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## Understanding and Predicting Health Behaviour Change: A Contemporary View Through the Lenses of Meta-Reviews

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Research on health behaviour change examines how to help people engage in healthy behaviours to prevent the development or worsening of chronic disease and early mortality and to improve mental health and well-being. While some of that research has been successful, it is often unclear why or how certain behaviour change interventions have worked (Michie & Abraham, 2004; Nielsen et al., 2018; Sumner et al., 2018). Understanding why successful behaviour change occurs is the key to creating healthy behaviour, reducing the burden of chronic disease worldwide, and promoting health. Without understanding why a behaviour change intervention succeeds, researchers will remain with an evidence base that is fragmented and uninformed. As a result, a great deal of research wastes opportunities to build forward momentum and thereby limits opportunities to harness and synthesise findings to systematically improve behaviour change interventions. Conversely, with an understanding of the causal mechanisms, researchers can build more efficient behaviour change interventions and so create an evidence base that reveals what works for which populations in what contexts and for which behaviours. Researchers have completed thousands of health behaviour change interventions on topics ranging from improving medication adherence behaviour, to decreasing risky sexual activity, to promoting physical activity. In turn, numerous meta-analyses have attempted to examine the effectiveness and to understand the results of such interventions. These meta-analyses have tended to focus on specific behaviours, types of behaviour change interventions, ways of delivering the behaviour change intervention, health outcomes, or populations. At this point, there are often so many meta-analyses focused on a given phenomenon that it is challenging for any individual to summarise the conclusions of these analyses accurately. We present here a special issue devoted to advancing the science of behaviour change in two main ways. First, this special issue presents information across several articles to aid researchers in locating information on both effectiveness and possible explanations for the (in-)effectiveness of behaviour change interventions combined across existing meta-analyses. Second, this special issue provides information on the most important implications for future research on advancing the science of health behaviour change interventions. The

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first goal will be achieved by a series of meta-reviews of meta-analyses on behaviour change interventions, and the second by three narrative reviews and a series of commentaries.

So, what is a *meta-review*? It is essentially a systematic review of systematic reviews (Blackwood, 2016). The intent is to synthesise meta-analyses and thus examine at the highest level only the summary of current evidence. These types of reviews provide evidence to make better decisions about what exists in the research landscape, and what is missing after a comprehensive and thorough search. Similar to published guidelines on quality and reporting standard put forward for meta-analyses, best practice guidelines for meta-reviews have also been proposed, which include pre-registration and standardised quality ratings for their constituent meta-analyses (Shea et al., 2017). By presenting a series of meta-reviews on differing aspects of health behaviour change, this special issue provides a clear overall picture of the current state of the research on health behaviour change research and its quality. It also delivers a clear message about what should be done now to advance the science of behaviour change to improve health.

The meta-reviews presented here were undertaken by personnel supported by The Science of Behavior Change (SOBC) Research Network. To move the health behaviour change field forward, the SOBC Research Network (funded by the U.S. National Institutes of Health) seeks to improve the understanding of underlying mechanisms of human behaviour change by promoting and a basic mechanism of action research by use of an experimental medicine method (Nielsen et al., 2018; Suls et al., 2020; Aklin et al., 2020). SOBC aims to bring together basic and applied scientists to support this mechanistic research across health-related behaviours to ultimately develop more effective behavioural interventions. Work during SOBC Stage 1 (2009–2014) identified three broad classes of intervention targets that are highly relevant to the mechanisms relating to behaviour change: self-regulation, stress reactivity/stress resilience, and interpersonal and social processes. Stage 1 work also determined the need for reliable and valid ways to measure whether these hypothesised mechanisms of actions were engaged or influenced through experimental manipulation or interventions, which became the focus of SOBC Stage 2 (2015–present). In this work, when a change in the mechanism results in an observed change in behaviour, the inference is that the identified mechanism is indeed a valid mechanism of action. SOBC's goal is to use the results of this method to optimise behaviour change interventions across disciplines.

Thus, the central goal of SOBC is to identify key mechanisms underlying successful behaviour change interventions aimed to change health behaviour, such as by improving positive health behaviours (e.g., diet and exercise) or by reducing unhealthy behaviours (e.g., smoking). SOBC also seeks to answer the critical question: What works, for whom, and under what circumstances? The SOBC network reviewed, provided feedback, and endorsed a plan for SOBC-supported personnel to undertake a systematic review of the current literature using extant meta-analyses, with the goal of a meta-review being created to understand what meta-analyses have been published thus far examining self-regulation as a means to influence health behaviour. By compiling meta-analyses across a wide range of interventions, behaviour change targets, and distal health outcomes, the results of the parent comprehensive meta-review (Hennessy, Johnson, Acabchuk, McCloskey, & Stewart-James, 2020), and the accompanying targeted meta-reviews (Protogerou, McHugh, & Johnson,

2020; Suls et al., 2020; Wilson et al., 2020) presented in this special issue promise to inform future studies by identifying gaps in current knowledge and advancing our knowledge where science has already established findings on the mechanisms of self-regulation.

Three salient facts make the current evidence base ripe for meta-reviewing the effectiveness and the explanatory mechanisms of behaviour change interventions: First, new strategies for characterising the content of interventions have led to a more standardised approach to descriptions in a taxonomic form, which has done much to resolve the fragmented and inconsistent way in which interventions have been previously described (e.g., Abraham & Michie, 2008; Knittle et al., 2020; Kok et al., 2016; Michie et al., 2013), with ongoing advances in nomenclature, definition, and structure promising even more precision. Thus, synthesising the evidence in meta-reviews by using existing taxonomies for identifying mechanisms most prominently and most effectively applied in behaviour change interventions is now possible. This approach also allows a more comprehensive and precise means for identifying shortcomings, gaps, and open questions in this field. The latter then allows for stimulating further improvements in planning, implementing, and describing intervention content. A long-term benefit of such an approach may be increasingly precise replication efforts together with substantial improvements in the effectiveness of the interventions tested across health behaviour change intervention research (Byrne, 2020).

Second, theories to understand health behaviour itself have also grown more complex, relative to the health behaviour theories proposed in the 1970s and 1980s. Contemporary models for example consider not only reflective, but also automatic processes involved in behaviour change (Deutsch & Strack, in press), or place behaviour change within several contexts, such as the romantic relationship (Lewis et al., 2006; Pietromonaco & Collins, 2017; Scholz, Berli, Lüscher, & Knoll, in press) or broader social networks (Berkman, Glass, Brissette, & Seeman, 2000) with individuals connected to others through reciprocal exchanges that vary depending both on the needs (or goals) of the individual and the needs (and goals) of the network partners. Furthermore, recent models also take into account that all this occurs within an overarching environment that facilitates or hinders behaviour change (e.g., via the presence of health-promoting policies and settings, such as bans on smoking in restaurants or streets with designated walking or bike paths; (e.g., Ruiters, Crutzen, de Leeuw, & Kok, in press; Schuz, 2017). As a consequence, contemporary theories do not only more precisely specify potential mechanisms for explaining health behaviour change, but also address the crucial question about what factors are likely to moderate the intervention's effectiveness. Using these models as theoretical frameworks for synthesising evidence in a meta-review allows a more purposive approach to this task.

Third, standards for conducting meta-analyses and meta-reviews have become increasingly rigorous, transparent, and, with this, more useful (e.g., Shea et al., 2017). The level of sophistication now available while exploring multiple meta-analyses creates the ability to address study-level nuances and a growing understanding of the assumptions involved in pooling the results of independent studies on a subject across summaries. Thus, the synthesis of available research results of behaviour change interventions pooled in meta-analyses can be evaluated while considering the quality of the meta-analyses. This allows a more

sophisticated view on the existing research. It is also important for considering how to improve future meta-analyses and how to understand the validity of the results.

To concentrate on the most comprehensive and methodologically sophisticated meta-analyses, the parent meta-review focuses on relatively recent published meta-analyses of interventions seeking to change participants' health behaviours, with the intent of engaging self-regulation. Results of this meta-review indicate that self-regulation is usually addressed in the form of intervention components that administer specific behaviour change techniques. Effectiveness is inconclusive and seems to be dependent on the target population and the behaviour. The following articles of this special issue address critical questions that could best be answered by targeted meta-reviews. Wilson and others examine self-regulation-related changes focused on improving medication adherence (Wilson et al., 2020), while Suls et al. (2020) address the role of self-regulation for improving cardiovascular disease prevention behaviours. Taking a slightly different approach, Protopogerou and colleagues examine health-behaviour related self-regulation interventions to reduce risky health behaviour (Protopogerou et al., 2020).

Aside from this series of meta-reviews, this special issue also includes narrative reviews complementing the topics covered by the meta-reviews. Alcántara et al. (2020) examine health behaviour self-regulation-related interventions through the lens of the social disparities of health, and so they test the way these factors potentially moderate the effectiveness of behaviour change interventions. Next, Miller et al. (2020) investigate how a developmental perspective is, or is not, considered in the science of behaviour change for self-regulation interventions and provide a strong case for the importance of doing so. As meta-review methodology has advanced so rapidly recently, this special issue also includes one article on how artificial intelligence can be combined with manual systematic searching to support reviewing the existing evidence more efficiently and to enhance the breadth and precision of the meta-analyses found to be eligible when reviewing literature (Marshall, Johnson, Wang, Rajasekaran, & Wallace, 2020).

We conclude this special issue with a series of commentaries on the state of the behaviour change science, and the perspective of funders (Aklin et al., 2020) that further complement the comprehensive overview provided by this special issue as a whole. The commentaries go beyond the implications for future research outlined in the meta-reviews and narrative reviews (O'Carroll, 2020) by e.g. addressing highly topical themes, such as the strong need for improving methods and quality in the area of health behaviour change research (Byrne, 2020), the role of interpersonal differences and environmental factors (O'Connor, 2020), and the interplay between intrapersonal and interpersonal processes (Rothman, Simpson, Huelsnitz, Jones, & Scholz, 2020) as well as the call for taking implementation science into account (Luszczynska, 2020). Finally, the special issue concludes with the perspective of a longstanding editor in chief of *Health Psychology Review* as the landmark journal for systematic reviews and meta-analyses of the science of behaviour change (Hagger, 2020).

We are convinced that this selection of outstanding articles serves the dual functions of (a) providing a comprehensive overview of the state of the science of behaviour change in terms of knowledge of the role of self-regulatory processes for successful behaviour change

interventions and (b) serving as a catalyst for promoting further highest-quality behaviour change interventions addressing the most pressing questions in the science of behaviour change.

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