Theoretical, Critical, and Practical Reflections on the Long-Term Maintenance of Health Behavior Change

Abstract: *This commentary is in response to Joseph, Daniel, Thind, Benitez and Pekmezi (2014). They reviewed randomized controlled trials (RCTs) that included long-term follow-up assessments at least 6 months post-intervention. Their main purpose was to understand which theory or model used by researchers could help explain the long-term maintenance of health behaviors once the intervention was withdrawn in trials focused on physical activity, dietary behavior, and excessive alcohol consumption. Results showed that social cognitive theory (SCT) and transtheoretical model (TTM) were used most often and associated with long-term behavior change compared to self-determination theory (SDT), theory of planned behavior (TPB), or the social-ecological model (SEM). SDT showed encouraging findings while the evidence was unclear for the TPB and the SEM. Here it is argued that scientists should continually reflect on the utility of theory over time and*

the efforts by Joseph and colleagues should be commended. It is also useful to distinguish theories, which are more specified and offer more generalized statements, than models. Models, such as the TPB and SEM, have incorporated elements of other theories but are typically viewed as tools to characterize behavior. For instance,

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It is well documented that chronic diseases, such as heart disease, obesity, cancer, stroke, and diabetes, are the leading causes of death worldwide.¹ It is

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in 10 studies reviewed by Joseph and colleagues the SCT and TTM were used in an integrative manner. An example of an integrated model is presented that incorporates elements of SDT, TPB, and SCT in an effort to highlight how integrating elements from multiple theories may be useful.

also widely accepted that each of these chronic diseases can be prevented or mitigated through healthy lifestyle behaviors.^{2,3} Understanding ways to intervene and help individuals adopt healthy lifestyles is an important public health challenge. Using established psychological and behavioral theories in

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the design, implementation, and evaluation of interventions can enhance researchers' efforts to help adults initiate and sustain healthy lifestyles and may help explain mechanisms of behavior change. Indeed, there is evidence that theory-based behavioral interventions are more effective than atheoretical approaches.⁴ The choice of which theory is most likely to help people maintain long-term changes in lifestyle was the focus of recent a recent review of randomized controlled trials (RCTs) that targeted physical activity, dietary behavior, tobacco use, and excessive alcohol consumption.⁵ This commentary will review, critically analyze, and extend this discussion.

From an empirical perspective, there is research to support the use of numerous theories that can explain the initiation or adoption of behavior change with diverse health behaviors.⁶ However, an important gap in scientific knowledge and the translation of this knowledge concerns which theories explain the long-term maintenance of behavior change after a program or intervention has ended. Put another way, *the theoretical mechanisms that allow individuals to sustain health behavior change 6 months or longer are not fully understood*. Indeed, this is an enormous scientific challenge as scientists have long noted that individuals who initiate behavior change often relapse or return to their baseline levels when the intervention is withdrawn.⁷⁻⁹ Joseph et al⁵ attempted to address this gap in knowledge by reviewing RCTs published since 1990 with adult participants that included follow-up assessments of ≥ 6 months postintervention. They searched PubMed and PsycINFO and only included studies that explicitly used one or more psychological or health behavior theory that guided research efforts. Of the 34 studies that met inclusion criteria, 5 theories were referenced: social-cognitive theory¹⁰ (SCT, $n = 22$), the transtheoretical model¹¹ (TTM, $n = 10$), self-determination theory¹² (SDT, $n = 4$), the theory of planned behavior¹³ (TPB, $n = 2$), and social-ecological model¹⁴ (SEM, $n = 1$). Of those using SCT, 8 of 9

showed positive effects at follow-up for weight loss, 6 out of 10 revealed sustained physical activity behavior, and 1 of the 3 smoking cessation studies showed positive long-term effects. Of the 10 studies that used TTM, all 5 that addressed weight loss showed sustained effects, 2 of the 3 demonstrated sustained physical activity at follow-up, and 1 out of 2 smoking cessation studies revealed positive effects. Interestingly, 5 of the 10 studies reviewed combined SCT and TPB and this point will be revisited. Three studies that used SDT reported positive outcomes at long-term follow-up with regard to weight loss while the remaining study also showed positive effects for smoking cessation. Finally, studies that applied the TPB ($n = 2$) and SEM ($n = 1$) were unsuccessful at follow-up. The discrepancy in the total number of studies reviewed appears to reflect studies that were coded as using multiple theoretical frameworks.

While noting several shortcomings, Joseph and colleagues concluded that there was support for the use of SCT and TTM to promote sustained maintenance of targeted health behaviors while SDT also appears to be promising. The authors noted that they observed heterogeneity of study descriptions, presumably related to procedures and methods employed. Neither the fidelity in which the authors of the studies applied the various behavioral theories nor the methodological quality was evaluated. One significant limitation not discussed by Joseph and colleagues relates to the imprecise measurement of study outcomes in many of the included studies as the predominant measurement strategy was self-reported data. Another shortcoming concerns the lack of any assessments related to risk of bias, internal and external validity, and methodological quality of the RCTs reviewed. This latter shortcoming raises questions about whether the effects in the included studies under- or overestimated the true effects.¹⁵

Given the concerns noted above, Joseph and colleagues' interpretations are appropriately framed in tentative language. Testing, retesting, and

revisiting theories is an iterative process and requires critical analysis of specific studies and close scrutiny of the cumulative evidence that supports or refutes such theories. It is also noteworthy that their review included a fairly diverse sample of adults throughout the age span. This is important because the advancement of scientific theory requires the replication of findings across time and in different settings with diverse individuals. Overall, their efforts should be commended since they provided support for 2 widely used theories, SCT and TTM, and encouragement for the use of SDT. They noted that the relative dearth of studies that fit their inclusion criteria using TPB and SEM limits clear conclusions about their usefulness to promote long-term health behavior change.

Several points of critical analyses are worth raising about Joseph and colleagues' overall conclusions and this section will begin with a question: What is the difference between a theory and a model? Joseph and colleagues used the words interchangeably by not distinguishing important differences between theories (SCT, SDT, and TPH) and models (TTM and SEM). One article cited by Joseph and colleagues offered guidance: *Theory at a Glance: A Guide for Health Promotion Practice*.⁴ In it, theories are distinguished from models in their level of specificity with the former offering researchers and practitioners "a systematic way of understanding events and situations ... a set of concepts, definitions, and propositions that explain or predict these events or situations by illustrating the relationships between variables."^{4(p11)} Models may draw on one or more theories but they are not as specified as theories. This is important with regard to TTM since this model draws on elements of SCT. While theories and models share some common elements, one key difference is that theories produce generalized statements while models often serve as tools intended to understand specific phenomena. Others have also characterized models as a pattern, blueprint, or some representation of

reality that can be very specific (ie, stages of change in TTM) or general (ie, levels of influence in the SEM).¹⁶ While these observations may appear to be minor semantic issues, their relevance in this commentary will be revisited.

Second, with regard to TPB, some consider this to be an explanatory theory so it is not surprising that there were relatively fewer RCTs that used this framework.⁴ Other researchers have expressed disappointment with experimental studies that have tested the intention-behavior relationship in the TPB.¹⁷ In this meta-analysis of 47 experimental studies with varying intervention lengths, medium-to-large changes in intention ($d = 0.66$) were associated with a small to medium change in behavior ($d = 0.36$) across diverse health behaviors.¹⁷ Although these changes are small, the predictive utility of the intention-behavior relationship has been supported in meta-analyses focused on physical activity behavior.^{18,19}

Third, many of the studies reviewed by Joseph and colleagues integrated 2 theories or models so one could question the utility of examining individual theories as predictors of long-term maintenance of behavior. Joseph and colleagues noted that SCT was integrated into 5 of the 10 studies falling under TTM in their review, but it was unclear how or why these studies were included under the SCT domain. The integration of theories and models reflects ongoing discussions in the social and behavioral sciences about whether a single theory, model, or combined frameworks, are preferable and/or superior at explaining behavior.^{4,6} Indeed, all the theories or models reviewed implicitly assume that health behavior is a deliberate and conscious process that requires active planning by individuals.²⁰ Hagger and Chatzisarantis²⁰ proposed the Integrated Behavior Change (IBC) Model for Physical Activity, which can apply to other health behaviors. They noted that intention, a central part of TPB and starting point for the IBC, is the most proximal predictor of behavior and is a central feature of

most social-cognitively based theories. Likewise, perceived behavioral control in the TPB is closely aligned with self-efficacy in SCT. The IBC proposes an important link between autonomous motivation from SDT to the belief-based antecedents of intention in the TPB. The same 2 researchers using meta-analyses demonstrated support for the integration of constructs from SDT and TPB.²¹ Finally, a cursory literature search using 2 or more theories or models in Google Scholar produces many examples of data-based studies that integrated one or more theories or other theorizing related to integrated models.²²⁻²⁶ The larger point here is that trying to determine whether one theory or model is better than others at predicting long-term maintenance of behavior change is an open empirical question. While Joseph and colleagues review tended to favor SCT and TTM across multiple health behaviors, researchers should consider the shared conceptual similarities across the theories and models reviewed and greater possibilities for integration.

Finally, the SEM is an example of a general model that recognizes the multiple levels of influence on human behavior (broad policies, community, organizational, interpersonal, individual, and genetic).²⁷ The SEM is integrative in nature and can include theories derived from multiple disciplines at each level of influence such as applying principles of SDT and/or SCT in community programs to reduce alcohol use. Proponents of this approach recently noted that in order to reverse trends in childhood obesity, policies need to be put in place that support healthy eating, nutrition education, and physical activity in schools, changes in the built environment, and social marketing campaigns.²⁷ Estabrooks et al²⁷ also noted that researchers should consider the larger context and settings in which study findings will be applied and use other metrics beyond efficacy that include effectiveness, sustainability, and cost-benefit analyses in future research.

One final point concerns the use of theory by practitioners. While most theories are viewed as falling under the

domain of scientists, it is also useful to gain the views of practitioners such as those working in county and state health departments.⁴ The combined efforts of scientists and practitioners is at the very heart of public health efforts such as the Community Preventive Services Task Force, Healthy People 2020, and other initiatives. The collaborative efforts of scientists and practitioners together using behavioral and psychological theory brings to mind how the 20th-century pragmatic philosopher William James viewed theory:

Theories thus become instruments, not answers to enigmas in which we can rest. We don't lie back upon them, we move forward, and, on occasion, make nature over again by their aid. Pragmatism unstiffens all our theories, limbers them up and set each one at work.^{28(p52)}

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