likely to increase a lot

Q31  To what extent do you think you are likely to decrease or increase your consumption of water in the next six months?

RESPONSE FRAME

1. Likely to decrease a lot
2. Likely to decrease a bit
3. Likely to stay the same
4. Likely to increase a bit
5. Likely to increase a lot
PERCEPTIONS OF HEALTH AND LIFESTYLE, SOCIAL NORMS

The next question is about your perceptions of health and lifestyle issues

Q32  Approximately what proportion of Australian adults do you believe are overweight?
TYPE IN ______%

Q33  Approximately how many kilojoules do you think is the Australian average daily adult intake?
TYPE IN ______

Q34  To what extent do you agree or disagree with the following statements.

RANDOMISE STATEMENTS [Except L – always last]

a. Just a handful of excess belly fat is a sign that toxic fat is doing harm inside your body
b. My lifestyle is increasing my risk of getting a chronic disease
c. Others would say that I have a very healthy lifestyle
d. I know that I should change my lifestyle so it is healthier
e. I am confident I could increase my physical activity to improve my health
f. I am confident I could decrease the amount of fast food or snack food I eat to improve my health
g. Making small changes to what you eat will decrease your risk of chronic disease
h. Making small changes to how physically active you are will decrease your risk of chronic disease
i. If you’re overweight, losing just a few kilos on the outside will remove toxic fat from inside your body
j. Drinking sugar sweetened soft drinks too often is a cause of overweight and obesity
k. It’s alright to be a bit overweight
l. Having a fat belly is a sign of good health
m. I am confident I could maintain any changes I make to improve my health (ALWAYS PRESENT THIS STATEMENT LAST)

RESPONSE FRAME

1. Strongly agree
2. Somewhat agree
3. Neither agree nor disagree
4. Somewhat disagree
5. Strongly disagree
Q35 This question is about other people’s perceptions of health, lifestyle and chronic disease. To what extent do you agree or disagree with the following statements.

RANDOMISE STATEMENTS (a) to (f)

a. Most people I know accept that being overweight or obese is normal and not something to worry about
b. Most people I know don’t worry that much about healthy eating
c. More people are avoiding fast food and takeaway snacks to be healthier
d. More people are avoiding too many sugar sweetened soft drinks to be healthier
e. More of those people who are overweight or obese are trying to have a healthier weight
f. Most people I know have no sympathy for people who are overweight or obese
g. Most of my family members walk for at least 30 minutes on almost every day
h. Most people I know walk for at least 30 minutes on almost every day

RESPONSE FRAME

1. Strongly agree
2. Somewhat agree
3. Neither agree nor disagree
4. Somewhat disagree
5. Strongly disagree

Q36 Using a scale from 0 to 10 where 0 is not at all important and 10 is extremely important, whose opinions about health and healthy living have the most important influence on you, from the following...

a. Members of your family
b. Friends you meet in person
c. Friends you meet on social media (like Facebook)
d. People at your work
e. Your doctor
f. Other health professionals
g. Famous personalities from sport, music, movies
h. Others (Specify_________________)

RESPONSE FRAME

RECORD IMPORTANCE RATING 0 TO 10.

Q37 In the past month, have you talked with your family, friends, work colleagues or health professionals about...

a. doing more exercise/physical activity to improve your health? YES/ No
b. healthier eating to improve your health? YES/ No

c. controlling or losing weight to improve your health? YES/ No

IF YES [TALKED TO FAMILY, FRIENDS, WORK COLLEAGUES OR HEALTH PROFESSIONALS]

Q38 Which people have you talked with about [Doing more exercise and physical activity / Healthier eating / Controlling or losing weight] to improve your health? You can select as many options as apply

MULTI RESPONSE

1. Members of our family
2. Friends you meet in person
3. Friends you meet on social media (like Facebook)
4. People at your work
5. Your Doctor
6. Other health professionals
7. Other (Specify_________________ )

AWARENESS OF ADVERTISING, COMMUNICATIONS, SERVICES

Now, thinking about advertising or messages ...

Q39 In the last month have you seen, read or heard any advertising or messages about physical activity, healthy eating or healthy weight?

1. Yes
2. No

IF YES [SEEN ADVERTISING]

Q40 Where did you see, read or hear any part of this / these advertising or messages? You can select as many options as apply

OPEN RESPONSE

IF YES [SEEN ADVERTISING]

Q41 Can you describe what you saw, read or heard from this/ these advertising or messages?

Open text________________________________________________________
Q42 In the last month have you seen, read or heard any advertising or messages about active living, healthy eating or healthy weight which included the Phrase “MAKE HEALTHY NORMAL?”
   1. Yes
   2. No

Q43 In the last month have you seen, read or heard any advertising or messages about active living, healthy eating or healthy weight which included information about “TOXIC FAT” inside the body?
   1. Yes
   2. No

[POST CAMPAIGN ONLY: Q44 – Q58 INCLUSIVE]

IF YES [SEEN/READ/HEARD “MHN” /or “Toxic Fat”]

Q44 Where did you see, read or hear any part of this / these advertising or messages? You can select as many options as apply

OPEN RESPONSE

Q45 What main message(s) was this advertising or message trying to say?

Open text____________________________________

The next few questions are about specific advertisements. Please CLICK HERE to view the first advertisement.

Q46 Have you seen this advertisement before?

Please CLICK HERE to view the second advertisement.

Q47 Have you seen this advertisement before?

Q48 Do you recall seeing any ads using images from the TV commercials in any of the following places?
   1. On a billboard or poster located in a shopping centre or in a bus shelter or train station
   2. Online
3. Newspaper
4. Magazine
5. Cinema

Q49 Have you heard this advertisement before?

Please CLICK HERE to hear a radio advertisement. [NOT ASKED]

Q50 Whether or not you have seen all of the ads described earlier, we are interested in YOUR THOUGHTS about it. Thinking about these ads, to what extent do you agree or disagree with the following statements.

The advertising

a. ...was easy to understand
b. ...taught me something new
c. ...makes me stop and think
d. ...is believable
e. ...is trustworthy
f. ...makes me feel uncomfortable
g. ...is relevant to me
h. ...makes me feel concerned about my health
i. ...makes me more likely to try to improve my health

RESPONSE FRAME

1. Strongly agree
2. Somewhat agree
3. Neither agree nor disagree
4. Somewhat disagree
5. Strongly disagree

Now, thinking about telephone-based services to help people with healthy eating, physical activity or having a healthy weight.

Q51 In the last month have you seen, read or heard any information about telephone-based services to help people with healthy eating, physical activity or having a healthy weight?

1. Yes
2. No
Q52 At the end of these TV ads, the name of a Service was mentioned that could be contacted for more information. What was the name of that service?

Open text______________________________

Q53 Have you seen/ read information about Get Healthy Information and Coaching Service?

YES /NO

IF YES [SEEN/READ “Get Healthy Service”]

Q54 What did you do as a result of seeing/ reading information about the Get Healthy Information and Coaching Service?

1. Registered for coaching service
2. Thinking about registering
3. Nothing
4. Other (Specify__________)

Now, thinking about Websites, Mobile Apps and Online tools ...

Q55 In the last month have you seen, read or heard anything about websites, Mobile Apps or online tools to do with active living, healthy eating and healthy weight?

1. Yes
2. No

IF YES [SEEN Website/App/Online tool]

Q56 Can you describe what you saw, read or what you did as a result of this/ these website/ Mobile Apps/ Online tools?

Open text_________________________________

Q57 In the last month have you seen, read or heard anything about any of the following websites, Mobile Apps or online tools to do with active living, healthy eating and healthy weight?

1. Website 8700.com.au for information
2. Website Make Healthy Normal for information
3. Mobile App 8700kJ to calculate ideal figure
4. Mobile App MHN to make healthy lifestyle changes
5. GetFitQuicker [DUMMY APP]
Q 58 What did you do as a result of seeing/ reading this/ these websites, Mobile Apps or online tools?

Website 8700.com.au

Website Make Healthy Normal

Mobile App 8700kJ

Mobile App MHN

Mobile App GetFitQuicker[Dummy]

RESPONSE FRAME FOR EACH ‘YES’ in Q 45

1. Nothing
2. Thought about making healthy changes
3. Discussed it with friend or family member
4. Used it to make a plan to be more healthy
5. Used it to help make a healthy food choice
6. Used it to help make a healthy exercise choice

DEMOGRAPHICS

Now, I would like to ask some questions about you just to check we have surveyed a good cross-section of the population...

QDEM1 Including yourself, how many adults, 18 years or older, are living in your household?

Number of adults 18 plus given (Specify___ ) [RANGE 1 TO 20]

QDEM2 And how many children aged 0-17 years live in your household?

Number of children 0-17 given (Specify___ ) [RANGE 1 TO 20]

QDEM3 Which one of the following best describes your household?

1. Live alone
2. Couple
3. Couple with children
4. Single parent
5. Live just with related adults
6. Live with related adults with children
7. Live just with unrelated adults
8. Live with unrelated adults with children
9. Other (Specify )

QDEM4 What is the highest level of education you have completed? PROMPT IF NECESSARY
1. Primary school
2. Year 10 or below
3. Year 11
4. Year 12
5. Trade I apprenticeship
6. TAFE I Technical Certificate
7. Diploma
8. Bachelor Degree
9. Post-Graduate Degree
10. Other (Specify_)

QDEM5 What is the main language spoken in your home?
1. English
2. Other (Specify_)

QDEM6 Are you from an Aboriginal or Torres Strait Islander background?
1. Yes
2. No

QDEM7 Do you currently smoke cigarettes?
1. Yes
2. No

QDEM8 Have you been told by a doctor or nurse that you currently have any of the following long-term health conditions? You can select as many options as apply
MULTIPLES ACCEPTED
1. Heart disease
2. Stroke, or at risk of a stroke
3. Type 2 Diabetes
4. High blood pressure (hyper tension)
5. High Cholesterol
6. None of these

QDEM9 How much do you weigh without shoes?

NOTE: We ask weight and height information to enable researchers to calculate Body Mass Index

Response given in kilograms (SPECIFY KILOGRAMS) (ALLOWABLE RANGE 20 TO 300 KILOGRAMS) *(DISPLAY "UN LIKELY RESPONSE" IF <40 or >200)

QDEM10 How tall are you without shoes?

NOTE: We ask weight and height information to enable researchers to calculate Body Mass Index

1. Response given in centimetres (Specify_) (ALLOWABLE RANGE 90 TO 300 CENTIMETRES) *(DISPLAY "UN LIKELY RESPONSE" IF <120 or >200)

QDEM11 And lastly, could you just confirm your postcode?_____________

NOTE: This is just so we can look at the statistical results by geographic area.

CLOSE OF SURVEY

That’s the end of the survey which was conducted on behalf of the NSW Ministry of Health. Your responses are confidential and provide very important information; we would greatly appreciate it if we could have permission to contact you again about 3 months from now; would that be alright?

YES - OK TO CONTACT AGAIN

NO - DO NOT CONTACT AGAIN
Make Healthy Normal campaign phase two evaluation questionnaire

Make Healthy Normal Phase 2: Survey for Adult Males (18-54 years)

INTRODUCTION

We are conducting a study on behalf of NSW Health into health issues affecting Australians. Your answers will provide important information which will help us plan health services.

• The survey will take about 15 minutes to complete.

• Please be assured that your answers are completely confidential and you can choose not to answer any question.

You can find more information on this survey from NSW Health and what participation would mean for you in the Participant Information Statement which can be accessed via the following link [INSERT LINK TO PDF PARTICIPANT INFORMATION LETTER].

If you do not wish to participate this time, we understand – thanks for your time in considering our invitation, no need to do anything else.

If you want to ask us anything about the research, please contact Ipsos using the link that appears at the bottom of each page.

How To Complete The Survey...

Use your mouse to "SELECT" the relevant circles or boxes to mark your selection with a black dot or a tick. Some questions require you to type in your answers or drag and drop responses.

You may close the survey down and re-enter at the point you left off using the link emailed to you.

Once you have completed all questions on a page you will need to SELECT the "Next" Button to proceed to the next screen.

In order for your answers to be sent you must SELECT the "Submit" button at the end of the survey.

We hope you enjoy the survey!

Please press NEXT to continue.

For access to Ipsos Privacy Policy, SELECT here (http://ipsos.com.au/privacy). For any technical problems with this survey please send an e-mail by selecting on the link that appears at the bottom of each page.
SECTION 1: SCREENER

NOTE TO PROGRAMMER: TERMINATE AT END OF SCREENING SECTION

S1. Are you…?
   Please select one response only.  
   Male ○ 1  
   Female ○ 2  

S2. To which of the following age groups do you belong?
   Please select one response only.
   Under 18 years ○ 1  
   18-24 years ○ 3  
   25-34 years ○ 4  
   35-44 years ○ 5  
   45-49 years ○ 6  
   50-54 years ○ 7  
   55-65 years ○ 8  
   66+ years ○ 9  

SECTION 2: KNOWLEDGE, ATTITUDES, BEHAVIOURS

The next few questions are about physical activity and health.

Q1. To maintain good health, how many minutes of moderate or vigorous physical activity do you think you should do each day?
   Moderate physical activity can be anything you do that causes a slight increase in your breathing and heart rate for a sustained period, such as a brisk walk.
   Vigorous physical activity makes you breathe harder or puff and pant, such as playing football or jogging.
   Please type in.

Q2. In the past 6 months, have you tried to change the amount of moderate or vigorous physical activity that you do?
   Please select one response only. SINGLE RESPONSE
   Yes, tried to increase amount ○ 1  
   Yes, tried to decrease amount ○ 2  
   No, haven’t tried to change ○ 3  
   Prefer not to answer ○ 4

ASK IF Q2=1 (TRIED TO INCREASE AMOUNT OF PHYSICAL ACTIVITY)

Q3. What influenced you to try and be more active?
   Please type in as much detail as possible.

   For Programmer: CODE FRAME
   An Advertising campaign (please type in) 1
   A TV program (please type in) 2
   To lose / control weight 3
   Improve health in general 4
<table>
<thead>
<tr>
<th>Reason for Increased Physical Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>To improve fitness</td>
<td>5</td>
</tr>
<tr>
<td>To look better/ appearance</td>
<td>6</td>
</tr>
<tr>
<td>To feel better physically</td>
<td>7</td>
</tr>
<tr>
<td>To feel better about self/ mentally</td>
<td>8</td>
</tr>
<tr>
<td>My doctor advised me to</td>
<td>9</td>
</tr>
<tr>
<td>Another health professional advised me</td>
<td>10</td>
</tr>
<tr>
<td>I got advice from the Get Healthy Service</td>
<td>11</td>
</tr>
<tr>
<td>Influence of friends or family members</td>
<td>12</td>
</tr>
<tr>
<td>I was/am trying to influence my family/others to exercise more</td>
<td>13</td>
</tr>
<tr>
<td>I was/am trying to decrease risk of cancer</td>
<td>14</td>
</tr>
<tr>
<td>I was/am trying to decrease risk of heart disease</td>
<td>15</td>
</tr>
<tr>
<td>I was/am trying to decrease my risk of Diabetes/Type 2 Diabetes</td>
<td>16</td>
</tr>
<tr>
<td>I was/am trying to decrease my risk of chronic diseases</td>
<td>17</td>
</tr>
<tr>
<td>Other (please type in)</td>
<td>18</td>
</tr>
</tbody>
</table>

**OPEN ENDED TO BE CODED; REFER CODE FRAME; MULTI RESPONSE ALLOWED. [RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]**

---

**ASK IF Q2=1 (TRIED TO INCREASE AMOUNT OF PHYSICAL ACTIVITY)**

**Q4.** What have you done to try to increase the amount of physical activity that you do? Please select all that apply.

**RANDOMISE, ANCHOR LAST CODE**

**MULTI RESPONSE ALLOWED**

- I have made time for more activity or exercise (walking/swimming/riding/running etc.) 01
- I have joined a gym/fitness/exercise group 02
- I got a personal trainer 03
- I have made an effort to get outside of the house more 04
- I have used an app on a mobile device or computer to track what I do 05
- I have used a wearable device (Fitbit/Jawbone etc.) to track what I do 06
- I have made an effort to watch less TV 07
- I have used a bicycle or walked instead of car/motor vehicle to get to places 08
- I have made an effort to reduce the amount of time I sit down at home or at work 09
- I have used public transport instead of car/motor vehicle to get to places 10
- I have gotten off public transport early so I can walk the rest of the way 11
- I have taken the stairs whenever I could 12
- Other (please type in) 13
- Prefer not to answer 14

---

**Q5.** Do you intend to increase the amount of physical activity you do in the next six months? Please select one response only. **SINGLE RESPONSE**

- Yes, in the next month 1
- Yes, probably in the next 6 months 2
- No 3
- Prefer not to answer 4
Q6. In the last week, how many times have you walked continuously for at least 10 minutes for recreation, exercise or to get to or from places?  
Please type in.  

Q7. What do you estimate was the total time you spent walking in this way in the last week?  
Please type in.  

Q8. In the last week, how many times did you do any vigorous physical activity which made you breathe harder or puff and pant? (e.g. football, competitive tennis, netball, squash, athletics, cycling, jogging, keep-fit exercises and vigorous swimming).  
Please type in.  

Q9. What do you estimate was the total time you spent doing this vigorous physical activity in the last week?  
Please type in.  

Q10. In the last week, how many times did you do any other more moderate physical activity that you haven’t already mentioned? (e.g. gentle swimming, golf, social tennis, lawn bowls, tai chi, sailing)  
Please type in.  

Q11. What do you estimate was the total time that you spent doing these activities in the last week?  
Please type in.  

Q12. How do you usually get to work?  
Please select all that apply.  

**RANDOMISE**  
**ANCHOR LAST 4 CODES**  
**MULTI RESPONSE ALLOWED**  

<table>
<thead>
<tr>
<th>Mode</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train</td>
<td>01</td>
</tr>
<tr>
<td>Bus</td>
<td>02</td>
</tr>
<tr>
<td>Ferry</td>
<td>03</td>
</tr>
<tr>
<td>Tram (incl. light rail)</td>
<td>04</td>
</tr>
<tr>
<td>Taxi</td>
<td>05</td>
</tr>
<tr>
<td>Car</td>
<td>06</td>
</tr>
<tr>
<td>Truck</td>
<td>07</td>
</tr>
<tr>
<td>Motor bike or motor scooter</td>
<td>08</td>
</tr>
<tr>
<td>Bicycle</td>
<td>09</td>
</tr>
<tr>
<td>Walking</td>
<td>10</td>
</tr>
<tr>
<td>Running/jogging</td>
<td>11</td>
</tr>
<tr>
<td>Other (please type in)</td>
<td>12</td>
</tr>
<tr>
<td>I work from home</td>
<td>13</td>
</tr>
<tr>
<td>I do not work</td>
<td>14</td>
</tr>
</tbody>
</table>
Q13. Do you intend to make any changes to the way you usually get to work to become more physically active in the next six months?

Please select one response only.
SINGLE RESPONSE

- Yes, in the next month
- Yes, probably in the next 6 months
- No
- Prefer not to answer

The next question is about sitting. Think about time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

Q14. During the last 7 days, how much time did you usually spend sitting on a typical weekday?

Please type in.

RANGE FOR HOURS: 0-24
RANGE FOR MINUTES: 0-1400

The next few questions are about food and health.
Q15. How many serves of vegetables do you usually eat each day?
**NOTE:** One serve is ½ cup cooked or 1 whole medium potato or 1 cup of salad vegetables.
*Please type in.*

<table>
<thead>
<tr>
<th>VEGETABLE</th>
<th>½ cup cooked vegies or legumes</th>
<th>1 whole medium potato</th>
<th>1 cup salad vegies</th>
</tr>
</thead>
</table>

serves per day

Q16. How many serves of fruit do you usually eat each day?
**NOTE:** A serve is 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces.
*Please type in.*

<table>
<thead>
<tr>
<th>FRUIT</th>
<th>1 medium piece (e.g. apple)</th>
<th>2 small pieces (e.g. apricots)</th>
<th>1 cup chopped or canned fruit</th>
</tr>
</thead>
</table>

serves per day

Q17. How often do you have meals or snacks such as burgers, pizza, chicken or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster, or restaurants and take-away places (e.g. Thai, Chinese, Indian)?
*Please type in the number of times per week or month, or select ‘Rarely/Never’ if that applies. Please select one response only.*

 SINGLE RESPONSE

<table>
<thead>
<tr>
<th>times per week</th>
<th>times per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rarely/Never</td>
<td>○ 1</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 2</td>
</tr>
</tbody>
</table>

Q18. Approximately, how many items of fast food or snack foods do you have each day? **NOTE:** An “item” means a slice of cake, a packet of chips, serve of hot chips, small burger, a chocolate bar, slice of pizza etc. You should count large portions as 2 items.
*Please select one response only.*

 SINGLE RESPONSE

<table>
<thead>
<tr>
<th></th>
<th>○ 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 item each day</td>
<td></td>
</tr>
<tr>
<td>1 item each day</td>
<td>○ 2</td>
</tr>
<tr>
<td>2 items each day</td>
<td>○ 3</td>
</tr>
<tr>
<td>3 items each day</td>
<td>○ 4</td>
</tr>
<tr>
<td>More than 3 items each day (please type in)</td>
<td>○ 5</td>
</tr>
<tr>
<td>I don’t eat fast food</td>
<td>○ 6</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 7</td>
</tr>
</tbody>
</table>
Q19. In the last six months, have you tried to decrease the amount of fast food or snack foods that you eat?

Please select one response only. SINGLE RESPONSE

Yes, I have tried to decrease the amount of fast food I eat

Yes, I have tried to decrease the amount of snack foods that I eat

Yes, I have tried to decrease the amount of fast food AND snack foods that I eat

No, I haven't tried to change

Prefer not to answer

ASK IF Q19=1 OR Q19=2 OR Q19=3 (TRIED TO DECREASE AMOUNT)

Q20. What influenced you to decrease the amount of fast food or snack foods that you eat?

Please type in as much detail as possible.

For Programmer: CODE FRAME

An Advertising campaign (please type in)
A TV program (please type in)
To lose / control weight
Improve health in general
To improve fitness
To look better/ appearance
To feel better physically
To feel better about self/ mentally
My doctor advised me to
Another health professional advised me to
I got advice from the Get Healthy Service
Influence of friends or family members
I was/am trying to influence my family/others to exercise more
I was/am trying to decrease risk of cancer
I was/am trying to decrease risk of heart disease
I was/am trying to decrease my risk of Diabetes/Type 2 Diabetes
I was/am trying to decrease my risk of chronic diseases
Other (please type in)

OPEN ENDED TO BE CODED; REFER CODE FRAME; MULTIPLE RESPONSE ALLOWED.
[RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]

ASK IF Q19=1 OR Q19=2 OR Q19=3 (TRIED TO DECREASE AMOUNT)

Q21. Can you indicate what you have done to try to decrease the amount of fast food or snack foods that you eat?

Please select all that apply.

I have bought or eaten less fast food or snack foods
I have reduced my portion or meal size
I have made an effort to cook or prepare food at home more often
I have used Menu Board information to select foods and meals with less kilojoules or calories

I have selected lighter or lower calorie fast foods or snack foods

I have used an app on a mobile device or computer to track what I eat

I have changed fried foods for fresh foods

I have changed soft drinks for water

Other (please type in)

Prefer not to answer

Q22. To what extent do you think you are likely to decrease or increase your consumption of fast food in the next six months?  
Please select one response only.  
SINGLE RESPONSE

Q23. To what extent do you think you are likely to decrease or increase your consumption of less healthy snack foods (e.g. chocolate, chips, cake) in the next six months?  
Please select one response only.  
SINGLE RESPONSE

Q24. In the last six months, have you tried to choose smaller portions or lower kilojoule/calorie foods in the meals that you eat?  
Please select one response only.  
SINGLE RESPONSE

ASK IF Q24=1 OR Q24=2 OR Q1924=3 (TRIED TO CHOOSE SMALLER PORTIONS / LOWER KILOJOULES)  
Q25. What influenced you to choose smaller portions or lower kilojoule/calorie foods in the meals that you eat?  
Please type in as much detail as possible.

For Programmer: CODE FRAME

An Advertising campaign (please type in)  
A TV program (please type in)  
To lose / control weight  
Improve health in general  
To improve fitness  
To look better/ appearance  
To feel better physically  
To feel better about self/ mentally
My doctor advised me to 9
Another health professional advised me to 10
I got advice from the Get Healthy Service 11
Influence of friends or family members 12
I was/am trying to influence my family/others to exercise more 13
I was/am trying to decrease risk of cancer 14
I was/am trying to decrease risk of heart disease 15
I was/am trying to decrease my risk of Diabetes/Type 2 Diabetes 16
I was/am trying to decrease my risk of chronic diseases 17
I read the menu board / food labels 18
Health Star Rating system 19
Other (please type in) 20

OPEN ENDED TO BE CODED; REFER CODE FRAME; MULTI RESPONSE ALLOWED. [RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]

ASK IF Q24=1 OR Q1924=2 OR Q24=3 (TRIED TO CHOOSE SMALLER PORTIONS / LOWER KILOJOULES)
Q26. Can you indicate what you have done to try to choose smaller portions or lower kilojoule foods in the meals that you eat? Please select all that apply.
RANDOMISE, ANCHOR LAST CODE MULTI RESPONSE ALLOWED.

I have limited the amount of alcohol I drink ☐ 1
I have chosen healthy snacks like fruit and vegetables ☐ 2
I have made an effort to cook or prepare food at home more often ☐ 3
I have used Menu Board information to select foods and meals with less kilojoules or calories ☐ 4
I have eaten smaller portions by using a smaller dinner plate ☐ 5
I have used an app on a mobile device or computer to track what I eat ☐ 6
I have changed fried foods for fresh foods ☐ 7
I have changed soft drinks for water ☐ 8
I have used the Health Star Rating to select foods with less kilojoules or calories ☐ 9
Other (please type in) ☐ 10
Prefer not to answer ○ 10

The next few questions will ask about soft drinks, firstly about sugar-sweetened soft drinks and then separately about diet or low calorie/joule soft drinks and fruit juice.

Q27. How often do you drink sugar-sweetened soft drink, cordials or sports drink, such as cola, lemonade or Gatorade? Please type in the number of times per week or month, or select ‘Rarely/Never’ if that applies. Please select one response only. SINGLE RESPONSE

<table>
<thead>
<tr>
<th>times per week</th>
<th>times per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rarely</td>
<td>○ 1</td>
</tr>
<tr>
<td>I do not drink soft drink, cordial or sports drink</td>
<td>○ 2</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 3</td>
</tr>
</tbody>
</table>

215
Q27. How many cups of sugar-sweetened soft drink, cordials or sports drink, such as cola, lemonade or Gatorade, do you usually drink in a day/week/month?

**NOTE:** 1 cup=250ml. One can of soft drink = 1.5 cups.
One 500ml bottle of Gatorade = 2 cups.

Please type in the number of cups per day or week or month.

<table>
<thead>
<tr>
<th>Q27</th>
<th>Cups per day</th>
<th>Cups per week</th>
<th>Cups per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q28. How many cups of sugar-sweetened soft drink, cordials or sports drink, such as cola, lemonade or Gatorade, do you usually drink in a day/week/month?

**NOTE:** 1 cup=250ml. One can of soft drink = 1.5 cups.
One 500ml bottle of Gatorade = 2 cups.

Please type in the number of cups per day or week or month.

<table>
<thead>
<tr>
<th>Q28</th>
<th>Cups per day</th>
<th>Cups per week</th>
<th>Cups per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q29. How often do you drink diet, low calorie/joule or sugar free soft drinks?

Please type in the number of times per week or month, or select ‘Rarely/Never’ if that applies.

Please select one response only. SINGLE RESPONSE

<table>
<thead>
<tr>
<th>Q29</th>
<th>Times per week</th>
<th>Times per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>○ 1</td>
<td></td>
</tr>
<tr>
<td>I do not drink diet, low calorie/joule or sugar free soft drink</td>
<td>○ 2</td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 3</td>
<td></td>
</tr>
</tbody>
</table>

Q30. How many cups of diet, low calorie/joule or sugar free soft drinks do you usually drink in a day/week/month?

**NOTE:** 1 cup=250ml. One can of diet soft drink = 1.5 cups.
One 500ml bottle of diet soft drink = 2 cups.

Please type in the number of cups per day or week or month.

<table>
<thead>
<tr>
<th>Q30</th>
<th>Cups per day</th>
<th>Cups per week</th>
<th>Cups per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q31. How often do you drink fruit juice?

Please type in the number of times per week or month, or select ‘Rarely/Never’ if that applies.

Please select one response only. SINGLE RESPONSE

<table>
<thead>
<tr>
<th>Q31</th>
<th>Times per week</th>
<th>Times per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Rarely</td>
<td>○ 1</td>
<td></td>
</tr>
<tr>
<td>I do not drink fruit juice</td>
<td>○ 2</td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 3</td>
<td></td>
</tr>
</tbody>
</table>

Q32. How many cups of fruit juice do you usually drink in a day/week/month?

**NOTE:** 1 cup=250ml, a household tea cup.

Please type in the number of cups per day or week or month

<table>
<thead>
<tr>
<th>Q32</th>
<th>Cups per day</th>
<th>Cups per week</th>
<th>Cups per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>○ 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q33. How many cups of water do you usually drink in a day?

**NOTE:** 1 cup=250ml, a household tea cup.
1 average bottle of water = 1.5 cups.

<table>
<thead>
<tr>
<th>Q33</th>
<th>Cups per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one cup per day</td>
<td>○ 2</td>
</tr>
<tr>
<td>I do not drink water</td>
<td>○ 1</td>
</tr>
</tbody>
</table>
Please type in the number of cups per day or select from the other three options.

<table>
<thead>
<tr>
<th>Prefer not to answer</th>
</tr>
</thead>
</table>

Q34. Do you intend to decrease your consumption of *sugar-sweetened* soft drinks, cordials or sports drinks in the next six months?

Please select one response only. SINGLE RESPONSE

<table>
<thead>
<tr>
<th>Yes, in the next month</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, probably in the next 6 months</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>4</td>
</tr>
</tbody>
</table>

Q35. Do you intend to increase your consumption of *water* in the next six months?

Please select one response only. SINGLE RESPONSE

<table>
<thead>
<tr>
<th>Yes, in the next month</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, probably in the next 6 months</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>4</td>
</tr>
</tbody>
</table>

SECTION 3: PERCEPTIONS OF HEALTH AND LIFESTYLE, SOCIAL NORMS

The next few questions are about your perception of health and lifestyle issues.

Q36. To what extent do you agree or disagree with the following statements?

Please select one response per row.

<table>
<thead>
<tr>
<th>RANDOMISE STATEMENTS</th>
<th>ANCHOR LAST STATEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE RESPONSE PER ROW ALLOWED.</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

1. Just a handful of excess belly fat is a sign that toxic fat is doing harm inside your body

   | 1 | 2 | 3 | 4 | 5 | 6 |

2. My lifestyle is increasing my risk of getting a chronic disease

   | 1 | 2 | 3 | 4 | 5 | 6 |

3. Others would say that I have a very healthy lifestyle

   | 1 | 2 | 3 | 4 | 5 | 6 |

4. I know that I should change my lifestyle so it is healthier

   | 1 | 2 | 3 | 4 | 5 | 6 |

5. I am confident I could increase my physical activity to improve my health

   | 1 | 2 | 3 | 4 | 5 | 6 |

6. I am confident I could decrease the amount of fast food or snack food I eat to improve my health

   | 1 | 2 | 3 | 4 | 5 | 6 |

7. Making small changes to what you eat will decrease your risk of chronic disease

   | 1 | 2 | 3 | 4 | 5 | 6 |
8. Making small changes to how physically active you are will decrease your risk of chronic disease

9. If you’re overweight, losing just a few kilos on the outside will remove toxic fat from inside your body

10. Drinking sugar sweetened soft drinks too often is a cause of overweight and obesity

11. It’s alright to be a bit overweight

12. Having a fat belly is a sign of good health

13. I am confident I could maintain any changes I make to improve my health

Q37. Approximately how many kilojoules do you think is the Australian average daily adult intake?

Please type in a number.
OPEN ENDED TO BE CODED. SINGLE RESPONSE ALLOWED [RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]

For Programmer: CODE FRAME
1. Less than 1000
2. 1000 – 1999
3. 2000 – 2999
4. 3000 – 3999
5. 4000 – 4999
6. 5000 – 5999
7. 6000 – 6999
8. 7000 – 7999
9. 8000 – 8999
10. 9000 – 9999
11. 10,000+

Q38. This question is about other people’s perceptions of health, lifestyle and chronic disease. To what extent do you agree or disagree with the following statements.

Please select one response per row.

RANDOMISE STATEMENTS, ANCHOR LAST THREE CODES. SINGLE RESPONSE PER ROW ALLOWED.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
<th>Prefer not to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Most people I know accept that being overweight or obese is normal and not something to worry about</td>
<td>O 1</td>
<td>O 2</td>
<td>O 3</td>
<td>O 4</td>
<td>O 5</td>
<td>O 6</td>
</tr>
<tr>
<td>2. Most people I know don’t worry that much about healthy eating</td>
<td>O 1</td>
<td>O 2</td>
<td>O 3</td>
<td>O 4</td>
<td>O 5</td>
<td>O 6</td>
</tr>
</tbody>
</table>
3. More people are avoiding too many sugar sweetened soft drinks to be healthier

4. More of those people who are overweight or obese are trying to have a healthier weight

5. Most people I know have no sympathy for people who are overweight or obese

Q39. Whose opinions about health and healthy living have the most influence on you? *Please select one response only.*

SINGLE RESPONSE

- Members of your family
- Your friends
- People at your work
- Your doctor
- Other health professionals
- Famous personalities from sport, music and movies
- Other (please specify)
- Prefer not to answer

Q40. Which of these figures do you think is closest to your body shape? *Please select one response only.*

Q41. Do you think this is a healthy size to be? *Please select one response only.*

- Yes
- No
- Not sure
- Prefer not to answer

SECTION 4: AWARENESS OF ADVERTISING, COMMUNICATIONS, SERVICES

Now, thinking about advertising or messages...

Q42. In the last month have you seen, read or heard any advertising or messages about

- Yes
<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q42</td>
<td>Physical activity, healthy eating or healthy weight?</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Prefer not to answer</td>
</tr>
<tr>
<td>Q43</td>
<td>Where did you see read or hear any part of this/these advertising or messages?</td>
</tr>
<tr>
<td></td>
<td>For Programmer: CODE FRAME</td>
</tr>
<tr>
<td></td>
<td>1. TV advertising</td>
</tr>
<tr>
<td></td>
<td>2. TV news I current affairs</td>
</tr>
<tr>
<td></td>
<td>3. Television program</td>
</tr>
<tr>
<td></td>
<td>4. Radio advertising</td>
</tr>
<tr>
<td></td>
<td>5. Radio news</td>
</tr>
<tr>
<td></td>
<td>6. Radio program</td>
</tr>
<tr>
<td></td>
<td>7. Cinema</td>
</tr>
<tr>
<td></td>
<td>8. Magazine article</td>
</tr>
<tr>
<td></td>
<td>9. Magazine advertising</td>
</tr>
<tr>
<td></td>
<td>10. Newspaper article</td>
</tr>
<tr>
<td></td>
<td>11. Newspaper advertising</td>
</tr>
<tr>
<td></td>
<td>12. Brochure I booklet</td>
</tr>
<tr>
<td></td>
<td>13. Website</td>
</tr>
<tr>
<td></td>
<td>14. Word of mouth</td>
</tr>
<tr>
<td></td>
<td>15. Bus I tram I train I public transport</td>
</tr>
<tr>
<td></td>
<td>16. Local area I health service</td>
</tr>
<tr>
<td></td>
<td>17. Doctor I general practitioner</td>
</tr>
<tr>
<td></td>
<td>18. School activity I education program</td>
</tr>
<tr>
<td></td>
<td>19. Information night</td>
</tr>
<tr>
<td></td>
<td>20. Shopping trolley</td>
</tr>
<tr>
<td></td>
<td>21. Shopping centre adshel (advertising board)</td>
</tr>
<tr>
<td></td>
<td>22. Car park</td>
</tr>
<tr>
<td></td>
<td>23. Outdoor billboard</td>
</tr>
<tr>
<td></td>
<td>24. Social media</td>
</tr>
<tr>
<td></td>
<td>25. Bus stop</td>
</tr>
<tr>
<td></td>
<td>26. Internet search advertising</td>
</tr>
<tr>
<td></td>
<td>27. Digital display advertising</td>
</tr>
<tr>
<td></td>
<td>28. Other (Specify)</td>
</tr>
</tbody>
</table>

ASK IF Q42=1 (SEEN/READ/HEARD ADVERTISING)

Q44. Can you describe what you saw, read or heard from this/these advertising or messages? Please type in as much detail as possible.

OPEN ENDED TO BE CODED

Q45. In the last month have you seen, read or heard any advertising or messages about physical activity, healthy eating or healthy weight? Yes | 1
active living, healthy eating or healthy weight which included the phrase “MAKE HEALTHY NORMAL”?

Please select one response only.
SINGLE RESPONSE

<table>
<thead>
<tr>
<th>Response</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>☐ 2</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>☐ 3</td>
</tr>
</tbody>
</table>

**ASK IF Q45=1 (SEEN/READ/HEARD “MAKE HEALTHY NORMAL”)**

Q46. In the last month, how many times have you seen, read or heard this/these advertising or messages?

Please type in.

RANGE FOR NUMBER OF TIMES: 0-99.

**ASK IF Q45=1 (SEEN/READ/HEARD “MAKE HEALTHY NORMAL”)**

Q47. Where did you see, read or hear any part of this/these advertising or messages?

Please type in as much detail as possible.

**For Programmer: CODE FRAME**

1. TV advertising
2. TV news I current affairs
3. Television program
4. Radio advertising
5. Radio news
6. Radio program
7. Cinema
8. Magazine article
9. Magazine advertising
10. Newspaper article
11. Newspaper advertising
12. Brochure I booklet
13. Website
14. Word of mouth
15. Bus I tram I train I public transport
16. Local area I health service
17. Doctor I general practitioner
18. School activity I education program
19. Information night
20. Shopping trolley
21. Shopping centre adshel (advertising board)
22. Car park
23. Outdoor billboard
24. Bus stop
25. Internet search advertising
26. Digital display advertising
27. Other (Specify)

OPEN ENDED TO BE CODED; REFER CODE FRAME; MULTI RESPONSE ALLOWED [RESEARCH COMPANY TO CODE THE RESPONSES INTO THIS CODE FRAME]
Q48. What main message(s) was this advertising or message trying to say?  
**Please type in as much detail as possible.**

<table>
<thead>
<tr>
<th>OPEN ENDED TO BE CODED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The next few questions are about specific advertisements.

Q49. Please **click here** to view the first advertisement. Have you seen this advertisement before?  

(PROGRAMMER NOTE: SHOW 15 SEC TVC CLIP)

Please select one response only.  
**SINGLE RESPONSE**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Prefer not to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
</tr>
</tbody>
</table>

Q50. Please **click here** to view the second advertisement. Have you seen this advertisement before?  

(PROGRAMMER NOTE: SHOW 15 SEC TVC CLIP)

Please select one response only.  
**SINGLE RESPONSE**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Prefer not to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ 1</td>
<td>☐ 2</td>
<td>☐ 3</td>
</tr>
</tbody>
</table>

Q51. Regarding these two TV commercials, do you recall seeing any ads using images from these TV commercials in any of the following places?  
Please select all that apply.  
**MULTI RESPONSES ALLOWED.**

| On a billboard or poster located in a shopping centre or in a bus shelter or train station | ☐ 1 |
| Online | ☐ 2 |
| Newspaper | ☐ 3 |
| Magazine | ☐ 4 |
| Cinema | ☐ 5 |
| None of these | ☐ 6 |
| Prefer not to answer | ☐ 7 |

Q52. In the last month, how many times have you seen either of the TV commercials or ads using images from those TV commercials?  
**Please type in.**  
**RANGE FOR NUMBER OF TIMES: 0-99.**

| times |
ASK IF Q24=1 OR Q24=1 OR Q24=1-4 (SEEN/READ/HEARD “MAKE HEALTHY NORMAL”)

What did you do as a result of seeing/reading this/these advertising or messages?

Please select all that apply.

RANDOMISE STATEMENTS. MULTI RESPONSES ALLOWED.

Q53.

- Thought about making healthy changes
- Discussed it with a friend of family member
- Discussed it with my doctor
- Made a plan to become healthier
- Made some healthy lifestyle changes
- Visited the Make Healthy Normal website
- None of these
- Prefer not to answer

Q54.

Whether or not you have seen all of the ads described earlier, we are interested in YOUR THOUGHTS about it. …Thinking about these ads, to what extent do you agree or disagree with the following statements. The advertising…

Please select one response per row.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Somewhat agree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat disagree</th>
<th>Strongly disagree</th>
<th>Prefer not to answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. …was easy to understand</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>2. …taught me something new</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>3. …makes me stop and think</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>4. …is believable</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>5. …makes me feel uncomfortable</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>6. …is relevant to me</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>7. …makes me feel concerned about my health</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>8. …makes me more likely to try to improve my health</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
<tr>
<td>9. …is trustworthy</td>
<td>○ 1</td>
<td>○ 2</td>
<td>○ 3</td>
<td>○ 4</td>
<td>○ 5</td>
<td>○ 6</td>
</tr>
</tbody>
</table>

Now, thinking about telephone-based services, websites, mobile apps and online tools to help people with healthy eating, physical activity or having a healthy weight.

Q55. Have you seen/read information about the “Get Healthy Information and Coaching Service”?

Please select one response only. SINGLE RESPONSE

- Yes ○ 1
- No ○ 2
- Prefer not to answer ○ 3

ASK IF Q55=1 (SEEN/READ GET HEALTHY)

What did you do as a result of seeing/reading information about the “Get Healthy Information and Coaching Service”?

Please select one response only.

MULTI RESPONSE ALLOWED RANDOMISE, ANCHOR LAST 2 CODES

- Registered for coaching service ○ 1
- Thinking about registering ○ 2
- Nothing ○ 3
- Other (please type in) ○ 4
- Prefer not to answer ○ 5
Q57. In the last month have you seen, read or heard anything about any of the following websites, mobile apps or online tools to do with active living, healthy eating and healthy weight? Please select all that apply. DO NOT RANDOMISE STATEMENTS. MULTI RESPONSES ALLOWED.

<table>
<thead>
<tr>
<th>Website/APP</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>8700.com.au website</td>
<td>1</td>
</tr>
<tr>
<td>Make Healthy Normal website</td>
<td>2</td>
</tr>
<tr>
<td>8700kJ mobile app</td>
<td>3</td>
</tr>
<tr>
<td>Make Healthy Normal mobile app</td>
<td>4</td>
</tr>
<tr>
<td>Get Fit Quick mobile app</td>
<td>5</td>
</tr>
<tr>
<td>None of these</td>
<td>6</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>7</td>
</tr>
</tbody>
</table>

ASK FOR EACH CODE SELECTED IN Q57

Q58. What did you do as a result of seeing/reading this/these websites, mobile apps or online tools? Please select one response per column. SINGLE RESPONSE ALLOWED PER COLUMN.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nothing</td>
<td>1</td>
</tr>
<tr>
<td>2. Thought about making healthy changes</td>
<td>2</td>
</tr>
<tr>
<td>3. Discussed it with friend or family member</td>
<td>3</td>
</tr>
<tr>
<td>4. Used it to make a plan to be more healthy</td>
<td>4</td>
</tr>
<tr>
<td>5. Used it to help make a healthy food choice</td>
<td>5</td>
</tr>
<tr>
<td>6. Used it to help make a healthy exercise choice</td>
<td>6</td>
</tr>
<tr>
<td>7. Prefer not to answer</td>
<td>7</td>
</tr>
</tbody>
</table>

SECTION 5: DEMOGRAPHICS

Now, we would like to ask some questions about you just to check we have surveyed a good cross-section of the population...

D1. Including yourself, how many adults, 18 years or older, are living in your household? Please type in. number of adults

Prefer not to answer ○ 2

RANGE 1 TO 20

D2. And how many children aged 0-17 years live in your household? Please type in. number of children

None ○ 2
Prefer not to answer ○ 3

RANGE 1 TO 20

D3. Which one of the following best describes your household? Please select one response only.

Live alone ○ 01
Couple ○ 02
Couple with children ○ 03
| Single parent | 04 |
| Live just with related adults | 05 |
| Live with related adults with children | 06 |
| Live just with unrelated adults | 07 |
| Live with unrelated adults with children | 08 |
| Other (please type in) | 09 |
| Prefer not to answer | 10 |

**D4.** What is the main language spoken in your home? *Please select one response only.*

| English | 01 |
| Chinese/Mandarin/Cantonese | 02 |
| Vietnamese | 03 |
| Italian | 04 |
| Korean | 05 |
| Japanese | 06 |
| Filipino | 07 |
| Thai | 08 |
| German | 09 |
| French | 10 |
| Spanish | 11 |
| Portuguese | 12 |
| Greek | 13 |
| Arabic | 14 |
| Turkish | 15 |
| Hindi | 16 |
| Other (please type in) | 17 |
| Prefer not to answer | 18 |

**D5.** What is the highest level of education you have completed? *Please select one response only.*

| Primary school | 01 |
| Year 10 or below | 02 |
| Year 11 | 03 |
| Year 12 | 04 |
| Trade 1 apprenticeship | 05 |
| TAFE 1 Technical Certificate | 06 |
| Diploma | 07 |
| Bachelor Degree | 08 |
| Post-Graduate Degree | 09 |
| Other (please type in) | 10 |
| Prefer not to answer | 11 |

**D6.** Are you from an Aboriginal or Torres Strait Islander background? *Please select one response only.*

| Yes | 01 |
| No | 02 |
### D7. Do you currently smoke cigarettes?  
**Please select one response only.**

<table>
<thead>
<tr>
<th>Response</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td></td>
<td></td>
<td>O</td>
</tr>
</tbody>
</table>

### D8. Have you been told by a doctor or nurse that you currently have any of the following long-term health conditions?  
**Please select all that apply.**

**MULTIPLE RESPONSES ALLOWED.**

- Heart disease [ ]
- Stroke, or at risk of a stroke [ ]
- Type 2 diabetes [ ]
- High blood pressure (hypertension) [ ]
- High cholesterol [ ]
- None of these [ ]
- Prefer not to answer [ ]

### D9. How much do you weigh without shoes?  
**NOTE:** We ask weight and height information to enable researchers to calculate Body Mass Index.  
**Please type in. Please answer in kg OR pounds and stones.**

- Please note, 1 pound = 0.45kg  
  1 stone = 6.4 kg

1. Response given in kilograms (ALLOWABLE RANGE 20 TO 300 KILOGRAMS) *(DISPLAY "UNLIKELY RESPONSE" IF<40 or >200)
2. Response given in stones and pounds (ALLOWABLE RANGE 3 TO 40 STONE) *(DISPLAY "UNLIKELY RESPONSE" IF stones <6 or >30)
3. Response given in pounds only (ALLOWABLE RANGE 40 TO 560 POUNDS) *(DISPLAY "UNLIKELY RESPONSE" IF<88 or >420)

<table>
<thead>
<tr>
<th>Kg</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds</td>
<td>2</td>
</tr>
<tr>
<td>Stones</td>
<td>3</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>4</td>
</tr>
</tbody>
</table>

### D10. How tall are you without shoes?  
**NOTE:** We ask weight and height information to enable researchers to calculate Body Mass Index.  
**Please type in. Please answer in centimetres OR feet and inches.**

- Please note, 1 foot = 30.5 centimetres  
  1 inch = 2.5 centimetres

1. Response given in centimetres (ALLOWABLE RANGE 90 TO 300 CENTIMETRES) *(DISPLAY "UNLIKELY RESPONSE" IF <120 or >200)
2. Response given in feet and inches (ALLOWABLE RANGE 3 TO 9 FEET) *(DISPLAY "UNLIKELY RESPONSE" IF feet <4 or >7)  
  (ALLOWABLE RANGE 0 TO 12 INCHES)

<table>
<thead>
<tr>
<th>Cm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feet</td>
<td>inches</td>
</tr>
</tbody>
</table>
D11. What is your post code?

Please type in.

Post code ___ ___ ___ ___

THAT IS THE END OF THE SURVEY – THANK YOU

That's the end of the survey which was conducted on behalf of the NSW Health.

As a market research company, we comply with the requirements of the Privacy Act. The information you have provided will be used only for research and evaluation purposes.

Should you need to contact us please call us on [INSERT NUMBER].
INTRODUCTION

Objective:
get participants to feel comfortable interacting and establish rapport.
10 mins

Cover off usual ground rules: active participation, no right or wrong, recording / viewing, privacy, duration.

Introductions: basic information and share details of the ideal weekend or something that’s very important for us at the moment in the community. Moderator to lead by example and get participants to talk to each other by drawing parallels between their situations.

MHN CAMPAIGN

Objective:
evaluate the MHN campaign at a high level and identify what works and what doesn’t
20 min

Get top of mind awareness of health communications, concentrating on MHN.

- What ads can you remember seeing or hearing recently about healthy eating and exercise? [PROBE FOR DETAILS]
- Describe what you remember seeing / hearing.
[GET THE GROUP TO MHN TVCs AS QUICKLY AS POSSIBLE – PARTICIPANTS SHOULD HAVE SEEN THEM ALREADY]
- What were the MHN ad/s trying to say?
- Do you remember your immediate reaction? How did the ad/s make you feel?
- In what ways was it relevant or not relevant to you?
- Did you think about changing anything in your life after seeing these ads?
- Did you actually change anything? How did you go about that?
- How would you describe the ads to someone else?

STIMULUS – MAKE HEALTHY NORMAL


Response to the ads

- So what’s running through your mind as you’re seeing them now?
- How would you sum up in your own words what they’re saying?
- What’s the difference between the two ads?
- Is any of the information new to you?
- In what ways are the ads relevant or not relevant to you? Why would that be?
- What is it about the ads that particularly captures your attention?
- What do you like/ dislike about them? (Probe for specific content/ visual elements/ mood/ feeling/ talent.)
- Is the ad motivating? Does the ad persuade you to think about making some change to your life? What change is that? If not, why not?
Would you do anything different after seeing this ad? What would help you do that? What would prevent you?

Would you know where to go next if you were looking for more information? [PROBE ON IF WOULD KNOW TO GO TO WEBSITE IF NOT RAISED]

PARENTS ONLY:

a. Was the ad useful or helpful in deciding what you feed or do with your kids?

Response to the Make Healthy Normal slogan

How about the slogan? Make Healthy Normal. What does that mean to you? What do you think this slogan is trying to get across?

**PROBLEM/ SOLUTION APPROACH**

Objective: explore reactions to the campaign messaging and the problem/ solution approach to identify what resonates

15 min

Share problem solution posters / online ads and probe for reactions. Show all pairs together.

**MEN AUDIENCE**

- CHOOSE SMALLER PORTIONS AND LESS KILOJOULES and EAT MORE FRUIT AND VEG
  - Belly Fat > Choose Fresh Over Fried
  - MAKE WATER YOUR DRINK
  - Daily Sugary Drink > Swap Sugary Drinks for Iced Water
  - BE ACTIVE EVERY DAY and SIT LESS AND MOVE MORE
  - Normal Sitting Most of The Day > Take the Stairs Instead of Escalator

**PARENTS AUDIENCE**

- CHOOSE SMALLER PORTIONS AND LESS KILOJOULES and EAT MORE FRUIT AND VEG
  - Unhealthy Snacks > Trade Chips for Popcorn
  - MAKE WATER YOUR DRINK
  - Child Daily Sugary Drink > Make Water Their Regular Drink
  - BE ACTIVE EVERY DAY and SIT LESS AND MOVE MORE
  - 2+ Screen Time Is Norm > Make Screen Time Green Time

- Do you recall seeing any of these ads?
- Did you see the pairs separately or together? Is it clear that the pairs are connected? Is it clear the ads are connected? What if you only see one?
- What do you think is the main message of the ads? Does it help that the messages are presented in pairs? What if the problem and the solution were in the same ad?
- What do you think the ad is asking you to do? How are these things relevant to you? If not relevant to you, why is that?
- How do you feel about the ads offering tips?
• Which of these tips are most useful or helpful for you in your daily life? Which are not helpful and why?
• What else could these ads say?

OTHER CAMPAIGNS

Objective:
identify elements of other health campaigns that resonate with this target audience decision-making
20 min

Share stimulus from other campaigns and get feedback on how they compare to MHN in terms of: cut through, relevance, feeling, message and impact.

MEN AUDIENCE
SWAP IT DON’T STOP IT
https://www.youtube.com/watch?v=98P_Jk5lZJw
LIVE LIGHTER toxic fat (30 sec)
https://www.youtube.com/watch?v=pThTr83UWa8&index=2&list=PLZuJLOaj_w9a-vIWr9qweUSLjO0uR48

PARENTS AUDIENCE
CHANGE4LIFE 100 CALORIE SNACKS
https://www.youtube.com/watch?v=pM8hWdvYuOl
SWAP IT DON’T STOP IT
https://www.youtube.com/watch?v=98P_Jk5lZJw

• What was running through your mind as you were watching these ads?
• How are these ads similar or different to the Make Healthy Normal ads you’ve seen?
• Is it clear what these ads are asking you to do?
• Are these things relevant to you? If not relevant to you, why is that?
• Do they make you think about doing something different in your life?
• Are these ads motivating? Are these ads more or less effective than MHN in making you think about doing something different in your life? Are they more or less persuasive about the need to make changes in your life than the MHN ads?

WHAT’S NORMAL?

Objective:
To identify how the audience perceives healthy and unhealthy, normal and abnormal behaviours and how current messages fit.
20 mins

START BY BRAINSTORMING EATING AND PHYSICAL ACTIVITY BEHAVIOURS.
EACH PARTICIPANT TO WRITE ON POST-IT NOTES:
• What they currently eat for a typical weekday breakfast, lunch, dinner and in-between (don’t need the detail of each meal but just a few examples of what they’ve had the last few days) as well as the current serving sizes for each of them
• What drinks they have throughout the day
• How many minutes or hours of incidental activity (e.g. walking the dog or to work) they complete on a typical weekday
• How many minutes of more vigorous physical activity (e.g. sport and exercise) they complete on a typical weekday
• How much time they sit at work on a typical day
• How much time they sit in front of a screen for leisure

OF NOTE TO MODERATOR:
• FOR MEN, INDIVIDUAL BEHAVIOUR (THEY MAY DO THESE WITH THEIR FAMILY)
• FOR FAMILIES, THINGS THEY DO TOGETHER

PEOPLE WILL THEN BE INVITED TO ARRANGE THE POST-IT NOTES ON A LARGE MAP STUCK TO THE WALL AS PER THE BELOW.

PROBE FOR EACH BEHAVIOUR AS THE POST-IT NOTES ARE DISCUSSED:
• Barriers to changing each behaviour
• For those behaviours that “few people do” and are “healthy”: would they have been at a different end of the map a few years ago?
• For those behaviours that “everyone does it” and are “unhealthy”: if behaviours haven’t changes in the last few years, have attitudes?
• How does the Make Healthy Normal ads compare with what’s on the “unhealthy” side? Do they speak to these issues?

REVIEW AGAINST 5 KEY MESSAGES
Now there are five things that the Make Healthy Normal ads are telling us. Let’s discuss each in more detail:
• What’s running through your mind as you’re reading this?
• How relevant do we feel it is...? does it come across as something we want to do...? Because...
• Does it feel achievable...? Because...
• How do we feel about the way it’s worded...? Is it motivating? If not, how would you say it in your own words?
• Is it speaking to the things we had written on the post-it notes? What is missing?

[MODERATORS WILL GO THROUGH EACH IN TURN BY SHOWING THEM ON A5 CARDS, ROTATING THE ORDER ACROSS GROUPS]

• Choose smaller portions and less kilojoules
• Eat more fruit and vegetables
• Make water your drink
• Be active every day
• Sit less and move more

CLOSING
Objective:
ensure everything is covered and identify key elements of the discussion
5 mins

Moderator to summarise discussion, ask for further input and thank participants for their time.
Make Healthy Normal Facebook page evaluation questionnaire

SCREENING

1. What is your age in years?
   a. _____ years (TERMINATE IF LESS THAN 18. ELSE GO TO 3)
   b. Prefer not to say

2. In which of the following age groups do you belong?
   a. Under 18 years (TERMINATE)
   b. 18 to 24 years
   c. 25 to 34 years
   d. 35 to 44 years
   e. 45 to 54 years
   f. 55 to 64 years
   g. 65 to 74 years
   h. 75 years or older
   i. Prefer not to say (TERMINATE)

3. Do you currently live in Australia?
   a. Yes
   b. No (TERMINATE)

FACEBOOK USE

4. On average, about how much time per day do you spend on Facebook?
   a. NUMBER OF HOURS PER DAY
   b. NUMBER OF MINUTES PER DAY

5. On average, how many times per day do you check Facebook?
   a. NUMBER OF TIMES PER DAY

TERMINATE IF 4a=0 AND 4b=0 AND 5=0. ELSE CONTINUE

6. Have you ever ‘liked’ any Facebook pages that relate to active living, healthy eating, or healthy weight?
   a. Yes
b. No (GO TO MHN PAGE SECTION)

7. Which Facebook pages that relate to active living, healthy eating, or healthy weight have you ‘liked’? You may select as many as apply. (MULTIPLE RESPONSE. RANDOMISE)

a. Michelle Bridges 12 Week Body Transformation: https://www.facebook.com/12WBT
b. Women’s Health: https://www.facebook.com/womenshealthau
c. Men’s Health: https://www.facebook.com/MensHealthAU/
d. Good Health Mag: https://www.facebook.com/GoodHealthMag
e. Live Lighter: https://www.facebook.com/LiveLighterCampaign
f. NSW Institute of Sport: https://www.facebook.com/nswis/
g. Australian Healthy Food Guide: https://www.facebook.com/AustralianHealthyFoodGuide/
h. Nutrition Australia: https://www.facebook.com/NutritionAustralia/
i. Clean Eating Australia: https://www.facebook.com/CleanEatingAust
j. Australian Men’s Fitness: https://www.facebook.com/AustralianMensFitness/
k. Healthier, Happier QLD: https://www.facebook.com/HealthierHappierQLD/
l. Fitness First Australia: https://www.facebook.com/FitnessFirstAustralia
m. My Fitness Pal: https://www.facebook.com/myfitnesspal
n. Heart Foundation: https://www.facebook.com/NationalHeartFoundation/
p. Shape Up Australia: https://www.facebook.com/swapitdontstopit/
r. I Quit Sugar: https://www.facebook.com/IQuitSugar/
s. Other (SPECIFY)

8. How frequently do you perform the following activities on any of the active living, healthy eating, or healthy weight Facebook pages you have ‘liked’? NOTE: ‘Very frequently’ means that you perform that activity every time or almost every time you log on to Facebook. (RANDOMISE)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very frequently</th>
<th>Somewhat frequently</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing content from any of these pages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Liking (or ‘reacting’ to) content from any of these pages (DISPLAY IMAGE OF REACTION ICONS)  
Commenting on content on any of these pages  
Viewing any of these pages  
Posting your own content on any of these pages  
Inviting friends to like any of these pages  
Any other activity on these pages (please specify)

**MHN PAGE**

9. Before today, had you heard of Make Healthy Normal?
   a. Yes
   b. No (GO TO DEMOGRAPHICS SECTION)

10. Where have you seen or heard of Make Healthy Normal? Please tick as many as apply. (MULTIPLE RESPONSE. RANDOMISE.)
   a. On Facebook
   b. On television
   c. On a billboard or poster located in a shopping centre or in a bus shelter or train station
   d. In a newspaper or magazine
   e. In the cinema
   f. Online (other than Facebook)
   g. Don’t know

IF 10=a CONTINUE. ELSE GO TO DEMOGRAPHICS SECTION

11. Have you ‘liked’ the Make Healthy Normal Facebook page? (DISPLAY IMAGE OF MHN PAGE)
   a. Yes
   b. No (GO TO 13)

12. Why did you ‘like’ it?
   a. OPEN RESPONSE (GO TO 14)

13. Why haven’t you ‘liked’ it?
a. OPEN RESPONSE (GO TO DEMOGRAPHICS SECTION)

14. How frequently do you perform the following activities when on Facebook? NOTE: ‘Very frequently’ means that you perform that activity every time or almost every time you log on to Facebook (RANDOMISE)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very frequently</th>
<th>Somewhat frequently</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing content from the Make Healthy Normal page</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liking (or ‘reacting’ to) content from the Make Healthy Normal page</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commenting on content on the Make Healthy Normal page</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing the Make Healthy Normal page</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inviting friends to like the Make Healthy Normal page</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(IF PARTICIPANT RESPONDS ‘NEVER’ TO ALL THEN GO TO DEMOGRAPHIC SECTION. ELSE CONTINUE)

15. Have you ever done any of the following in response to content on the Make Healthy Normal Facebook page? (RANDOMISE. MULTIPLE RESPONSE)

a. Discussed content with friends or family offline (i.e. outside of Facebook)

b. Visited the Make Healthy Normal website

c. Called the Get Healthy Information and Coaching Service

d. Sought advice or help from a health professional

e. Tried to changed your own behaviour or habits

16. How satisfied are you with the quality of the content on the Make Healthy Normal Facebook page?

a. Very satisfied

b. Somewhat satisfied

c. Somewhat unsatisfied

d. Very unsatisfied

17. How satisfied are you with the frequency of posting new content on the Make Healthy Normal Facebook page?

a. Very satisfied
b. Somewhat satisfied

c. Somewhat unsatisfied

d. Very unsatisfied

18. What do you like most about the Make Healthy Normal Facebook page?
   a. OPEN RESPONSE

19. What do you like least about the Make Healthy Normal Facebook page?
   a. OPEN RESPONSE

DEMOGRAPHICS

You’re almost done. These questions are about you, just to check we have surveyed a good cross-section of the population.

20. What is your gender?
    a. Male
    b. Female
    c. Non-binary

21. What is your postcode? This is just so we can look at the results by geographical area.
    a. OPEN RESPONSE

22. How many children aged 0-17 years live in your household?
    a. OPEN RESPONSE (ALLOWABLE RANGE 0 TO 15)

(IF 22=0, GO TO 24. ELSE CONTINUE)

23. Which of the following best describes your role in planning meals, shopping for food, cooking meals, and feeding your children when they are in your care? (Please select one)

    a. I make all / the majority of the decisions
    b. I share responsibility equally with my partner
    c. I have some input but my partner is more responsible
    d. I have little or no input

24. In general, would you say that your health is excellent, very good, good, fair, or poor?
    a. Excellent
b. Very good

c. Good

d. Fair

e. Poor

25. In the past week, on how many days have you done a total of **30 minutes or more** of physical activity, which was enough to raise your breathing rate? This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job.

   a. NUMBER OF DAYS (MIN 0, MAX. 7)

26. How many cups of **sugary drinks such as** soft drink, cordials or sports drink (for example cola, lemonade or Gatorade), do you usually drink in a day? NOTE: 1 cup=250ml. One can of soft drink = 1.5 cups. One 500ml bottle of Gatorade = 2 cups.

   a. NUMBER OF CUPS PER DAY

   b. I do not drink soft drink

27. How tall are you in centimetres without shoes? NOTE: We use this information to enable us to calculate Body Mass Index.

   a. RESPONSE IN CENTIMETRES (ALLOWABLE RANGE 90 TO 300)

   b. Prefer not to say

28. How much do you weigh in kilograms? NOTE: We use this information to enable us to calculate Body Mass Index.

   a. RESPONSE IN KILOGRAMS (ALLOWABLE RANGE 20 TO 300)

   b. Prefer not to say

**CONSENT TO RECONTACT**

That’s the end of the survey, conducted on behalf of the NSW Ministry of Health. Your responses provide very valuable information that will help the Ministry to improve the Make Healthy Normal page.

29. Would you be interested in participating in a focus group on the Make Healthy Normal Facebook page? Note that you can change your mind later without consequence. If you are interested, you will receive more information about these focus groups within the next 3 weeks.

   a. Yes

   b. No
FEEDBACK

30. Would you like to receive a one page summary of the results from this study? The summary will be sent out after the project has finished.
   a. Yes
   b. No

PRIZE DRAW

31. Would you like to enter the draw to win a $200 Rebel Sport voucher? The prize will be drawn on [INSERT DATE], with winners notified by email and posted on the Make Healthy Normal Facebook page.
   a. Yes
   b. No

EMAIL ADDRESS

IF YES TO 28, 29, OR 30. ELSE TERMINATE.

32. Please provide your name and email address. Your details will be stored separately from your responses to this survey and will not be provided to anyone else or used for any purpose other than what you have consented to.
   a. ENTER NAME
   b. ENTER EMAIL ADDRESS

TERMINATION PAGE

Thank you very much for your time.
Make Healthy Normal Facebook page focus group discussion guide

GENERAL USE OF FACEBOOK

- How often do they use it?
- What do they do on Facebook?
- What style of Facebook user are they?
  - Are they very active, creating and sharing their own and others’ content or do they prefer to just see what comes up in their feeds or something in between?
- Who do they communicate with and for what purpose?
- What do they use Facebook for?
- What was the most recent thing they did on Facebook?

ENGAGEMENT WITH HEALTH ISSUES ON FACEBOOK

- Why engage (or why not)?
- How do they engage?
- Frequency and type of engagement
- User expectations of pages addressing public health issues on Facebook
- Good and bad/liked and disliked aspects of public health-related pages on Facebook

MHN PAGE (MHN FANS ONLY)

- How did they find out about the page?
- Why like the page?
- Frequency and type of engagement
  - Why engage with some content and not with others?
  - What do they expect from other users when they engage with the MHN page?
  - If they also engage with other health-related pages, do they do that more or less frequently? Why or why not?
  - How does their engagement with MHN (and other health-related pages) compare to other non-health-related pages they might like?
- User expectations of the MHN page
- Good and bad/liked and disliked aspects of MHN page
- What do they think could be improved?
• Have they done anything in response to MHN content, outside of Facebook (e.g. tried to change their behaviour, called the Get Healthy Service etc.)?
  o What have they done?
  o How often do they do it?

**MHN PAGE (NON-FANS ONLY)**

• Are they aware of MHN?

• Did they know MHN had a Facebook page?

• If yes, have they not liked the page for any particular reason?

• If no, what is their initial reaction to hearing about/seeing the page?

**MHN CONTENT**

• Participants to be shown selected content from MHN:
  o Understanding (does it make sense, easily understood?)
  o Relevance (to them and/or to others)
  o Impressions (like/dislike? Why?)
  o What would they do if they saw this content on Facebook?

• How does this MHN content compare to content from other pages?
  o Show 1 example from other pages with a similar message to the MHN posts
Appendix 3: Author contributions for published papers
A systematic search and review of adult-targeted overweight and obesity prevention mass media campaigns and their evaluation: 2000-2017 (Chapter 2)

James Kite, Anne Grunseit, Erika Bohn-Goldbaum, Bill Bellew, Tom Carroll, Adrian Bauman

James Kite’s contribution to this paper:

- Led the design of the study
- Reviewed search results to identify papers for inclusion
- Extracted data
- Conducted all analyses
- Led interpretation of analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- AG contributed to the design of the study, reviewed search results to identify papers for inclusion, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- EBG conducted the search and initial cull of search results, extracted data, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- BB and AB conceived the study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- TC contributed to interpretation of all analyses, and contributed to the review and editing of the paper
Impact of the Make Healthy Normal mass media campaign (Phase 1) on knowledge, attitudes, and behaviours: a cohort study (Chapter 3.3)

James Kite, Joanne Gale, Anne Grunseit, William Bellew, Vincy Li, Beverley Lloyd, Michelle Maxwell, John Vineburg, Adrian Bauman

James Kite’s contribution to this paper:

- Contributed to the design and led the conduct of the broader cohort study, including study design and data collection
- Led the design and conduct of all analyses within this paper
- Conducted descriptive analysis
- Led interpretation of all analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- JG contributed to the design of the advanced analyses, conducted the advanced analyses, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- AG contributed to the design of the advanced analyses, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- WB and AB led the design and contributed to the conduct of the broader cohort study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- VL and BL contributed to the design and conduct of the broader cohort study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- MM and JV led the implementation of MHN campaign, provided campaign-specific contextual information, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
From awareness to behaviour: Testing a hierarchy of effects model on the Australian Make Healthy Normal campaign using mediation analysis (Chapter 4)

James Kite, Joanne Gale, Anne Grunseit, Vincy Li, William Bellew, Adrian Bauman

James Kite’s contribution to this paper:

- Contributed to the design and led the conduct of the broader cohort study, including study design and data collection
- Co-led the design of all analyses with this paper
- Conducted of all analyses within this paper
- Led interpretation of all analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- JG conducted initial analyses and co-led the design of the final analyses, including writing the program for the final analyses. Also contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- AG contributed to the design of the analyses, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- WB and AB led the design and contributed to the conduct of the broader cohort study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- VL contributed to the design and conduct of the broader cohort study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
James Kite’s contribution to this paper:

- Conceived and designed the study
- Collected data
- Conducted descriptive analysis and contributed to the design of the advanced analyses
- Led interpretation of all analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- BCF and BF contributed to the design of the study, collected data, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- AG led the design of and conducted the advanced analyses, contributed to the interpretation of analyses, and contributed to the review and editing of the paper
User perceptions of the Make Healthy Normal campaign Facebook page: a mixed methods study (Chapter 6.2)

James Kite, Bronwyn McGill, Becky Freeman, John Vineburg, Vincy Li, Nathan Berton, Anne C. Grunseit

James Kite’s contribution to this paper:

- Conceived and designed the study
- Collected data
- Conducted and led interpretation of all analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- BM contributed to analyses and interpretation of qualitative data and contributed to the review and editing of the paper
- BF contributed to the design of the study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- JV, VL, and NB contributed to study design, contributed to data collection, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- AG contributed to all analyses, contributed to the interpretation of analyses, and contributed to the review and editing of the paper
Generating engagement on the Make Healthy Normal campaign Facebook page (Chapter 6.3)

James Kite, Anne Grunseit, John Vineburg, Vincy Li, Nathan Berton, Adrian Bauman, Becky Freeman

James Kite’s contribution to this paper:

- Conceived and designed the study
- Collected, cleaned, and collated data
- Led development of analysis plan, conducted descriptive analyses, and led interpretation of all analyses
- Led the writing process, including drafting, editing, and responding to reviewer comments

Co-authors’ contributions

- AG contributed to the design of the study, conducted advanced analyses, contributed to their interpretation, and contributed to the review and editing of the paper
- JV, VL, and NB contributed to study design, contributed to data collection, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
- AB contributed to the interpretation of analyses and contributed to the review and editing of the paper
- BF contributed to the design of the study, contributed to interpretation of all analyses, and contributed to the review and editing of the paper
Appendix 4: Other publications relating to this thesis


Kite, J., Collins, M., Freeman, B. Using Facebook to recruit for a public health campaign evaluation. *Public Health Research & Practice*. Accepted.