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Improving theory use in social marketing: The TITE four-step theory application

process

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Plain Language Summary

Theory remains underused in social marketing despite many added potential benefits that may arise if theory is concretely and consistently applied. This paper draws on interdisciplinary methods and resources to propose a standardised framework—the TITE process—designed to support rigorous theory application and explicit reporting of theory use in social marketing. With time the TITE process will support the development of a robust theory base that can be reliably followed to further advance social marketing’s effectiveness.

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Improving theory use in social marketing: The TITE four-step theory application process

Abstract

Purpose

Theory remains underused in social marketing despite many added potential benefits that may arise if theory is concretely and consistently applied. In response to ongoing calls for standardised frameworks and methods, a four-step theory application process is presented with the aim of supporting improved theory use across the entire social marketing process.

Design/methodology/approach

The role and importance of theory application in behaviour change is outlined alongside an integrative review and critical analysis of theory application in social marketing. To address key challenges impeding rigorous theory use, the TITE four-step theory application process is proposed. Evidence-based guidance, current best practice examples, and a worked example are provided to illustrate how the TITE process may be initially followed.

Findings

Low levels and poor quality of theory use suggest social marketing researchers and practitioners need further support in rigorously applying theories across the life of an intervention. The TITE process leverages the known benefits of theory use and capitalises on the reciprocal relationship that may be enacted between theory selection, iterative schematisation, theory testing, and explicit reporting of theory use.

Research implications

The TITE process delivers a standardised framework that aims to stimulate rigorous theory application and explicit reporting of theory use in social marketing. Clear theory application and reporting will permit a more fine-grained understanding of intervention effectiveness to

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be established by shifting away from a simple dichotomous view of effectiveness (success or failure) to unpacking the ‘active ingredients’ contributing to observed outcomes.

Practical implications

The evidence-based guidance and best practice examples provided for each step of the TITE process will increase the accessibility and usability of theory among practitioners. With time the TITE process will support practitioners by delivering a robust theory base that can be reliably followed to further extend on social marketing’s effectiveness.

Originality/value

This paper draws on interdisciplinary methods and resources to propose a standardised framework—the TITE process—designed to support rigorous theory application and explicit reporting of theory use in social marketing. Refinement, uptake, and widespread implementation of the TITE process will improve theory use and support the creation of a shared language, thereby advancing social marketing’s cumulative knowledge over time.

Keywords: behaviour; behaviour change; interventions; social marketing; social marketing theory; review

Word count: 7276

Introduction

As the discipline of social marketing increases in visibility and acceptability, funders and policymakers will continue to request evidence of social marketing's effectiveness (Gordon et al., 2008, Thaler and Helmig, 2013, Wettstein and Suggs, 2016). Providing robust evidence presents a significant challenge for the social marketing discipline (Gordon et al., 2008).

While there is evidence to support the effectiveness of social marketing (Kubacki et al., 2015b, Carins and Rundle-Thiele, 2014, Truong, 2014, Dietrich et al., 2016, Xia et al., 2016, Firestone et al., 2017), there are also examples of interventions that have failed to achieve the desired outcomes (Wymer, 2011, Cook et al., 2021, Helmig and Thaler, 2010). The complex and multidisciplinary nature of social marketing complicates evaluations of effectiveness (Helmig and Thaler, 2010, Gordon et al., 2008). As will be discussed in this paper, further improvements in social marketing implementation are needed to move the discipline away from viewing intervention effectiveness as a dichotomous outcome (success or failure) to unpacking the 'active ingredients' and identifying common factors contributing to observed outcomes. The complexity inherent in changing peoples' behaviours necessitates methods, frameworks, and models capable of supporting the identification and mapping of casual pathways to behavioural change across different populations and settings (Michie et al., 2018). Establishing a more fine-grained understanding of how social marketers are, or are not, effecting change is key to not only demonstrating return on investment for funders and policymakers but for ensuring the discipline's longevity.

Building a social marketing evidence base that can be reliably drawn upon to deliver beneficial change across different behaviours, populations, and settings relies, in part, on theory application. There is much debate among the scientific community concerning the role of theory in behavioural and social change research with proponents and opponents fervently

supporting or opposing theory use (Dalgetty et al., 2019, Hagger and Weed, 2019). Theory represents one of the core social marketing concepts and is one of the eight social marketing benchmark criteria (SMBC) which have been used to distinguish the discipline from other behaviour change approaches (NSMC, 2012). There is evidence to support the use of theory in effecting behaviour change (Avery et al., 2013, Xia et al., 2016, Aceves-Martins et al., 2016, Bluethmann et al., 2017, Protogerou and Johnson, 2014, Taylor et al., 2012, Webb et al., 2010, Michie et al., 2009, Samdal et al., 2017, Teixeira et al., 2012, Gourlan et al., 2016, Ntoumanis et al., 2021). While clear steps and worked examples are available for foundational SMBC such as segmentation (Dietrich et al., 2017) and consumer orientation (Rundle-Thiele et al., 2021), few structured approaches delivering evidence-based guidance and best practice examples are available for theory.

Acknowledging the considerable span remaining in the knowledge-to-practice gap (Berkman and Wilson, 2020) concerning theory use in behaviour change, this paper presents a standardised framework aiming to leverage the strengths and overcome the limitations of currently available methods and resources. First, an overview of the role and importance of theory in behaviour change research is provided. Next, an integrative review and critical analysis of theory application in social marketing is presented to elucidate challenges faced in improving levels and quality of theory use. To address identified gaps, this paper contributes the TITE process—a four-step theory application process that aims to guide social marketing researchers and practitioners through the design, implementation, evaluation, and reporting of theory-driven interventions.

A multi-faceted view on the role and importance of theory

Definitions and interpretations of theory vary within and across disciplines. Davis et al. (2015) offers a consensus definition that we adopt to conceptualise and explain the role and importance of theory within the context of social marketing interventions intended to change or maintain a given behaviour. The consensus definition reads: ‘A set of concepts and/or statements with specification of how phenomena relate to each other. Theory provides an organising description of a system that accounts for what is known, and explains, and predicts phenomena (p. 327).’ We acknowledge that Davis et al.’s (2015) definition has an implicit philosophical stance (positivism/post-positivism); however, we deem this philosophical basis to be appropriate to the form, domain, and purpose of inquiry presented in this paper (Brennan et al., 2011). Moreover, we argue that scientific and practical advancement within social marketing requires a pluralistic perspective where different methodological approaches are pragmatically integrated to deliver scientific progress in the field.

The social and behavioural sciences have historically relied on the power of the word; however, language is inherently (and adaptively) vague and ambiguous (Smaldino, 2020). Consequently, much of our scientific knowledge concerning how to change behaviours has been built on disparate observations or descriptions rather than formal explanation tested through high quality research design (Michie et al., 2014, Smaldino, 2020, Willmott and Rundle-Thiele, 2021). If we are to advance social marketing’s cumulative knowledge base of ‘what works,’ researchers and practitioners alike must become more cognizant of the language being used to define, use, and report theory within behaviour change interventions (Willmott and Rundle-Thiele, 2021). Refer to Supplementary File 1 for a glossary of theory-related terms used in this paper.

Improving theory application and reporting in social marketing

Theory provides a structured framework in which knowledge of how to change behaviour across different populations and settings can be coherently organised, accumulated, and advanced over time (Michie et al., 2014, Davis et al., 2015, Michie and Prestwich, 2010). There are many functions and benefits of rigorous theory application and explicit reporting of theory use across the life of an intervention intended to change or maintain behaviour (Willmott and Rundle-Thiele, 2021). In social marketing, the use of theory is contended to assist with understanding the target audience (including segments) and their behaviour as well as supporting intervention planning such as positioning products or services, framing messages, selecting channels, and identifying strategies for altering the choice environment (NSMC, 2012, Alcalay and Bell, 2001); however, the benefit of theory application can extend beyond the formative planning and design stages. Theory provides a framework within which to identify appropriate intervention targets (i.e., antecedents, mediators, and moderators of behaviour change) and select component behaviour change techniques (BCTs) (Michie and Prestwich, 2010, Michie et al., 2008, Michie et al., 2018, David et al., 2019, David and Rundle-Thiele, 2019, Willmott et al., 2019a); supports the visualisation of relationships between the target behaviours, intervention targets or mechanisms of action (MOAs), and BCTs in the form of logic models (Bartholomew and Mullen, 2011, Centers for Disease Control and Prevention, 2018, Hardeman et al., 2005); facilitates theoretically derived measurement, evaluation, and monitoring permitting a fine-grained understanding of how an intervention elicits or not the desired effects (Rothman, 2009, Michie and Abraham, 2004, Willmott et al., 2019a, Bartholomew and Mullen, 2011); informs the refinement of theoretically derived intervention activities (Rothman, 2004, Rothman, 2009, Michie and Abraham, 2004); supports tailoring to individuals or different subgroups (segments) of the target population (Willmott et al., 2019a, Noar et al., 2007); and enables the accumulation of evidence within structured frameworks (Bartholomew and Mullen, 2011). In short, theory can

give rise to more accurate and complete descriptions of interventions (and their associated outcomes) when rigorously applied across the planning, design, implementation, evaluation, and monitoring stages (Willmott and Rundle-Thiele, 2021). Previous review findings have underscored the importance of moving current practice away from reporting intervention effectiveness as one complete and cohesive entity to unpacking the ‘black box’ and clearly reporting how and when theory has been applied (Willmott et al., 2019a). Theory is fundamental to being able to deconstruct interventions, unpack active ingredients, and identify common factors contributing to (or not) observed outcomes (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

Rigorous theory application and reporting is a prerequisite to the development of an evidence base that can be reliably drawn upon to deliver beneficial change across different behaviours, populations, and contexts (Willmott and Rundle-Thiele, 2021). Despite the potential value in rigorously applying theory, arguments for or against theory have narrowly focused on effectiveness, and in doing so, have overlooked the many other known benefits impacting levels and quality of theory use (Willmott and Rundle-Thiele, 2021). The inclination of behavioural and social scientists to view intervention effectiveness as a dichotomous outcome (success or failure) detracts from the broader benefits of rigorous theory application and limits scientific and practical progress. Clear reporting of how and when theory has been applied permits the identification of underlying MOAs and enables their subsequent effects to be confirmed via meta-analytic studies (Willmott et al., 2019a). When concretely and consistently applied over time, theory can advance our understanding of what works, for whom, how, why, and when (Rundle-Thiele et al., 2019). In the absence of concrete and consistent application, theory cannot be reliably expected to deliver the roadmaps that

practitioners need to enact the desired changes in behaviour (Willmott and Rundle-Thiele, 2021). Moreover, theories cannot be appropriately refuted or built upon where levels of application are limited or poor (Michie and Prestwich, 2010). Consequently, approaches that can be applied to increase levels and quality of theory use in social marketing are needed.

Integrative review of theory application and reporting practices

Prior to the development of the TITE theory application process, an integrative review of reviews evaluating the effectiveness of social marketing interventions was completed. The integrative review method is best used when different streams of research and practice seem to be working in parallel and where research therein could be improved if their findings were synthesised (Cronin and George, 2020). Integrative reviews are of unique value among other forms of knowledge-synthesis (e.g., narrative reviews, systematic reviews, or meta-analyses) and are central to the sensemaking circle of scholarship (Cronin and George, 2020). The purpose of the present integrative review was to establish the current state-of-play regarding theory application and reporting practices in social marketing, elucidate key challenges, and situate the social marketing discipline within the broader behavioural and social science fields. Previously there has been a scoping review (Davis et al., 2015) of theory use in behaviour change and a systematic review of reviews evaluating the theory-effectiveness hypothesis (Dalgetty et al., 2019). To the best of our knowledge, there is yet to be a comprehensive synthesis of the social marketing field's cumulative assessment of theory application. Accordingly, we present an integrative review of reviews evaluating the effectiveness of social marketing interventions.

Several reviews of social marketing interventions have been conducted to assess the extent to which core concepts (i.e., SMBC) have been applied, and in some cases, explore whether

their application is associated with effectiveness. Table 1 provides a synthesis of 30 reviews evaluating social marketing interventions.

INSERT TABLE 1 ABOUT HERE

As shown in Table 1, most reviews evaluating the social marketing evidence base draw from Andreasen's (2002) six SMBC: behaviour change, consumer research, marketing mix, exchange, segmentation, and competition. Others applied the National Social Marketing Centre's (NSMC) SMBC which extend Andreasen's (2002) criteria by including theory and insight (NSMC, 2012), a combination of the two criteria, or author-selected criteria (see Table 1). The inclusion of theory in the NSMC (2012) SMBC acknowledges that a solid theoretical grounding can codify social marketing practice by identifying what works, for whom, how, why, and when (Rundle-Thiele et al., 2019). Out of the 30 social marketing reviews summarised in Table 1, eighteen (60%) include theory as a criterion for assessing available evidence. When examining the theoretical base of interventions, some reviews focused solely on whether a study mentioned or referenced a theory (Almestahiri et al., 2017, Almosa et al., 2017, Dietrich et al., 2016, Firestone et al., 2017, Kim et al., 2019, Luecking et al., 2017, Alhosseini Almodarresi et al., 2020, Alcalay and Bell, 2001, Stead et al., 2007, Gracia-Marco et al., 2011, Evans et al., 2014, Aceves-Martins et al., 2016, Flaherty et al., 2021, Ryan et al., 2021). As a result, these reviews fail to deliver an understanding of exactly *how* included studies applied theory across intervention planning, design, implementation, evaluation, and monitoring. Other reviews provided some insight on how referenced theories were applied within social marketing interventions (Luca and Suggs, 2013, Truong, 2014, Truong and Dang, 2016, Schmidtke et al., 2021). The Alhosseini Almodarresi et al. (2020), Firestone et al. (2017), and Ryan et al. (2021) reviews found theory to be the *least* used

SMBC. Similarly, Truong's (2014) review found that only 160 (18.5%) of the 867 articles reviewed mentioned theory. Truong and Dang's (2016) later identified a small increase in studies claiming theory use (23%); however, a rigorous assessment of theory application to evaluate the veracity of these claims remained notably absent. These findings are in line with earlier research indicating a lack of progress regarding social marketing's use of theory (Lefebvre, 2000, Luca and Suggs, 2013, Thackeray and Neiger, 2000, Alcalay and Bell, 2001). Given evidence indicating behaviour change is more likely when core social marketing concepts are used (Carins and Rundle-Thiele, 2014, Firestone et al., 2017, Xia et al., 2016, Aceves-Martins et al., 2016), a lack of concrete and consistent theory application may be limiting outcomes achieved by social marketers given greater effect sizes have been observed when theory has been applied (Avery et al., 2013, Xia et al., 2016, Aceves-Martins et al., 2016, Bluethmann et al., 2017, Protogerou and Johnson, 2014, Taylor et al., 2012, Webb et al., 2010, Michie et al., 2009, Samdal et al., 2017, Teixeira et al., 2012, Gurlan et al., 2016, Ntoumanis et al., 2021).

Low levels and poor quality of theory use suggest social marketing researchers and practitioners may need further support or more practical guidance in rigorously applying theories across the life of an intervention. Willmott and Rundle-Thiele (2021) outline a call for action to develop a standardised approach to theory application and reporting in behaviour change research. This call for action details four recommendations (see pp. 483-485) to support the development of a standardised framework to promote rigorous theory application and explicit reporting of theory use across the complete intervention life cycle (Willmott and Rundle-Thiele, 2021). In response to this call, we present a four-step theory application process (TITE) that heeds Willmott & Rundle-Thiele's (2021) recommendations and seeks to address gaps identified in the integrative review.

A guiding framework: The TITE theory application process

The TITE theory application process leverages the known benefits of theory use and capitalises on the reciprocal relationship that may be enacted between theory selection, iterative schematisation (of theory use), theory testing, and explicit reporting of theory use (see Table 2). Evidence-based guidance and current best practice examples are provided to explain how each stage of the TITE process can be applied. The strengths and limitations of available methods and resources are consolidated to support the implementation of the four steps in the TITE process. A worked example of how the process can be applied across the intervention life cycle is subsequently offered. The TITE process seeks to standardise theory application and reporting in social marketing research and practice through a four-step process that builds upon, rather than replaces, established methods. Moreover, the TITE process underscores the need to apply theory to the *complete* life cycle of an intervention, not only in the formative planning and design stages. Consequently, the TITE process advocates for a more multifaceted view of theory applications and draws on interdisciplinary methods and resources to deliver a standardised framework.

INSERT TABLE 2 ABOUT HERE

Step 1: Theory Selection

The first step of the TITE process is the *selection* of an appropriate theory. Theory selection can be a challenge given the sheer volume of theories, many of which contain overlapping constructs (Gainforth et al., 2015). For example, one consensus method generated 33 theories and 128 explanatory constructs (Michie et al., 2005), while a later review identified 83 theories (Davis et al., 2015). Moreover, only a small proportion of these theories have been

subjected to wide-scale rigorous empirical evaluation (Willmott et al., 2021). Consequently, Step 1 of the TITE process provides guidance to overcome the lack of knowledge surrounding which theory to use, for what purpose, and how to apply theory to change (or maintain) a given behaviour within a particular population and setting.

A theory should not be chosen because it is most common or popular but because it is ideally suited to the characteristics of the target behaviour, population, and setting (Davis et al., 2015). According to Brennan et al. (2014) ‘if the theoretical input is either incorrect, of low quality, or irrelevant to the problem at hand, the result is going to be ineffective regardless of the quality of the intervention (p. 331).’ Therefore, intervention designers should begin the theory selection process with the end goal of the intervention firmly in mind and by first gaining a complete understanding of the problem (e.g., population, behaviour, and context) at hand (Glanz and Bishop, 2010). Resources to guide theory selection are emerging. Within the social marketing discipline, there is a book describing behaviour change theories that have been applied in social marketing contexts (Brennan et al., 2014) and a stage-based process to guide theory selection (Manikam and Russell-Bennett, 2016). Both resources do not, however, clearly outline how theory should be applied from the initial formative research stage right through to intervention evaluation and monitoring. In Step 1 of the TITE process, we provide guidance for theory selection including quality criteria (see Table 3) that should be met to ensure the theory selected can be applied in subsequent stages of the process.

INSERT TABLE 3 ABOUT HERE

Resources on theories of behaviour change tend to reflect specific contexts and disciplines and are inevitably limited in the range of theories included (Glanz and Bishop, 2010). In

addition, formative research or analyses are not often undertaken to guide theory selection (Davies et al., 2010). Behavioural scientists, including social marketers, should begin their theory selection process with a comprehensive formative assessment (e.g., systematic review and/or survey) to avoid choosing an irrelevant theory (Cane et al., 2012). For example, Pang (2017) began with a systematic review of active school travel interventions which then led to a quantitative analysis of two potential theories (TPB and ECAC model) to test for the greatest explanatory potential. Once a short list of potential theories has been reached, quality assessment frameworks (Table 3) should be applied to confirm the suitability or ‘goodness’ of the chosen theory (Davis et al., 2015).

While many theories are available that can offer valuable and relevant informal description of behaviours without rigorous testing and replication to determine analytical and predictive powers veracity remains questionable (Rundle-Thiele et al., 2019). In the absence of high-quality theory, researchers may refer to frameworks summarising theoretical (or explanatory) constructs. The Theoretical Domains Framework (TDF) draws on 128 explanatory constructs from 33 theories of behaviour to deliver a list of domains which explain the barriers and facilitators of a given behaviour (Cane et al., 2012). Similarly, the Grid-Enabled Measures (GEM) database provides descriptions of theoretical constructs and the associated measures that may be used to assess them (NCI, 2019). Both the TDF and GEM database deal with theoretical domains and constructs, not theories themselves. For example, Willmott et al. (2021) conducted an empirical examination of the COM-B model (Michie et al., 2011b) using a novel method of measurement and analysis (TDF→COM-B mapping) permitting mechanisms of action (MOAs) underlying young adult’s eating and physical activity behaviours to be systematically identified. Identified MOAs (i.e., enablers and barriers) were recommended as potential targets for future intervention design. The COM-B model was

selected as the chosen theoretical foundation for intervention design following a comprehensive systematic review (Willmott et al., 2019b, Willmott et al., 2019a). In summary, resources are available to assist social marketers in the theory selection process and these should be supplemented with formative research to ensure an appropriate theoretical input is selected as the basis for evidence-based intervention development.

Step 2: Iterative Schematisation

The second step of the TITE process focuses on improving theory application practices through iterative schematisation of theory use; that is, creating a visual map of theoretical inputs across intervention planning, design, implementation, evaluation, and monitoring. When rigorously applied, theory provides an organising framework within which to identify and map the casual pathways to behavioural change (or maintenance) and permits an evaluation of how specific intervention components are (or are not) effectively contributing to observed outcomes (Michie and Prestwich, 2010, Michie et al., 2008, Hardeman et al., 2005, Michie and Abraham, 2004, Rothman, 2009, Willmott et al., 2019a). Theory can assist in the identification or selection of participants who are most likely to benefit from the intervention and can inform the refinement and tailoring of interventions to meet the specific (and often changing) needs of participants (Rothman, 2009, Noar et al., 2007, Willmott et al., 2019a). The TXT2BFiT intervention (Allman-Farinelli et al., 2016), for example, used the Transtheoretical Model (Prochaska and DiClemente, 1986, Prochaska and DiClemente, 1992) to develop a series of personalised text messages tailored to participants' stage of change. Theory provides an ideal means of understanding the specific behavioural needs of an individual and can optimise intervention delivery via segmentation and tailoring (Noar et al., 2007). Yet, few studies use theory to select intervention recipients or inform the tailoring of

intervention delivery to different sub-groups (segments) of the target population (Noar et al., 2007, Prestwich et al., 2014, Webb et al., 2010, Willmott et al., 2019a).

Consequently, Step 2 of the TITE process focuses on the visual mapping of theoretical inputs across the complete intervention life cycle (i.e., iterative schematisation). Figure 2 explains the logic behind iterative schematisation as outlined in the second step of the TITE process. Theory enables MOAs to be appropriately identified and targeted by an intervention via the selection of component BCTs (Michie and Prestwich, 2010). The creation of a visual map allows theoretical inputs to be coherently organised and the relationships between each stage to be mapped and linked to intended outcomes at each intervention stage (see Figure 2).

INSERT FIGURE 2 ABOUT HERE

This approach extends on established methods and resources including taxonomies (Abraham and Michie, 2008, Michie et al., 2011a, Michie et al., 2013), methods for linking behaviour change techniques (BCTs) with MOAs (Michie et al., 2017, Michie et al., 2008, Carey et al., 2019, Connell et al., 2019), and the intervention mapping (IM) protocol for intervention development (Kok et al., 2004, Bartholomew, 2006, Bartholomew, 2011, Eldredge et al., 2016). As shown in Figure 2, theoretical inputs should be present across all intervention stages, not only in the formative planning and design stages. According to May (2013), implementation must be understood from the outset as a *process*; that is, a continuous and interactive accomplishment rather than an outcome. The TITE process views theory application in the same way: an iterative process where refinements of theoretical inputs can be made using process and outcome evaluation data.

Improving theory application and reporting in social marketing

Rigorous application of theory involves specifying causal determinants of behaviour (MOAs) and targeting these determinants with component BCTs ensuring that the methods used for creating these links are supported by a solid theoretical foundation (Kok et al., 2016, Michie et al., 2008). The HEYMAN intervention provides a useful example of how theoretically derived MOAs may be linked to appropriate BCTs in intervention design and evaluation (Ashton et al., 2017). Thus, to complete Step 2 of the TITE process intervention designers must have a working knowledge of the MOAs specified within the selected theory and component BCTs to understand how the two may be linked in intervention design (Kok et al., 2016, Michie et al., 2017, Peters et al., 2015).

Systematic problem-driven approaches such as the Medical Research Council's (MRC) framework for the development and evaluation of complex interventions (Craig et al., 2018), IM protocol for intervention development (Bartholomew, 2011), or the TDF (Cane et al., 2012) may be drawn upon for further guidance. The MRC's framework outlines a stepwise approach which starts with a "theory" phase before progressing to "modelling" and "experimental" phases. While useful, this framework offers limited guidance for how to progress through each phase, and the expected outcomes of each phase. IM describes a planning process moving the 'central planner' from problem identification to problem solving through six steps describing a series of planning tasks to be completed (Bartholomew, 2011). The IM protocol requires a significant degree of agency and competency on the part of practitioners and policymakers to complete all six steps and the several tasks within each. The TDF aims to further simplify and integrate the plethora of behaviour change theories available and make theory more accessible and usable (Cane et al., 2012). The TDF builds on the MRC's framework and IM by 1) providing a comprehensive list of all the possible influences on behaviour, 2) providing clarity about each kind of influence with each domain

specified by component constructs, and 3) making links between theories and BCTs to address implementation difficulties. The IMPLEMENT intervention provides an example of how the TDF can be applied to intervention design (French et al., 2012). The TDF does not specify how different methods or BCTs interact to generate behaviour change (Peters et al., 2015). Consequently, researchers must decide whether selecting and using constructs from multiple theories is preferable to using a single theory. Evidence suggests multiple theory use does not lead to increased effectiveness when compared to single theory use (Lara et al., 2014). Moreover, combining theories can complicate theory testing and impede the identification of the underlying MOAs and is akin to hoping a picture will emerge from various puzzle pieces. The use of a single theory lends itself to theory testing as the intervention designer starts with the picture first and then deconstructs the puzzle to re-evaluate the contribution of each piece within a theoretically grounded evaluation. The TITE process advocates for the careful selection of theory to support the visual mapping of theoretical inputs across the complete intervention life cycle.

Step 3: Test Theory

The third step of the TITE process involves capitalising on the unique opportunity that interventions provide to test and refine theories of behaviour, behaviour change, or behaviour maintenance. A lack of studies testing theory in intervention evaluations and using these results to build upon or refine theory limits our understanding of the underlying MOAs contributing to observed outcomes, thereby impeding practical and scientific advancement (Michie and Johnston, 2012, Noar and Zimmerman, 2005, Rothman, 2009, Weinstein and Rothman, 2005, Willmott et al., 2019a). In the absence of appropriate theory testing, theories are unable to be refined to enhance intervention efficiency and effectiveness over time (Davis et al., 2015). Of note, collecting empirical data within a theoretical framework permits the

accumulation of evidence across different behaviours, populations, and contexts (Michie and Prestwich, 2010, Bartholomew and Mullen, 2011). Consequently, Step 3 of the TITE process advocates for increased theory testing within interventions.

To be able to test a selected theory within the intervention context, the first two steps (theory selection and iterative schematisation) of the TITE process must have been implemented. In particular, the theory selected to guide intervention design must display clarity in the relationships specified between constructs (and the target behaviour), have a methodology available for measuring constructs (and the target behaviour), and permit testing of the relationships specified (see Table 3). According to Lippke and Ziegelmann (2008), theories need to be empirically testable in two ways. First, they need to specify a set of changeable variables (i.e., MOAs) to describe, explain, or predict behaviour; and second, they need to be specified in such a way that they can be rigorously tested and falsified. Moreover, to permit study-level comparisons, standardised measures of theory-relevant constructs that are reliable and valid must be embedded in pre- and post-intervention evaluations (David and Rundle-Thiele, 2018, Willmott et al., 2021). The GEM database (NCI, 2019) and The Science of Behaviour Change (SOBC, 2019) provide a collection of theoretical measures.

Once researchers have measured and tested theory in the evaluation and monitoring stages of an intervention, they must identify underlying MOAs to determine which intervention components (BCTs) require refinement. For example, Wadsworth and Hallam (2010) sought to evaluate the effects of a website intervention based on Social Cognitive Theory (SCT) (Bandura, 1986) on college students' physical activity and determine whether SCT variables mediated levels of physical activity. The intervention focused on six self-regulation skills (self-monitoring, goal setting, social support, reinforcements, time management, and relapse)

and reported a successful increase ($p = .002$) in participant's self-regulation skills post-intervention. Similarly, Epton et al. (2014) and Cameron et al. (2015) evaluated an online health behaviour intervention for new university students (U@Uni: LifeGuide) based on Self-Affirmation Theory (Sherman and Cohen, 2006) and the Theory of Planned Behaviour (Ajzen, 1991). Post-intervention significant differences between the control and treatment arms on the social cognitive variables measured were observed. Participants in the intervention arm reported stronger injunctive norms and perceptions of control but weaker descriptive norms than participants in the control arm for fruit and vegetable intake. In the repeat trial, participants in the intervention arm held more negative attitudes toward binge drinking than participants in the control arm post-intervention.

To complete Step 3 of the TITE process social marketing researchers and practitioners must be able to deconstruct their intervention design to identify the active ingredients significantly associated with the target behaviour, as well as those not significantly associated with the target behaviour, to optimise future intervention design.

Step 4: Explicitly Report Theory Use

The fourth and final step of the TITE process is to explicitly report theory use in intervention evaluations. A lack of clear reporting of theory use has been identified (Willmott et al., 2019a, Painter et al., 2008, Prestwich et al., 2015). While a lack of theory reporting does not necessarily equate to a lack of use, without explicit reporting we are unable to replicate studies, perform critical appraisals, and unequivocally establish the utility of using theory to enhance intervention outcomes (Michie and Prestwich, 2010). Thus, Step 4 of the TITE process promotes accurate, consistent, and transparent reporting of theory use across the complete intervention life cycle.

In the same manner that tools such as the Consolidated Standards for Reporting Trials (Altman et al., 2001) and the Transparent Reporting of Evaluations with Non-Randomized Designs (Des Jarlais et al., 2004) promote transparency in the reporting of a study's design, conduct, analysis, and interpretation, social marketing researchers and practitioners must seek the same level of transparency when reporting theory use. Explicit reporting of theory use will permit critical appraisal within and across studies and prevent spurious study findings being used to support or refute the value of a particular theory. Table 4 presents an implementation checklist for the TITE process. This checklist can be used when reporting how theory has been applied across the life of an intervention. The checklist promotes best practice reporting in line with the Theory Coding Scheme (Michie and Prestwich, 2010) developed to inform evidence syntheses. Inclusion of the checklist in intervention evaluation papers or as supplementary material will promote transparency, inform replication studies, and permit critical appraisal.

INSERT TABLE 4 ABOUT HERE

Worked example of TITE process implementation

The TITE process underscores the importance of applying theory to the complete life cycle of an intervention, not only in the formative planning and design stages. Taking together the evidence-based guidance and best practice examples outlined for each step of the TITE process, we present a worked example of how the TITE process was applied in the FIT2GETHER© intervention (see Table 5).

INSERT TABLE 5 HERE

As shown in Table 5, prior to the development of FIT2GETHER©, a systematic review was performed to develop a potential short list of theories (Willmott et al., 2019b, Willmott et al., 2019a). The objective of the FIT2GETHER© intervention is to promote physical activity and healthy eating among young adults (aged 18-35 years), with the overall goal of supporting young adults in managing their weight to optimise current and future health and wellbeing. Evidence-based definitions of weight management, physical activity, and healthy eating were established prior to intervention development (Willmott et al., 2021). Systematic review findings supported the use of socio-ecological theories (e.g., COM-B/MOAB models) over more popular individual-focused socio-psychological theories (e.g., TPB/TRA models). Theory quality assessment criteria were applied in the selection of the COM-B model (Step 1) when compared to similar models such as MOAB (Willmott and Parkinson, 2017). Underpinned by the COM-B model, formative research was conducted with 1909 young adults to identify key barriers and facilitators of physical activity and healthy eating (Willmott et al., 2021). Using structural equation modelling, two empirically tested behavioural models were established (Willmott et al., 2021). The formative research performed in Step 1 allowed for the identification of theoretically derived determinants (MOAs) related to the two target behaviours (Step 2). Using the TDF, identified MOAs were effectively mapped to BCTs (refer to Table 5 for examples). While the FIT2GETHER© is currently transitioning from the co-create to the build phase of intervention development (Rundle-Thiele et al., 2021), plans for theory testing (Step 3) and explicit reporting of theory use (Step 4) are outlined in Table 5. As illustrated with the above worked example, the TITE process seeks to standardise theory application and reporting in social marketing research and practice through a four-step process that builds upon established methods.

Discussion

To allow the development of an evidence base that can be reliably drawn upon to deliver beneficial change across different behaviours, populations, and contexts, social marketers need to speak the same language which involves clear and transparent reporting of theory. This paper aims to support increased theory application and promote explicit reporting of theory use in social marketing. An integrative review and critical analysis were presented to elucidate key challenges with current theory application and reporting practices in social marketing. Integrative review findings reveal there is much room for improvement in terms of level and quality of theory application and reporting in social marketing. Responding to calls for standardised frameworks and methods through which to define, use, and report theory (Dalgetty et al., 2019), this paper outlined a four-step theory application process (TITE) to guide social marketing researchers and practitioners through the planning, design, implementation, evaluation, and monitoring of theory-driven interventions.

Despite the presence of methods such as IM, there is still a lack of interventions rigorously applying theory across the complete intervention life cycle (Prestwich et al., 2014, Davies et al., 2010, Willmott et al., 2019a) highlighting the need for a standardised framework that can be readily applied in practice. Underpinned by Davis et al.'s (2015) definition of theory and utilising set quality criteria (Table 3), the TITE process delivers a standardised framework aiming to support increased rigour in theory application and reporting in social marketing. The TITE process leverages the known benefits of theory use and capitalises on the reciprocal relationship that may be enacted between theory selection, iterative schematisation, theory testing, and explicit reporting of theory use. Drawing on the strengths and addressing limitations of available methods and resources, the TITE process extends on Step 3 (Theory-Based Methods and Practical Applications) of IM by providing practical evidence-based

guidance to ensure theoretical inputs are incorporated in a way that ensures reciprocity is enacted across all intervention stages, not only in the formative planning and design stages. While the IM protocol focuses on the planning process of intervention development, describing theory in terms of methods and practical applications, the TITE process focuses on theory application across the complete intervention life cycle with theoretical advancement and future intervention optimisation the main anticipated outcomes. Consequently, implementation of the TITE process will allow social marketing researchers and practitioners to realise the benefits of theory use firsthand (Willmott and Rundle-Thiele, 2021).

Evidence-based guidance and current best practice examples are provided for each step of the TITE process to support the accessibility and usability of theory, thereby overcoming the ‘practicality’ crisis (Berkman and Wilson, 2020) and facilitating adaptation (Yoong et al., 2020). Bridging the knowledge-to-practice gap is gaining increasing importance within behaviour change as much of the research forming the field’s evidence base has been conducted in controlled experimental settings that have decontextualised intervention effects by studying narrowly selected participants and applying narrowly specified intervention strategies that are not generalisable (Glasgow et al., 2004). Consequently, intervention effectiveness across different behaviours, populations, and contexts are inadequately understood limiting potential for translation and scale-up (Hagger and Weed, 2019). As stated by Kok et al. (2016), there is a risk that poor translation of theory-based methods may lead to erroneous conclusions as to method-effectiveness. We illustrate how a standardised theory application process (TITE) can assist in shifting the current narrative regarding theory use toward a more multifaceted view recognising the reciprocal benefits that can be enacted across the life of an intervention. Theory, as applied in the TITE process, can iteratively deliver intervention optimisation by providing a ‘road map’ of how behaviour change (or

maintenance) may be achieved across different populations and settings (Michie and Prestwich, 2010, Michie et al., 2008, Hardeman et al., 2005, Michie and Abraham, 2004, Rothman, 2009, Willmott et al., 2019a). Refinement, uptake, and widespread implementation of the TITE process will improve theory use and support the creation of a shared language, thereby advancing social marketing's cumulative knowledge over time.

Adoption and implementation of the TITE process will advance social marketing research and practice in several ways. First, following guidance outlined in Step 1 of the process will increase the likelihood that selected theoretical inputs are of sound quality and suited to the target population, behaviour, and context under investigation; thus, increasing the probability that the intervention will achieve desired outcomes. Progress in theory application will require the social marketing community to move away from abstract, informal, and verbal descriptions toward concrete and consistent use of theory (Smaldino, 2020, Willmott and Rundle-Thiele, 2021). The strength and weakness of any social theory lie in their scope and level of specification (Willmott et al., 2021). Theories such as SCT (Bandura, 1986) and the Health Belief Model (Hochbaum et al., 1952) assist researchers and practitioners in dissecting complex behavioural and social phenomena considering MOAs and effects; however, when researchers apply theory in an intervention setting, variations that confound causal pathways can emerge and MOAs can be overlooked. This is at the heart of the theory-to-evidence-to-practice conundrum faced by the social marketing community who are being challenged to demonstrate the true value of their work (Gordon et al., 2008, Thaler and Helmig, 2013, Wettstein and Suggs, 2016). Building an evidence base researchers and practitioners can rely on requires robust theories that have been concretely and consistently applied. The evidence for the veracity and applicability of a theory depends on research which must be replicated in many different populations and settings to be generalisable and applicable for practitioners.

Thus, Step 1 advocates for formative research and the use of quality assessment criteria in selecting a suitable theory to be applied across the life of an intervention.

Second, Step 2 of the process outlines methods and resources to guide visual mapping (i.e., iterative schematisation) of the casual pathways to behavioural change (MOAs) and permit an evaluation of how specific intervention components (BCTs) are effectively contributing to observed outcomes or not. This process of creating a visual map of theoretical inputs across the complete intervention life cycle ensures activities and outcomes are coherently organised from the outset of intervention development. In this way the TITE process places the focus on process rather than outcome (success or failure) recommending refinements of theoretical inputs be made following theoretically grounded process and outcome evaluations (May, 2013). Step 2 also encourages social marketers to tailor intervention delivery to identified sub-groups (segments) to optimise intervention outcomes (Rothman, 2009, Noar et al., 2007).

Third, by following Steps 1 and 2 of the TITE process researchers will be able to empirically investigate (Step 3) which components of an intervention are driving observed outcomes and in doing so optimise future intervention design. The ability to deconstruct intervention design and identify the active ingredients significantly associated with the target behaviour (as well as non-significant components) will support future intervention optimisation and theoretical advancement over time (Rothman, 2009, Michie and Abraham, 2004, Willmott et al., 2019a, Bartholomew and Mullen, 2011).

Fourth, the explicit reporting of theory use throughout all intervention stages using the TITE implementation checklist (Step 4) will promote transparency, inform replication, and permit critical appraisal across studies. In the absence of clear reporting, establishing an evidence

base that can be reliably drawn upon to deliver beneficial change across different behaviours, populations, and contexts will not be possible (Willmott and Rundle-Thiele, 2021).

Taken together, the TITE process aims to move current practice away from merely acknowledging a lack (or poor quality) of theory use to advancing work on methods, tools, techniques, and processes that support rigorous theory application and explicit reporting of theory use in social marketing. The explicit reporting of the TITE process across the complete intervention life cycle is envisaged to move research closer to practice through the delivery of roadmaps that practitioners can reliably follow to achieve desired outcomes. The TITE process seeks to resolve any confusion regarding how theory should be applied across the life of an intervention, and in time, contribute to increased levels and quality of theory application and reporting.

Although the TITE process has potential to advance social marketing research and practice, limitations are acknowledged. First, the TITE process assumes theory application is superior. This assumption is supported by meta-analytic reviews; however, more empirical evidence is needed to achieve consensus in the field. While some evidence exists indicating intervention effectiveness may be superior when theory is used, field trials that empirically examine interventions with (and without) theory are needed. Second, the TITE process is underpinned by an implicit methodological assumption (pragmatism). Although qualitative methods can provide a deeper understanding of the target population, behaviour, and context, the TITE process assumes that a quantitative or mixed-methods research design will be used in intervention evaluation. Third, the TITE process as outlined in the present study lends itself to behaviour change interventions targeting individual-level (micro-level) determinants and its applicability to enacting change at structural or policy-levels (macro-level) will require

further adaptation. This limitation reflects the current state-of-play where theory use in the social marketing field is dominated by micro-level intervention approaches (Brennan et al., 2016). Acknowledging that behaviours occur in complex systems with social, political, and economic factors influencing people's behaviours (Kelly and Barker, 2016), systems social marketing and macro-social marketing are postulated to offer a more holistic, multi-level behavioural change approach (Flaherty et al., 2020). Systems social marketing is argued to consist of iterative macro-meso-micro-macro processes and not just macro events (Flaherty et al., 2020). Further research is needed to determine how systems social marketing may be integrated into the TITE process. Specifically, more research is needed to understand how MOAs and BCTs interact within and are influenced by systems. Lastly, the TITE process represents an initial attempt at delivering a standardised framework to support rigorous theory application and reporting in social marketing. Further research is needed to assess the applicability and value of the process within and across contexts to ensure appropriate parameters can be set. We call for research exploring the boundaries and limits of commonly applied theories as well as research investigating the utility of the TITE process. Identifying areas for refining the TITE process will support knowledge translation in practice; thereby, ensuring change can be reliably achieved across different behaviours, populations, and settings. Changes in intervention outcomes are not often proportional to inputs; thus, establishing how best to maximise return on investment will be key to advancing the field.

Conclusion

This paper draws on interdisciplinary methods and resources to propose a standardised framework—the TITE process—designed to support rigorous theory application and explicit reporting of theory use in social marketing. Refinement, uptake, and widespread

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implementation of the TITE process will improve theory use and support the creation of a shared language, thereby advancing social marketing's cumulative knowledge over time.

Figure 1. Black box versus theory-driven approach

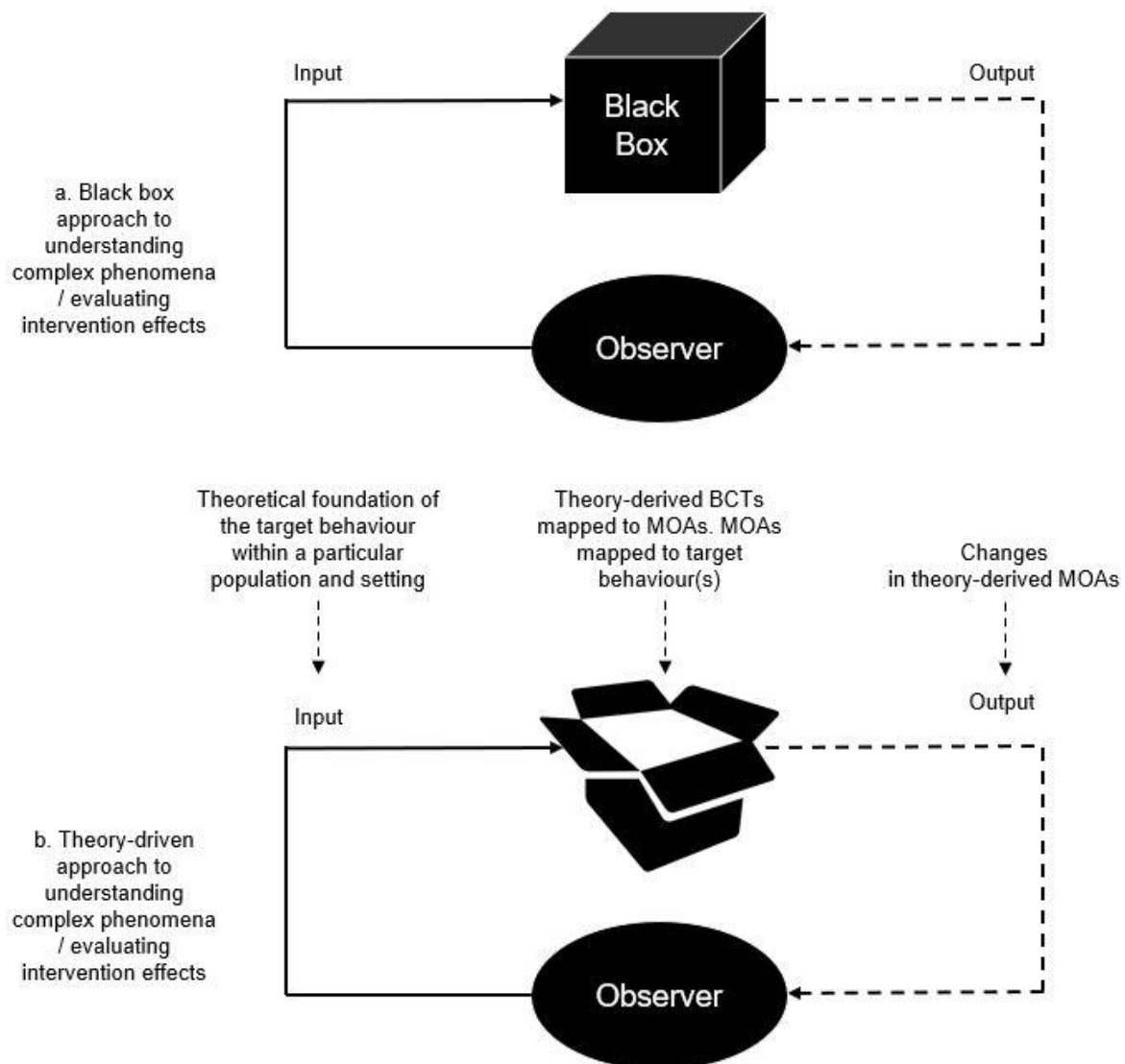
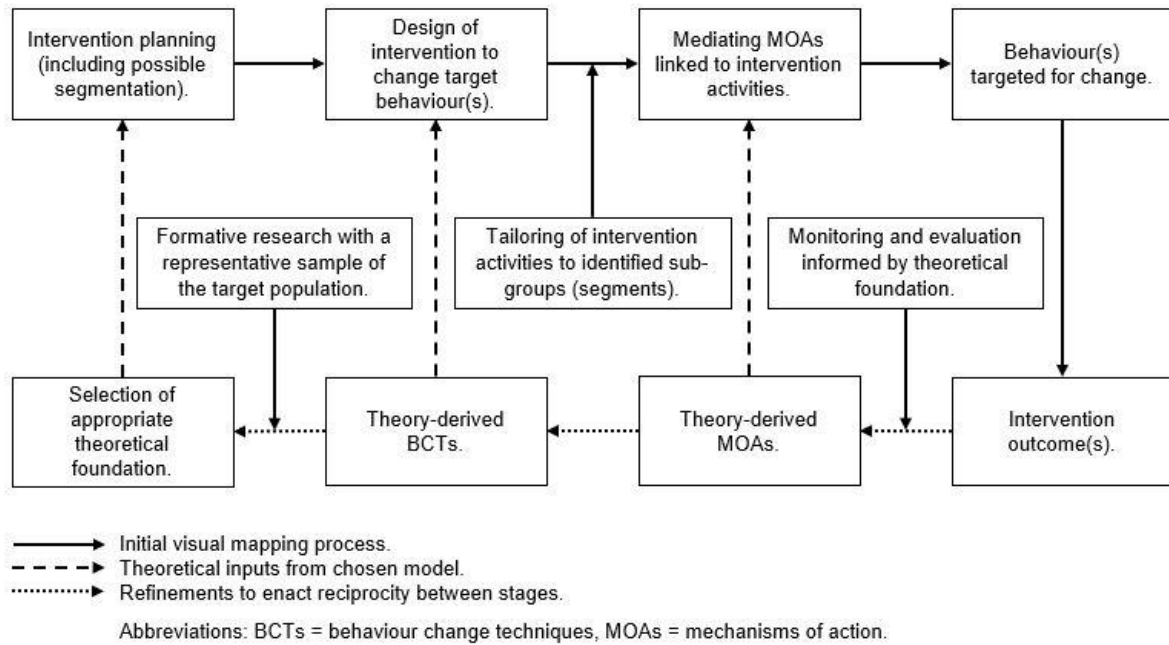


Figure 2. Iterative schematisation logic model



Note: BCTs = behaviour change techniques, MOAs= mechanisms of action

Table 1. Synthesis of reviews evaluating social marketing interventions

Author/Year	Behaviour(s)	Assessment	Theory	Key findings
Alcalay and Bell (2001)	Diet & PA	Stage-based SM model (4)	✓	Strategies and practices of 50 community-based nutrition and physical activity interventions reviewed. Consistent, integrated application of SM, theories, and media advocacy principles needed across the four stages: planning and research, strategy design, implementation, and evaluation.
Gordon et al. (2006)	SM health interventions (diet, PA, & substance misuse)	Andreasen's (2002) SMBC (6)	✗	Evidence from three reviews comprising 31 nutrition, 22 PA, and 35 substance misuse interventions suggest SM interventions of different types can be effective.
Stead et al. (2007)	SM health interventions (alcohol & tobacco use, drug abuse, & PA)	Andreasen's (2002) SMBC (6)	✓	Among the 54 interventions reviewed, there was evidence that interventions adopting SM principles could be effective across a range of behaviours.
Luca and Suggs (2010)	SM health interventions (disease prevention, reproductive health, PA, diet, & tobacco)	Marketing mix (6P's)	✗	The complete marketing mix was identifiable in 5 of the 17 interventions included in the review. Results identified several strategies that showed potential for the marketing mix.
Gracia-Marco et al. (2011)	Child and adolescent obesity prevention interventions (diet, PA, lifestyle, & social support)	French and Blair-Stevens (2006) SMBC (8)	✓	Among the 41 interventions reviewed, more recent studies included a greater number of SMBC. Behaviour was the only SMBC applied in all studies. Exchange, customer orientation, and segmentation were commonly used. Competition and the methods mix were not featured in most studies.
Luca and Suggs (2013)	SM health interventions (prevention of disease, reproductive health, PA, & smoking cessation)	Andreasen's (2002) SMBC (6)	✓	Of these 17 interventions reviewed, only eight reported using theory and only seven stated how it was used. Findings highlight a lack of (or underreporting of) theory use in SM campaigns, reinforcing the call to action for improved application and reporting of theory to design and evaluate SM interventions.
Carins and Rundle-Thiele (2014)	Diet (healthy eating)	Andreasen's (2002) SMBC (6)	✗	Most studies (14/16) reported positive change to healthy eating behaviour. The mean number of SMBC identified across the 16 included studies was five. SM interventions applying all SMBC were found to be more effective in achieving behavioural change.
Evans et al. (2014)	Water & sanitation	Content analysis	✓	An analysis of 32 articles revealed widespread use of the 4Ps, with price interventions being the least common. Evaluations show improvements in mediators but mixed results in behaviour change. Future evaluations need to focus on mediators that explain successful behaviour change to identify best practices and improve future programs.

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Author/Year	Behaviour(s)	Assessment	Theory	Key findings
Truong (2014)	SM interventions (multiple behaviours)	Andreasen's (2002) SMBC (6) + theory	✓	Of the 867 articles analysed, were chosen for analysis, only 160 articles (18.5%) explicitly stated the use of theory. A further 654 articles (75.4%) were not theoretically informed, with the remaining 53 articles (6.1%) not providing any theory-related information. Findings reveal a downstream dominance in SM, with limited upstream approaches. The lack of theory use in SM creates difficulties in identifying common factors in effective interventions.
Fujihira et al. (2015)	PA (older adults)	Andreasen's (2002) SMBC (6)	✗	Some evidence for positive behaviour change (4/34 studies), with no negative changes reported. No intervention addressed all six SMBC. Audience research, segmentation, and exchange were the least used.
Kubacki et al. (2015b)	Alcohol harm minimisation	Andreasen's (2002) SMBC (6)	✗	Evidence from the 23 articles reviewed support SM's effectiveness in creating positive effects through changing behaviours and policies to affect short term or immediate changes as well as longer term changes via attitude, behavioural intention, and/or raising awareness. No intervention employed all six SMBC.
Kubacki et al. (2015a)	PA & healthy eating interventions targeting children	Andreasen's (2002) SMBC (6)	✗	Most studies (16/23) reported positive behavioural outcomes. No intervention employed all six SMBC. Extending the application of SMBC in SM interventions will assist to increase effectiveness.
Aceves-Martins et al. (2016)	Obesity (youth obesity in European school-based interventions)	NSMC's (2012) SMBC (8)	✓	Only one of the 38 included articles mentioned the use of a SM approach for the design and implementation of the intervention. All (38/38) reported the use of the following SMBC: participant orientation, behaviour, segmentation, and methods mix. Regarding the other four SMBC, 21 articles reported the inclusion of the theory domain, four mentioned the insight domain, 17 reported the exchange domain, and 36 publications reported the competition domain. Evidence indicates that inclusion of at least five SMBC in school-based interventions could benefit efforts to prevent obesity in young people.
Buyucek et al. (2016)	Alcohol-related harm	Narrative synthesis of stakeholder involvement	✗	Findings from the 23 interventions reviewed revealed the number of stakeholders was greatest in more complex community settings when compared to more narrow settings such as universities and schools. A restricted stakeholder focus was observed for evaluation.
Dietrich et al. (2016)	Alcohol education interventions (school-based settings)	SMBC selected by the authors: behaviour change, theory, audience research, and segmentation	✓	Findings revealed that the majority of the 16 programs reviewed were developed based on a theory and achieved short- and medium-term behavioural effects. Most programs were universal and did not apply the full market segmentation process. Limited audience research in the form of student involvement in program design was identified.

Author/Year	Behaviour(s)	Assessment	Theory	Key findings
Truong and Dang (2016)	SM formative research studies (multiple behaviours)	Content analysis	✓	Majority of the 166 identified interventions reported conducting some form of formative research to understand characteristics, attitudes, behaviours, and preferred communication channels of the target audience.
Xia et al. (2016)	PA (in adults)	SMBC selected by the authors (14)	✗	Analyses involving 92 interventions and 173 conditions revealed that the presence of more SMBC increased the likelihood of success in PA promotion. The presence of more than 3 SMBC improved intervention success. All interventions were successful when more than 7.5 SMBC were present.
Almestahiri et al. (2017)	Tobacco cessation	Andreasen's (2002) SMBC (6) + theory	✓	Limited (1/14 interventions) application of all seven SMBC. Most studies measured behaviour change and conducted audience research. Few studies applied the principles of segmentation, competition, and exchange. Eight interventions were classified as being theoretically informed based on mention of theory only.
Almosa et al. (2017)	Littering reduction	Andreasen's (2002) SMBC (6) + theory	✓	Variable application of SMBC evident. All (16/16) studies reported a specific littering behaviour change goal. Limited use of audience research, segmentation, the marketing mix, and exchange evident. Most (10/16) interventions were classified as being theoretically informed based on mention of theory only.
Firestone et al. (2017)	Global health in low- and middle-income countries (multiple behaviours)	NSMC's (2012) SMBC ¹ (8)	✓	Only three studies (out of 125) met all eight SMBC. Effective studies used audience insights and performed cost-benefit analyses to maximise incentives and increase likelihood of behaviour change. Theory was the least used criteria, with few studies applying theories of behaviour change.
Kubacki et al. (2017)	PA (in adults)	Andreasen's (2002) SMBC (6)	✗	Of the seven SM interventions assessed, none applied all six SMBC. Three interventions addressed five SMBC and a further three interventions addressed four SMBC. Four interventions reported positive behaviour change, and no negative behavioural changes were reported among all seven SM interventions. Behavioural objectives, formative research, and marketing mix were well utilised. The use of segmentation, exchange, and competition was limited.
Luecking et al. (2017)	Nutrition and PA (in children)	NSMC's (2012) SMBC (8)	✓	Only two (out of 77) interventions incorporated all eight SMBC. The majority (41/77) included fewer than four. Each intervention included behaviour and methods mix SMBC, and more than half identified audience segments. One-third of interventions incorporated customer orientation, theory, exchange, and insight. Only six (out of 77) interventions addressed competing behaviours. Intervention effectiveness based on number of SMBC used was not found to be statistically significant.

Author/Year	Behaviour(s)	Assessment	Theory	Key findings
Kubacki et al. (2018)	Sponsorship for public health and SM (multiple behaviours)	Budgets, locations, target audiences, aims, evaluation methods and outcomes	✘	Only 17 studies reporting evaluations of sports sponsorship in SM and public health were identified. A lack of evaluations of sponsorship effectiveness was evident including comparisons of sponsorship as a primary tool versus being part of a comprehensive marketing mix.
Kim et al. (2019)	Food waste	NSMC's (2012) SMBC (8)	✓	Only 2 out of 23 food waste programs self-identified as SM. Full application of the SMBC was not achieved in any of the interventions reviewed. An average of 2.69 SMBC components was applied across the studies.
Kubacki and Szablewska (2019)	SM targeting Indigenous peoples (multiple behaviours)	Andreasen's (2002) SMBC (6)	✘	Full application of the SMBC was not evident. Of the 13 interventions assessed, seven applied two or fewer SMBC. Segmentation, exchange, and competition were the least used.
Alhosseini Almodarresi et al. (2020)	SM interventions in Iran (multiple behaviours)	Andreasen's (2002) SMBC + theory (6)	✓	Full application of the SMBC was only evident in one study out of the five reviewed. Segmentation, competition, exchange, and theory were the least used.
Makris et al. (2021)	Health care disparities for patients with disabilities	Andreasen's (2002) SMBC (6)	✘	Full application of the six SMBC was not evident. Out of the four studies assessed, 75% applied only two SMBC. One applied four SMBC. Exchange and competition were the least used.
Flaherty et al. (2021)	Digital technologies in SM (multiple behaviours)	Amalgamation of Andreasen's (2002) SMBC (6) and the NSMC's (2012) SMBC (8)	✓	Only one intervention out of 50 assessed addressed all SMBC. Two interventions addressed seven SMBC while 12 interventions demonstrated clear evidence of addressing four SMBC. Exchange, competition, and citizen orientation were the least common. Thirty-one interventions were informed by theory, with twenty-two of these reporting positive behavioural outcomes.
Schmidtke et al. (2021)	SM interventions in low- and middle-income countries (multiple behaviours)	NSMC's (2012) SMBC (8)	✓	None of the 17 interventions reviewed addressed all eight SMBC. Only two interventions provided evidence of seven criteria. Two interventions reported evidence of six criteria. Seven out of the 17 interventions applied three or fewer benchmark criteria. Nine out of the 17 interventions reported using theory with only basic levels of theory utilisation evident: five studies were informed by theory, three studies applied theory, and only one tested theory.
Ryan et al. (2021)	Health behaviour change interventions in pacific islands populations (multiple behaviours)	NSMC's (2012) SMBC (8)	✓	Of the 22 studies reviewed, the most used SMBC were behaviour change, insight, and customer orientation. Theory was the least used. There was no clear indication of which SMBC (or combination of SMBC) resulted in more effective interventions.

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Note. This is an extensive but not an exhaustive list of social marketing reviews. Our integrative review focuses on synthesising reviews applying SMBC or related assessment tools to their inclusion criteria or in their evaluations of social marketing interventions. Abbreviations: PA = physical activity, SM = social marketing, SMBC = social marketing benchmark criteria. ¹Included studies had to apply at least one (but not all) of the eight SMBC.

Table 2. Summary of the TITE process

Stage	Description of stage	Step	Description of steps
Planning	Selection of appropriate theoretical foundation (+identifying theoretically derived intervention targets aka MOAs).	(1) Theory selection	<ul style="list-style-type: none"> • Understand the problem (behaviour, population, and context). • Identify the goal or purpose of the intervention, including defining the target behaviour(s). • Seek evidence (primary or secondary) for the relationship between the theoretical constructs specified in a theoretical model and the behaviour(s) targeted for change (or maintenance) with consideration for the target population (and possible sub-groups aka segments). • Develop a short list of potential theories for selection. • Apply a quality assessment framework to confirm the suitability or ‘goodness’ of the chosen theory.
Design & Implementation	Creating an iterative schema to link theoretical foundations with theory-derived BCTs, theory-derived MOAs, and targeted behavioural outcomes.	(2) Iterative schematisation	<ul style="list-style-type: none"> • Acquire working knowledge of the chosen theory and relevant BCTs. • Identify how to change theoretically derived MOAs. • Link BCTs with MOAs. • Links MOAs with targeted behavioural outcomes for monitoring and evaluation. • Theory may be used to select recipients for the intervention and/or tailor the intervention.
Monitoring & Evaluation	Measuring and testing the theory-derived MOAs and their impact on the target behaviour.	(3) Test theory	<ul style="list-style-type: none"> • Test theory in intervention monitoring and evaluation. • Use results to refine chosen theory and/or formulate suggestions for future refinement.
Monitoring & Evaluation	Report theory use across the complete intervention life cycle.	(4) Explicit reporting	<ul style="list-style-type: none"> • Explicitly report theory use throughout all intervention stages. • Publish (TITE) implementation checklist.

Abbreviations: BCTs = behaviour change techniques, MOAs = mechanisms of action.

Table 3. Quality assessment criteria to guide theory selection

No.	Criteria	Explanation
1	Clarity of constructs	Has the case been made for the independence of constructs? E.g., have constructs demonstrated convergent and discriminant validity?
2	Clarity of relationships between constructs	Are the relationships (hypotheses) between constructs clearly specified?
3	Measurability	Is a reliable and valid method available for measuring theoretical constructs?
4	Testability	Has the theory been specified in such a way that it can be tested?
5	Explanatory	Has the theory been previously used to explain or account for a set of observations? (Statistically or logically)
6	Causality	Has the theory been used to describe mechanisms of change (MOAs) drawing from longitudinal evidence?
7	Parsimony	Has the case for parsimony been made?
8	Generalisability	Have generalisations been investigated across behaviours, populations, and settings?
9	Evidence base	Does an evidence base exist to support the chosen theory?

Abbreviations: MOAs = mechanisms of action.

Table 4. TITE implementation checklist

Stage	Step	Sub-steps (actions)	Check (Y/N)	Evidence (Page No.)
Planning	(1) Theory selection	<ul style="list-style-type: none"> • Identified goal or purpose of the intervention. • Conducted initial formative assessment to gain an understanding of the problem including population, behaviour, and context. • Developed a short list of potential theories. • Assessed theory suitability with primary data (e.g., testing explanatory potential) and/or with quality assessment criteria. • Theory selected is ideally suited to the characteristics of the target behaviour, population, and setting. 		
Design	(2) Iterative schematisation	<ul style="list-style-type: none"> • Used available resources to identify how to change theoretically derived determinants (MOAs) of behaviour. • Systematically linked BCTs with MOAs of behaviour. • Linked MOAs with targeted behavioural outcomes. • Considered the value in tailoring intervention delivery to identified sub-groups (segments) to optimise intervention outcomes. 		
Monitoring & Evaluation	(3) Test theory	<ul style="list-style-type: none"> • Reliable and valid theoretical measures sourced and embedded in the intervention evaluation protocol. • Tested theory during intervention monitoring and evaluation. Additional: used intervention results to refine theory or formulate suggestions for future research. 		
Monitoring & Evaluation	(4) Explicit reporting	<ul style="list-style-type: none"> • Explicitly reported theory use throughout all intervention stages <i>and</i> published TITE process implementation checklist as part of the main text or as supplementary material. 		

Abbreviations: BCTs = behaviour change techniques, MOAs = mechanisms of action.

Table 5. Worked example of TITE process implementation

Step	Check	Evidence
(1) Theory selection	Y	<ul style="list-style-type: none"> ✓ A systematic review was performed to develop a potential short list of theories (Willmott et al., 2019b, Willmott et al., 2019a). ✓ Findings supported the use of socio-ecological theories (e.g., COM-B/MOAB models). ✓ Theory quality assessment criteria was applied in the selection of the COM-B model. ✓ Underpinned by the COM-B model, formative research was conducted with 1909 young adults to identify key barriers and facilitators of PA and healthy eating (Willmott et al., 2021). ✓ Two empirically tested behavioural models were established (Willmott et al., 2021).
(2) Iterative schematisation	Y	<ul style="list-style-type: none"> ✓ Theoretically derived determinants (MOAs) related to the two target behaviours were identified in Step 1. ✓ Using the TDF, identified MOAs were effectively mapped to BCTs. Below are examples: <ol style="list-style-type: none"> 1. Premium subscription to a diet and PA tracking app (e.g., MyFitnessPal) to facilitate action planning and action control (capability) and to support habit formation (capability). 2. Tailored nudges to prompt weekly PA and dietary goal setting (capability). 3. A private online Facebook group will be created to provide social support (opportunity) and promote positive social norms (opportunity) for healthful PA and dietary behaviours. Expert and user-generated content will be encouraged in the group. 4. Weekly emails with 3-4 healthy meal recipes with embedded videos of “how to prepare, cook, and store” meals (capability). Links to products will be embedded within the email to allow participants to simply click on recipe ingredients and add them to their online grocery shop (opportunity). Ingredients will be seasonal and affordable to ensure accessibility (opportunity). 5. Weekly texts with personalised messages of encouragement and/or focused on self-efficacy building (motivation). Text messages will be tailored to participants based on their self-perception (motivation) in relation to the two target behaviours. 6. The Achievement app will be used so participants can receive monetary rewards for developing and maintaining healthful behaviours (motivation).
(3) Test theory	Y	<ul style="list-style-type: none"> ✓ A reliable and valid short form measure developed in the initial planning stage of the FIT2GETHER© intervention will be used in the intervention evaluation. Qualitative focus groups (process) and quantitative surveys (outcome) will be used in intervention evaluation.
(4) Explicit reporting	Y	<ul style="list-style-type: none"> ✓ Application of the COM-B model in the planning, design, implementation, evaluation, and monitoring of the FIT2GETHER© intervention will be reported as supplementary material alongside process and outcome evaluations.

Abbreviations: BCTs = behaviour change techniques, MOAs = mechanisms of action, PA = physical activity, TDF = theoretical domains framework.

References

- ABRAHAM, C. & MICHIE, S. 2008. A taxonomy of behavior change techniques used in interventions. *Health Psychology*, 27, 379-387.
- ACEVES-MARTINS, M., LLAURADÓ, E., TARRO, L., MORENO-GARCÍA, C. F., TRUJILLO ESCOBAR, T. G., SOLA, R. & GIRALT, M. 2016. Effectiveness of social marketing strategies to reduce youth obesity in European school-based interventions: A systematic review and meta-analysis. *Nutrition Reviews*, 74, 337-351.
- AJZEN, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- ALCALAY, R. & BELL, R. A. 2001. Strategies and practices in community—based campaigns promoting nutrition and physical activity. *Social Marketing Quarterly*, 7, 2-15.
- ALHOSSEINI ALMODARRESI, S. M., SHAHADATI, A. & ARDEKANI, S. S. 2020. Social marketing interventions in iran: A systematic review; 2002–2017. *Social Marketing Quarterly*, 26, 47-61.
- ALLMAN-FARINELLI, M., PARTRIDGE, S. R., MCGEECHAN, K., BALESTRACCI, K., HEBDEN, L., WONG, A., PHONGSAVAN, P., DENNEY-WILSON, E., HARRIS, M. F. & BAUMAN, A. 2016. A mobile health lifestyle program for prevention of weight gain in young adults (TXT2BFiT): Nine-month outcomes of a randomized controlled trial. *JMIR mHealth and uHealth*, 4, 408-419.
- ALMESTAHIRI, R., RUNDLE-THIELE, S., PARKINSON, J. & ARLI, D. 2017. The use of the major components of social marketing: A systematic review of tobacco cessation programs. *Social Marketing Quarterly*, 23, 232-248.
- ALMOSA, Y., PARKINSON, J. & RUNDLE-THIELE, S. 2017. Littering reduction: A systematic review of research 1995–2015. *Social Marketing Quarterly*, 23, 203-222.
- ALTMAN, D. G., SCHULZ, K. F., MOHER, D., EGGER, M., DAVIDOFF, F., ELBOURNE, D., GÖTZSCHE, P. C. & LANG, T. 2001. The revised CONSORT statement for reporting randomized trials: explanation and elaboration. *Annals of Internal Medicine*, 134, 663-694.
- ANDREASEN, A. R. 2002. Marketing social marketing in the social change marketplace. *Journal of Public Policy & Marketing*, 21, 3-13.
- ASHTON, L. M., MORGAN, P. J., HUTCHESON, M. J., ROLLO, M. E. & COLLINS, C. E. 2017. Feasibility and preliminary efficacy of the 'HEYMAN' healthy lifestyle program for young men: A pilot randomised controlled trial. *Nutrition Journal*, 16, 1-17.
- AVERY, K. N. L., DONOVAN, J. L., HORWOOD, J. & LANE, J. A. 2013. Behavior theory for dietary interventions for cancer prevention: A systematic review of utilization and effectiveness in creating behavior change. *Cancer Causes & Control*, 24, 409-420.
- BANDURA, A. 1986. *Social foundations of thought and action: A social cognitive theory*, Englewood Cliffs, N.J, Prentice Hall.
- BARTHOLOMEW, L. K. 2006. *Planning health promotion programs: an intervention mapping approach*, San Francisco, Calif, Jossey-Bass.
- BARTHOLOMEW, L. K. 2011. *Planning health promotion programs: an intervention mapping approach*, San Francisco, Jossey-Bass.
- BARTHOLOMEW, L. K. & MULLEN, P. D. 2011. Five roles for using theory and evidence in the design and testing of behavior change interventions. *Journal of Public Health Dentistry*, 71, S20-S33.

- BERKMAN, E. & WILSON, S. M. 2020. So useful as a good theory? The practicality crisis in academic psychology. *Preprint*.
- BLUETHMANN, S. M., BARTHOLOMEW, L. K., MURPHY, C. C. & VERNON, S. W. 2017. Use of theory in behavior change interventions: An analysis of programs to increase physical activity in posttreatment breast cancer survivors. *Health Education & Behavior*, 44, 245-253.
- BRENNAN, L., BINNEY, W., PARKER, L., ALETI, T. & NGUYEN, D. 2014. *Social marketing and behaviour change: Models, theory and applications*, Cheltenham, England, Edward Elgar Publishing Limited.
- BRENNAN, L., PREVITE, J. & FRY, M. L. 2016. Social marketing's consumer myopia: Applying a behavioural ecological model to address wicked problems. *Journal of Social Marketing*, 6, 219-239.
- BRENNAN, L., VOROS, J. & BRADY, E. 2011. Paradigms at play and implications for validity in social marketing research. *Journal of Social Marketing*, 1, 100-119.
- BUYUCEK, N., KUBACKI, K., RUNDLE-THIELE, S. & PANG, B. 2016. A systematic review of stakeholder involvement in social marketing interventions. *Australasian Marketing Journal*, 24, 8-19.
- CAMERON, D., EPTON, T., NORMAN, P., SHEERAN, P., HARRIS, P. R., WEBB, T. L., JULIOUS, S. A., BRENNAN, A., THOMAS, C., PETROCZI, A., NAUGHTON, D. & SHAH, I. 2015. A theory-based online health behaviour intervention for new university students (U@Uni: LifeGuide): Results from a repeat randomized controlled trial. *Trials*, 16, 555.
- CANE, J., O'CONNOR, D. & MICHIE, S. 2012. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7, 37-37.
- CAREY, R. N., CONNELL, L. E., JOHNSTON, M., ROTHMAN, A. J., BRUIN, M. D., KELLY, M. P. & MICHIE, S. 2019. Behavior change techniques and their mechanisms of action: A synthesis of links described in published intervention literature. *Annals of Behavioral Medicine*, 53, 693-707.
- CARINS, J. E. & RUNDLE-THIELE, S. R. 2014. Eating for the better: A social marketing review (2000-2012). *Public Health Nutrition*, 17, 1628-1639.
- CENTERS FOR DISEASE CONTROL AND PREVENTION. 2018. *Logic models: CDC approach to evaluation* [Online]. Available: <https://www.cdc.gov/eval/logicmodels/index.htm#:~:text=A%20logic%20model%20is%20a,activities%20and%20its%20intended%20effects>. [Accessed 09/08/2020].
- CONNELL, L. E., CAREY, R. N., DE BRUIN, M., ROTHMAN, A. J., JOHNSTON, M., KELLY, M. P. & MICHIE, S. 2019. Links between behavior change techniques and mechanisms of action: An expert consensus study. *Annals of Behavioral Medicine*, 53, 708-720.
- COOK, J., LYNES, J. & FRIES, S. 2021. Exploring mistakes and failures in social marketing: The inside story. *Social Marketing Quarterly*, 27, 13-31.
- CRAIG, P., DI RUGGIERO, E., FROHLICH, K. L., MYKHALOVSKIY, E., WHITE, M., CAMPBELL, R., CUMMINS, S., EDWARDS, N., HUNT, K., KEE, F., LOPPIE, C., MOORE, L., OGILVIE, D., PETTICREW, M. & POLAND, B. 2018. *Taking account of context in population health intervention research: Guidance for producers, users and funders of research*, Southampton, England, NIHR Journals Library.
- CRONIN, M. A. & GEORGE, E. 2020. The why and how of the integrative review. *Organizational Research Methods*, 109442812093550.

- DALGETTY, R., MILLER, C. B. & DOMBROWSKI, S. U. 2019. Examining the theory-effectiveness hypothesis: A systematic review of systematic reviews. *British Journal of Health Psychology*, 24, 334-356.
- DAVID, P. & RUNDLE-THIELE, S. 2018. Social marketing theory measurement precision: A theory of planned behaviour illustration. *Journal of Social Marketing*, 8, 182-201.
- DAVID, P. & RUNDLE-THIELE, S. 2019. Rethinking behaviour change: A dynamic approach in social marketing. *Journal of Social Marketing*, 9, 252-268.
- DAVID, P., RUNDLE-THIELE, S. & PALLANT, J. I. 2019. (Re)Focussing on behavioural change: An examination of the utility of hidden Markov modelling. *Journal of Social Marketing*, 9, 130-145.
- DAVIES, P., WALKER, A. E. & GRIMSHAW, J. M. 2010. A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. *Implementation Science*, 5, 14-14.
- DAVIS, R., CAMPBELL, R., HILDON, Z., HOBBS, L. & MICHIE, S. 2015. Theories of behaviour and behaviour change across the social and behavioural sciences: A scoping review. *Health Psychology Review*, 9, 323-344.
- DES JARLAIS, D. C., LYLES, C., CREPAZ, N. & GROUP, T. 2004. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: The TREND statement. *American Journal of Public Health*, 94, 361-366.
- DIETRICH, T., RUNDLE-THIELE, S. & KUBACKI, K. 2017. *Segmentation in Social Marketing: Process, Methods and Application*, Singapore, Springer
- DIETRICH, T., RUNDLE-THIELE, S., SCHUSTER, L. & CONNOR, J. P. 2016. A systematic literature review of alcohol education programmes in middle and high school settings (2000-2014). *Health Education*, 116, 50-68.
- ELDREDGE, L. K. B., MARKHAM, C. M., RUITER, R. A., FERNÁNDEZ, M. E., KOK, G. & PARCEL, G. S. 2016. *Planning health promotion programs: an intervention mapping approach*, San Francisco, CA, Jossey-Bass & Pfeiffer Imprints, Wiley.
- EPTON, T., NORMAN, P., DADZIE, A., HARRIS, P. R., WEBB, T. L., SHEERAN, P., JULIOUS, S. A., CIRAVEGNA, F., BRENNAN, A., MEIER, P. S., NAUGHTON, D., PETROCZI, A., KRUGER, J. & SHAH, I. 2014. A theory-based online health behaviour intervention for new university students (U@Uni): Results from a randomised controlled trial. *BMC Public Health*, 14, 563.
- EVANS, W. D., PATTANAYAK, S. K., YOUNG, S., BUSZIN, J., RAI, S. & BIHM, J. W. 2014. Social marketing of water and sanitation products: A systematic review of peer-reviewed literature. *Social Science & Medicine*, 110, 18-25.
- FIRESTONE, R., ROWE, C. J., MODI, S. N. & SIEVERS, D. 2017. The effectiveness of social marketing in global health: A systematic review. *Health Policy and Planning*, 32, 110-124.
- FLAHERTY, T., DOMEKAN, C. & ANAND, M. 2021. The use of digital technologies in social marketing: A systematic review. *Journal of Social Marketing*, 11, 378-405.
- FLAHERTY, T., DOMEKAN, C., DUANE, S., BRYCHKOV, D. & ANAND, M. 2020. Systems social marketing and Macro-Social marketing: A systematic review. *Social marketing quarterly*, 26, 146-166.
- FRENCH, S. D., GREEN, S. E., O'CONNOR, D. A., MCKENZIE, J. E., FRANCIS, J. J., MICHIE, S., BUCHBINDER, R., SCHATNER, P., SPIKE, N. & GRIMSHAW, J. M. 2012. Developing theory-informed behaviour change interventions to implement evidence into practice: A systematic approach using the theoretical domains framework. *Implementation Science*, 7, 38-38.

- FUJIHIRA, H., KUBACKI, K., RONTO, R., PANG, B. & RUNDLE-THIELE, S. 2015. Social marketing physical activity Interventions among adults 60 years and older: A systematic review. *Social Marketing Quarterly*, 21, 214-229.
- GAINFORTH, H. L., WEST, R. & MICHIE, S. 2015. Assessing connections between behavior change theories using network analysis. *Annals of Behavioral Medicine*, 49, 754-761.
- GLANZ, K. & BISHOP, D. B. 2010. The role of behavioral science theory in development and implementation of public health interventions. *Annual Review of Public Health*, 31, 399-418.
- GLASGOW, R. E., KLESGES, L. M., DZEWALTOWSKI, D. A., BULL, S. S. & ESTABROOKS, P. 2004. The future of health behavior change research: What is needed to improve translation of research into health promotion practice? *Annals of Behavioral Medicine*, 27, 3-12.
- GORDON, R., MCDERMOTT, L. & HASTINGS, G. 2008. Critical issues in social marketing: A review and research agenda. In: WYMER, W. & SARGEANT, A. (eds.) *The Routledge companion to nonprofit marketing*. Oxon, England: Routledge.
- GORDON, R., MCDERMOTT, L., STEAD, M. & ANGUS, K. 2006. The effectiveness of social marketing interventions for health improvement: What's the evidence? *Public Health*, 120, 1133-1139.
- GOURLAN, M., BERNARD, P., BORTOLON, C., ROMAIN, A. J., LAREYRE, O., CARAYOL, M., NINOT, G. & BOICHÉ, J. 2016. Efficacy of theory-based interventions to promote physical activity. A meta-analysis of randomised controlled trials. *Health Psychology Review*, 10, 50-66.
- GRACIA-MARCO, L., VICENTE-RODRÍGUEZ, G., BORYS, J. M., LE BODO, Y., PETTIGREW, S. & MORENO, L. A. 2011. Contribution of social marketing strategies to community-based obesity prevention programmes in children. *International Journal of Obesity*, 35, 472-479.
- HAGGER, M. S. & WEED, M. 2019. DEBATE: Do interventions based on behavioral theory work in the real world? *International Journal of Behavioral Nutrition and Physical Activity*, 16, 36.
- HARDEMAN, W., SUTTON, S., GRIFFIN, S., JOHNSTON, M., WHITE, A., WAREHAM, N. J. & KINMONTH, A. L. 2005. A causal modelling approach to the development of theory-based behaviour change programmes for trial evaluation. *Health Education Research*, 20, 676-687.
- HELMIG, B. & THALER, J. 2010. On the effectiveness of social marketing—what do we really know? *Journal of Nonprofit & Public Sector Marketing*, 22, 264-287.
- HOCHBAUM, G., ROSENSTOCK, I. & KEGELS, S. 1952. Health belief model. Chapel Hill, NC: United States Public Health Service.
- KELLY, M. P. & BARKER, M. 2016. Why is changing health-related behaviour so difficult? *Public Health*, 136, 109-116.
- KIM, J., RUNDLE-THIELE, S. & KNOX, K. 2019. Systematic literature review of best practice in food waste reduction programs. *Journal of Social Marketing*, 9, 447-466.
- KOK, G., GOTTLIEB, N. H., PETERS, G. Y., MULLEN, P. D., PARCEL, G. S., RUITER, R. A. C., FERNÁNDEZ, M. E., MARKHAM, C. & BARTHOLOMEW, L. K. 2016. A taxonomy of behaviour change methods: An intervention mapping approach. *Health Psychology Review*, 10, 297-312.
- KOK, G. J., SCHAALMA, H. P., RUITER, R. A. C., VAN EMPELEN, P. & BRUG, J. 2004. Intervention mapping: protocol for applying health psychology theory to prevention programmes. *Journal of Health Psychology*, 9, 85-98.

- KUBACKI, K., HURLEY, E. & RUNDLE-THIELE, S. R. 2018. A systematic review of sports sponsorship for public health and social marketing. *Journal of Social Marketing*, 8, 24-39.
- KUBACKI, K., RONTO, R., LAHTINEN, V., PANG, B. & RUNDLE-THIELE, S. 2017. Social marketing interventions aiming to increase physical activity among adults: A systematic review. *Health Education*, 117, 69-89.
- KUBACKI, K., RUNDLE-THIELE, S., LAHTINEN, V. & PARKINSON, J. 2015a. A systematic review assessing the extent of social marketing principle use in interventions targeting children (2000-2014). *Young Consumers*, 16, 141-158.
- KUBACKI, K., RUNDLE-THIELE, S., PANG, B. & BUYUCEK, N. 2015b. Minimizing alcohol harm: A systematic social marketing review (2000-2014). *Journal of Business Research*, 68, 2214-2222.
- KUBACKI, K. & SZABLEWSKA, N. 2019. Social marketing targeting Indigenous peoples: a systematic review. *Health Promotion International*, 34, 175-176.
- LARA, J., HOBBS, N., MOYNIHAN, P. J., MEYER, T. D., ADAMSON, A. J., ERRINGTON, L., ROCHESTER, L., SNIEHOTTA, F. F., WHITE, M. & MATHERS, J. C. 2014. Effectiveness of dietary interventions among adults of retirement age: A systematic review and meta-analysis of randomized controlled trials. *BMC Medicine*, 12, 60-60.
- LEFEBVRE, R. C. 2000. Theories and models in social marketing. In: BLOOM, P. N. & T., G. G. (eds.) *Handbook of marketing and society* Newbury Park, CA: SAGE Publications.
- LIPPKE, S. & ZIEGELMANN, J. P. 2008. Theory-based health behavior change: Developing, testing, and applying theories for evidence-based interventions. *Applied Psychology: An International Review*, 57, 698-716.
- LUCA, N. R. & SUGGS, L. S. 2010. Strategies for the social marketing mix: A systematic review. *Social Marketing Quarterly*, 16, 122-149.
- LUCA, N. R. & SUGGS, L. S. 2013. Theory and model use in social marketing health interventions. *Journal of Health Communication*, 18, 20-40.
- LUECKING, C. T., HENNINK-KAMINSKI, H., IHEKWEAZU, C., VAUGHN, A., MAZZUCCA, S. & WARD, D. S. 2017. Social marketing approaches to nutrition and physical activity interventions in early care and education centres: a systematic review: Social marketing for interventions in child care. *Obesity Reviews*, 18, 1425-1438.
- MAKRIS, A., KHALIQ, M. & PERKINS, E. 2021. A scoping review of behavior change interventions to decrease health care disparities for patients with disabilities in a primary care setting: Can social marketing play a role? *Social Marketing Quarterly*, 27, 48-63.
- MANIKAM, S. & RUSSELL-BENNETT, R. 2016. The social marketing theory-based (SMT) approach for designing interventions. *Journal of Social Marketing*, 6, 18-40.
- MAY, C. 2013. Towards a general theory of implementation. *Implementation Science*, 8, 18-18.
- MICHIE, S. & ABRAHAM, C. 2004. Interventions to change health behaviours: evidence-based or evidence-inspired? *Psychology & Health*, 19, 29-49.
- MICHIE, S., ABRAHAM, C., WHITTINGTON, C., MCATEER, J. & GUPTA, S. 2009. Effective techniques in healthy eating and physical activity interventions: A meta-regression. *Health Psychology*, 28, 690-701.
- MICHIE, S., ASHFORD, S., SNIEHOTTA, F. F., DOMBROWSKI, S. U., BISHOP, A. & FRENCH, D. P. 2011a. A refined taxonomy of behaviour change techniques to help

- people change their physical activity and healthy eating behaviours: The CALO-RE taxonomy. *Psychology & Health*, 26, 1479-1498.
- MICHIE, S., CAREY, R. N., JOHNSTON, M., ROTHMAN, A. J., DE BRUIN, M., KELLY, M. P. & CONNELL, L. E. 2017. From theory-inspired to theory-based interventions: A protocol for developing and testing a methodology for linking behaviour change techniques to theoretical mechanisms of action. *Annals of Behavioral Medicine*, 52, 1-12.
- MICHIE, S., CAREY, R. N., JOHNSTON, M., ROTHMAN, A. J., DE BRUIN, M., KELLY, M. P. & CONNELL, L. E. 2018. From theory-inspired to theory-based interventions: A protocol for developing and testing a methodology for linking behaviour change techniques to theoretical mechanisms of action. *Annals of Behavioral Medicine*, 52, 501-512.
- MICHIE, S. & JOHNSTON, M. 2012. Theories and techniques of behaviour change: Developing a cumulative science of behaviour change. *Health Psychology Review*, 6, 1-6.
- MICHIE, S., JOHNSTON, M., ABRAHAM, C., LAWTON, R., PARKER, D. & WALKER, A. 2005. Making psychological theory useful for implementing evidence based practice: A consensus approach. *Quality and Safety in Health Care*, 14, 26-33.
- MICHIE, S., JOHNSTON, M., FRANCIS, J., HARDEMAN, W. & ECCLES, M. 2008. From theory to intervention: Mapping theoretically derived behavioural determinants to behaviour change techniques. *Applied Psychology: An International Review*, 57, 660-680.
- MICHIE, S. & PRESTWICH, A. 2010. Are interventions theory-based? Development of a theory coding scheme. *Health Psychology*, 29, 1-8.
- MICHIE, S., RICHARDSON, M., JOHNSTON, M., ABRAHAM, C., FRANCIS, J., HARDEMAN, W., ECCLES, M. P., CANE, J. & WOOD, C. E. 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46, 81-95.
- MICHIE, S., VAN STRALEN, M. M. & WEST, R. 2011b. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42-42.
- MICHIE, S., WEST, R., CAMPBELL, R., BROWN, J. & GAINFORTH, H. 2014. *ABC of behaviour change theories: An essential resource for researchers, policy makers and practitioners*, Surrey, England, Silverback Publishing.
- NCI. 2019. *Grid-enabled measures database* [Online]. National Cancer Institute. Available: <https://www.gem-beta.org/public/MeasureList.aspx?cat=2> [Accessed].
- NOAR, S. M., BENAC, C. N. & HARRIS, M. S. 2007. Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychological Bulletin*, 133, 673-693.
- NOAR, S. M. & ZIMMERMAN, R. S. 2005. Health behavior theory and cumulative knowledge regarding health behaviors: Are we moving in the right direction? *Health Education Research*, 20, 275-290.
- NSMC. 2012. *Social marketing benchmark criteria* [Online]. National Social Marketing Centre. Available: <https://www.thensmc.com/sites/default/files/benchmark-criteria-090910.pdf> [Accessed].
- NTOUMANIS, N., NG, J. Y. Y., PRESTWICH, A., QUESTED, E., HANCOX, J. E., THØGERSEN-NTOUMANI, C., DECI, E. L., RYAN, R. M., LONSDALE, C. & WILLIAMS, G. C. 2021. A meta-analysis of self-determination theory-informed

- intervention studies in the health domain: Effects on motivation, health behavior, physical, and psychological health. *Health Psychology Review*, 15, 214-244.
- PAINTER, J. E., BORBA, C. P. C., HYNES, M., MAYS, D. & GLANZ, K. 2008. The use of theory in health behavior research from 2000 to 2005: A systematic review. *Annals of Behavioral Medicine*, 35, 358-362.
- PANG, B. 2017. *Promoting active school travel: A theoretically grounded social marketing study*. Griffith University.
- PETERS, G. Y., DE BRUIN, M. & CRUTZEN, R. 2015. Everything should be as simple as possible, but no simpler: Towards a protocol for accumulating evidence regarding the active content of health behaviour change interventions. *Health Psychology Review*, 9, 1-14.
- PRESTWICH, A., SNIEHOTTA, F. F., WHITTINGTON, C., DOMBROWSKI, S. U., ROGERS, L. & MICHIE, S. 2014. Does theory influence the effectiveness of health behavior interventions? Meta-analysis. *Health Psychology*, 33, 465-474.
- PRESTWICH, A., WEBB, T. L. & CONNER, M. 2015. Using theory to develop and test interventions to promote changes in health behaviour: Evidence, issues, and recommendations. *Current Opinion in Psychology*, 5, 1-5.
- PROCHASKA, J. O. & DICLEMENTE, C. C. 1986. Toward a comprehensive model of change. In: MILLER, M. R. & HEATHER, N. (eds.) *Treating addictive behaviors: Processes of change*. New York, NY: Plenum Press.
- PROCHASKA, J. O. & DICLEMENTE, C. C. 1992. Stages of change in the modification of problem behaviors. In: HERSEN, M., EISLER, R. M. & MILLER, P. M. (eds.) *Progress in behavior modification*. Sycamore, IL: Sycamore Press.
- PROTOGEROU, C. & JOHNSON, B. T. 2014. Factors underlying the success of behavioral HIV-prevention interventions for adolescents: A meta-review. *AIDS and Behavior*, 18, 1847-1863.
- ROTHMAN, A. J. 2004. "Is there nothing more practical than a good theory?": Why innovations and advances in health behavior change will arise if interventions are used to test and refine theory. *International Journal of Behavioral Nutrition and Physical Activity*, 1, 11-11.
- ROTHMAN, A. J. 2009. Capitalizing on opportunities to refine health behavior theories. *Health Education & Behavior*, 36, 150S-155S.
- RUNDLE-THIELE, S., DAVID, P., WILLMOTT, T., PANG, B., EAGLE, L. & HAY, R. 2019. Social marketing theory development goals: An agenda to drive change. *Journal of Marketing Management*, 35, 160-181.
- RUNDLE-THIELE, S., DIETRICH, T. & CARINS, J. 2021. CBE: A framework to guide the application of marketing to behavior change. *Social Marketing Quarterly*, 27, 175-194.
- RYAN, S. T., KARIIPPANON, K. A. E., OKELY, A. D., STANLEY, R. M., WAQA, G. & RANDLE, M. 2021. Social marketing benchmark criteria use in health behaviour change interventions in pacific islands populations: A systematic review. *Journal of Social Marketing*, Ahead-of-print.
- SAMDAL, G. B., EIDE, G. E., BARTH, T., WILLIAMS, G. & MELAND, E. 2017. Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults: Systematic review and meta-regression analyses. *International Journal of Behavioral Nutrition and Physical Activity*, 14, 42-14.
- SCHMIDTKE, D. J., KUBACKI, K. & RUNDLE-THIELE, S. 2021. A review of social marketing interventions in low-and middle-income countries (2010–2019). *Journal of Social Marketing*, 11 240-258.

- SHERMAN, D. K. & COHEN, G. L. 2006. The psychology of self-defense: self-affirmation theory. In: BERKOWITZ, L. (ed.) *Advances in experimental social psychology*. Elsevier Science & Technology.
- SMALDINO, P. E. 2020. How to translate a verbal theory into a formal model. *Social Psychology*, 51, 207-218.
- SOBC. 2019. *The measures* [Online]. Science of Behavior Change. Available: <https://scienceofbehaviorchange.org/measures/> [Accessed].
- STEAD, M., GORDON, R., ANGUS, K. & MCDERMOTT, L. 2007. A systematic review of social marketing effectiveness. *Health Education*, 107, 126-191.
- TAYLOR, N., CONNER, M. & LAWTON, R. 2012. The impact of theory on the effectiveness of worksite physical activity interventions: A meta-analysis and meta-regression. *Health Psychology Review*, 6, 33-73.
- TEIXEIRA, P. J., CARRAÇA, E. V., MARKLAND, D., SILVA, M. N. & RYAN, R. M. 2012. Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 9, 78-78.
- THACKERAY, R. & NEIGER, B. L. 2000. Establishing a relationship between behavior change theory and social marketing: Implications for health education. *Journal of Health Education*, 31, 331-335.
- THALER, J. & HELMIG, B. 2013. Theoretical framework of social marketing effectiveness: Drawing the big picture on its functioning. *Journal of Nonprofit and Public Sector Marketing*, 25, 211-236.
- TRUONG, V. D. 2014. Social marketing: A systematic review of research 1998–2012. *Social Marketing Quarterly*, 20, 15-34.
- TRUONG, V. D. & DANG, N. V. H. 2016. Reviewing research evidence for social marketing: Systematic literature reviews. In: KUBACKI, K. & RUNDLE-THIELE, S. (eds.) *Formative research in social marketing*. 1 ed. Singapore Springer.
- WADSWORTH, D. D. & HALLAM, J. S. 2010. Effect of a web site intervention on physical activity of college females. *American Journal of Health Behavior*, 34, 60-69.
- WEBB, T. L., JOSEPH, J., YARDLEY, L. & MICHIE, S. 2010. Using the internet to promote health behavior change: A systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research*, 12, e4.
- WEINSTEIN, N. D. & ROTHMAN, A. J. 2005. Commentary: Revitalizing research on health behavior theories. *Health Education Research*, 20, 294-297.
- WETTSTEIN, D. & SUGGS, L. S. 2016. Is it social marketing? The benchmarks meet the social marketing indicator. *Journal of Social Marketing*, 6, 2-17.
- WILLMOTT, T., PANG, B., RUNDLE-THIELE, S. & BADEJO, A. 2019a. Reported theory use in electronic weight management interventions targeting young adults: A systematic review. *Health Psychology Review*, 13, 295-317.
- WILLMOTT, T. & PARKINSON, J. 2017. Motivation, opportunity, and ability: Understanding new habits and changes adopted for weight management. *International Journal of Consumer Studies*, 41, 291-298.
- WILLMOTT, T. & RUNDLE-THIELE, S. 2021. Are we speaking the same language? Call for action to improve theory application and reporting in behaviour change research. *BMC Public Health*, 21, 479-479.
- WILLMOTT, T. J., PANG, B. & RUNDLE-THIELE, S. 2021. Capability, opportunity, and motivation: An across contexts empirical examination of the COM-B model. *BMC Public Health*, Forthcoming.

- WILLMOTT, T. J., PANG, B., RUNDLE-THIELE, S. & BADEJO, A. 2019b. Weight management in young adults: Systematic review of electronic health intervention components and outcomes. *Journal of Medical Internet Research*, 21, e10265.
- WYMER, W. 2011. Developing more effective social marketing strategies. *Journal of Social Marketing*, 1, 17-31.
- XIA, Y., DESHPANDE, S. & BONATES, T. 2016. Effectiveness of social marketing interventions to promote physical activity among adults: A systematic review. *Journal of Physical Activity and Health*, 13, 1263-1274.
- YOONG, S. L., BOLSEWICZ, K., GRADY, A., WYSE, R., SUTHERLAND, R., HODDER, R. K., KINGSLAND, M., NATHAN, N., MCCRABB, S., BAUMAN, A., WIGGERS, J., MOULLIN, J., ALBERS, B., FERNANDEZ, M. E., HALL, A., SIMS-GOULD, J., TAYLOR, N., RISSEL, C., MILAT, A., BAILEY, A., BATCHELOR, S., ATTIA, J. & WOLFENDEN, L. 2020. Adaptation of public health initiatives: Expert views on current guidance and opportunities to advance their application and benefit. *Health Education Research*, 35, 243-257.

Supplementary file 1. Glossary of terms

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Term	Definition	Source
Behaviour	Behaviours are physical events that occur in the body and are controlled by the brain.	(Davis et al., 2015)
Behaviour change	Behaviour change refers to individual action taken in response to internal or external stimuli. Action can occur consciously or automatically in response to a particular stimulus.	(Davis et al., 2015)
Intervention	A series of inter-related events occurring within a system where the change in outcome (attenuated or amplified) is not proportional to the change in input. According to this definition, interventions are ongoing social processes rather than fixed and bounded entities.	(Hawe et al., 2009)
Behaviour change intervention	Behaviour change interventions represent coordinated sets of activities designed to change specified behaviour patterns.	(Michie et al., 2011)
Theory	An organising description of a system that accounts for what is known and explains and predicts phenomena. Encompasses a set of concepts and/or statements with specification of how phenomena relate to each other.	(Michie et al., 2014)
MOA	The processes through which a BCT affects behaviour. It should be noted that not all theoretical constructs can be considered potential MOAs (e.g., MOAs do not include personality traits, demographic variables, or stages of change).	(Michie et al., 2017, Michie et al., 2013)
BCT	An observable, replicable, and irreducible component of an intervention designed to alter or redirect causal determinants (or processes) that regulate behaviour; that is, a technique is proposed to be an active ingredient within an intervention (e.g., feedback, self-monitoring, and reinforcement).	(Michie et al., 2013)
Behaviour change taxonomy	An extensive, integrated, and hierarchical classification system for reliably specifying intervention components.	(Michie et al., 2017)
IM	Six-step intervention planning process, with each step comprising several tasks to support intervention development.	(Bartholomew, 2011)

Abbreviations: BCT = behaviour change techniques; IM = intervention mapping; MOA = mechanisms of action.

References

- BARTHOLOMEW, L. K. 2011. *Planning health promotion programs: an intervention mapping approach*, San Francisco, Jossey-Bass.
- DAVIS, R., CAMPBELL, R., HILDON, Z., HOBBS, L. & MICHIE, S. 2015. Theories of behaviour and behaviour change across the social and behavioural sciences: A scoping review. *Health Psychology Review*, 9, 323-344.
- HAWE, P., SHIELL, A. & RILEY, T. 2009. Theorising interventions as events in systems. *American Journal of Community Psychology*, 43, 267-276.
- MICHIE, S., CAREY, R. N., JOHNSTON, M., ROTHMAN, A. J., DE BRUIN, M., KELLY, M. P. & CONNELL, L. E. 2017. From theory-inspired to theory-based interventions: A protocol for developing and testing a methodology for linking behaviour change techniques to theoretical mechanisms of action. *Annals of Behavioral Medicine*, 52, 1-12.
- MICHIE, S., RICHARDSON, M., JOHNSTON, M., ABRAHAM, C., FRANCIS, J., HARDEMAN, W., ECCLES, M. P., CANE, J. & WOOD, C. E. 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46, 81-95.
- MICHIE, S., VAN STRALEN, M. M. & WEST, R. 2011. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42-42.

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MICHIE, S., WEST, R., CAMPBELL, R., BROWN, J. & GAINFORTH, H. 2014. *ABC of behaviour change theories: An essential resource for researchers, policy makers and practitioners*, Surrey, England, Silverback Publishing.