

Advances in multiple health behavior change research

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In the USA, national surveys have long demonstrated that adults tend to have multidimensional patterns of health behaviors (e.g., smoking, poor diet, sedentary activity, risky drinking, etc.), rather than any one of these health behaviors in isolation [1, 2]. This trend results in not only higher rates of premature mortality, but also morbidity and disability [3, 4]. In addition, this trend is not limited to adult populations, but has been shown to start in adolescence. Pronk and colleagues [5] found that less than a third of adolescents are at criteria for having a healthy weight, physical activity, diet, and not smoking. Multiple risk behaviors also have been shown to have incremental increases in disability, pharmaceutical, and overall medical costs in large worksite samples. Research has shown that by treating two behaviors effectively, an individual's medical costs decrease by approximately \$2,000 per year [6]. The benefits of impacting on multiple behaviors are therefore important for a variety of reasons.

Given this evidence, incorporating multiple health behavior risks into intervention delivery would be expected to have an important impact on population health. Yet, multiple health behavior change is one of the largest challenges for behavioral medicine, spanning issues including the need to examine relationships between behaviors, choosing between different assessment methods for multiple health behavior change, and optimal design and delivery of interventions.

Behavior change science has developed through the context of traditional care settings which previously existed in silos. Moving to real-world settings demands that we examine multiple health behaviors in complex care environments. Due to these issues, multiple behavior change was identified as a key theme during the NIH Science of Behavior Change meeting in 2009 [7]. The report challenged scientists to harness the synergies between different behaviors in order to make health promotion easier. The first step in this process is to identify behaviors that are correlated, or identified in the report as “bundled,” which may have common underlying processes. By identifying these common processes, interventions may be able to be developed to focus on multiple behaviors at once. These types

of interventions may help primary care providers who often have to consider numerous interventions targeted to specific behaviors. A call for generalized behavior change principles could help the already-burdened health care system by providing “prefabricated interventions” focusing on common principles and processes where the content can be secondary. Finally, methods for assessing how multiple behavior change occurs will be necessary in order to evaluate new interventions in this field.

In 2008, the Multiple Health Behavior Change [MHBC] Special Interest Group of the Society of Behavioral Medicine coordinated the publication of a Special Issue in *Preventive Medicine* [8]. Since that time, MHBC research has steadily increased in sophistication, relevance, and impact. However, as outlined in Prochaska et al. [9], although no significant barriers are keeping researchers from conducting MHBC research, the benefits of MHBC interventions and research are not yet fully appreciated. There needs to be a greater consideration of the importance, implications, and evidence for focusing on MHBC research and practice. In 2001, the MHBC Special Interest Group of SBM held a full day pre-conference seminar entitled “Multiple Health Behavior Change: How Far We've Advanced in 5 Years.” This full day workshop included a variety of activities to identify advances in the previous 5 years, gaps in research, and outlined future trends. As part of that meeting, it was determined that a follow-up to the 2008 special issue should be developed. This Special Section in *Translational Behavioral Medicine* is intended to present an updated collection of state-of-the-science conceptual and research papers on core topics in multiple risk behavior research. The papers span different populations (e.g., adults and adolescents, employees, health clinic patients), methods (e.g., quantitative and qualitative), and modalities (e.g., survey and intervention research).

As noted previously, a first step in the science of multiple behavior change is to examine relationships among behaviors or bundles of behaviors that may share common underlying processes. Five of the articles in this special section discuss these issues and take a variety of approaches to determine these relationships.

Harper et al. [10] examine variables that may influence multiple health behavior changes in older African American colorectal cancer survivors after treatment. Through the use of qualitative interviews and focus groups, five themes were identified. Support was found for the relevance of existing theories of behavior change with this population. The researchers offer recommendations for how researchers can help bridge the gap between health behavior recommendations, standards of practices, and actual behaviors within the population.

Callahan et al. [11] examine the relationship among multiple risk behaviors in order to guide the development of an intervention to reduce sexual risk in adolescents. Through the use of self-report questionnaires, the researchers found that a single latent variable was inadequate to capture all three risk behaviors. Based upon these results, they outline the design of a multiple behavior intervention for youth involved with the justice system.

Harley et al. [12] provide an examination of the relationship between sociodemographic and social contextual influences on multiple health behavior change. The researchers found that gender, marital status, and perceived discrimination were significantly associated with multiple health behavior change in a worksite intervention trial. They recommend that these factors be considered when designing and delivering worksite interventions targeting more than one behavior.

In an effort to identify opportunities to enhance colorectal cancer prevention within the context of diabetes management, Adjaye-Gbewonyo and colleagues [13] use data from the National Health Interview Survey to examine relationships between colorectal screening and selected diabetes self-care behaviors. The authors offer recommendations about opportunities to jointly promote both colorectal screening and diabetes prevention and self-management.

Walsh et al. [14] examine longitudinal relationships between health-compromising behaviors and mental health including depression, anxiety, and stress. Their findings suggest that intervening upon mental health challenges may promote improvements across multiple health behaviors.

Although many different methods of quantifying change in multiple risk behaviors have been proposed [15], these methods have only infrequently been compared. Two articles in the Special Section focus on the challenge of assessing multiple behavior change.

Drake et al. [16] use data from two different multiple behavior change trials (one in small businesses, another in health centers) to examine four assessment strategies. Based on the results, the authors recommend that the decision about which assessment method to use should take into consideration the target population and the study design. Importantly, researchers need to develop a better understanding of the methods available for use.

Yin et al. [17] explore methods to determine the consistency, robustness, and synergy in patterns of

multiple concurrent behavior change outcomes. They describe the phenomenon of paired action and discuss how changes over time on one behavior may influence change on the other behavior.

A final challenge for multiple behavior change researchers is to develop interventions that intervene on multiple behaviors simultaneously. Such an undertaking requires balancing several concepts such as participant burden for multiple assessments, prioritizing the presentation of multiple behavior strategies, etc. Researchers have concluded that multiple simultaneous behavior change interventions are promising for addictive behaviors and for multiple cancer prevention behaviors including diet, physical activity, and obesity prevention [18–24]. In this Special Section, Velicer et al. [25] describe a large intervention trial that examined the effectiveness of two different computer-delivered interventions designed to influence multiple behaviors in middle school students: The first intervention targeted multiple substance use behaviors; the other targeted energy balance behaviors. The energy balance intervention was found not only to have an impact on the intended energy balance behaviors but also, unexpectedly, on the substance use prevention behaviors.

The articles in this Special Section add to the growing evidence base of research documenting relationships among assessments and interventions for multiple health risk behaviors. To achieve the population-wide impact on health and well-being that multiple behavior change is poised to accomplish, future research must address the public health challenge of translating research findings to real-world settings [26]. The recent Prescription for Health Common Measures, Better Outcomes Study exemplifies several challenges that were encountered when delivering a multiple behavior change intervention across 54 primary care practices [27]. These included difficulties with obtaining complete data using common data collection tools and challenges in consistently implementing interventions across practices [27]. The authors conclude that “the strength of evidence for field-ready methods to address multiple health risk behaviors remains elusive.” Our hope is that the articles presented in this Special Section will strengthen the knowledge base about multiple health behavior research and help to inform future research aiming to implement multiple health behavior change intervention in practice-based and community settings.

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