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Behav Res Ther. 2018 February ; 101: 1–2. doi:10.1016/j.brat.2017.12.005.**A mechanism-focused approach to the science of behavior change: An introduction to the special issue****Jennifer A. Sumner,**

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A recent Google search (July 20, 2017) for the term “behavior change” returned approximately 4,560,000 results, including an article on “Why behavior change is hard—and why you should keep trying,” a book on how to design products to facilitate change in daily routines, and a fitness certification program advertisement for becoming a “Behavior Change Specialist.” The wide-ranging nature of these themes reflects more than the vast breadth of topics an Internet query returns; it also shows how broad vernacular conceptions of behavior change are. Although scientists use more restrictive definitions, the landscape remains vast across invested disciplines. Furthermore, whether one is an individual seeking to stop a troublesome habit, or a scientist seeking to improve an important public health outcome, consistent, reliable behavior change remains an elusive target.

For years, researchers, clinicians, and policy makers have sought to improve health outcomes by promoting behavior change—with sometimes discouraging results. In fact, *few interventions currently exist that produce reliable, long-lasting behavior change for large numbers of people.* Moreover, many promising inroads have not been extended across disciplines, and instead are discovered and applied in a “siloes” fashion, with limited cross-talk or collaboration among investigators. For example, researchers from disciplines including psychology, behavioral medicine, neuroscience, behavioral economics, etc., all work to better understand how to help people change their behavior so they can live healthier lives. Nevertheless, there is little consistency in how key constructs are defined and measured (Kolata, 2016). Furthermore, basic and applied researchers who target similar behaviors rarely work together, so their findings are not always mutually informative (Riley, 2017).

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Thus, key stakeholders are often isolated and slow to incorporate the successes of others, and to learn from others' mistakes. This balkanized landscape is challenging to navigate as a denizen, let alone as an outsider trying to extract or apply any "take-home" finding or message. Given this set of circumstances, we should be thoughtful in considering how to move forward. Poor health behaviors such as smoking, physical inactivity, and poor diet account for nearly 40% of the risk associated with preventable premature deaths in the United States (Yoon, Bastian, Anderson, Collins, & Jaffe, 2014), and criminal behaviors account for over \$70 billion in annual and federal corrections costs (Schmitt, Warner, & Gupta, 2010). All of these behaviors are resistant to change, and many more examples could be provided. So how should our disparate disciplines achieve the common goal of effecting tangible and reliable improvements in high risk behaviors? At the very least, we need a multidisciplinary research agenda that identifies *mechanisms* of behavior change, and a more inclusive, unified behavior change science that is rigorous and transparent.

The National Institutes of Health (NIH) Science Of Behavior Change initiative (SOBC; <https://commonfund.nih.gov/behaviorchange>)—supported by the NIH Common Fund (<https://commonfund.nih.gov/>)—is an explicit effort to address the stymied and siloed behavior change field. As described in this Special Issue, SOBC represents a fundamental change in the way that research on initiation, personalization, and maintenance of behavior change is being conducted and applied. In this editorial, we highlight key contributions of SOBC in these areas.

First, SOBC is integrative. Contributors are breaking down disciplinary boundaries and barriers across phases of the translational research pipeline to develop a unified science of behavior change. This approach differs from simple teams of investigators from different backgrounds who study the same topic, with each expert examining a distinct component (e.g., a geneticist studying underlying molecular processes, an economist conducting the cost-benefit analysis of an intervention, a behavioral medicine researcher investigating how to implement the intervention in a particular population). Instead, SOBC funds collaborative, integrative science in which members of interdisciplinary research teams (1) identify specific mechanisms of behavior change, (2) formulate interventions that alter identified mechanisms, and (3) apply appropriate intervention components in both specific and transdiagnostic populations. Thus, SOBC integrates basic science aimed at identifying mechanistic processes with applied intervention approaches, which are used to inform one another. SOBC Research Network teams profiled in this Special Issue (see also <https://scienceofbehaviorchange.org/>) provide exemplars of these interactive, interdisciplinary, and collaborative behavior change projects.

Second, SOBC researchers are harnessing common methods. As alluded to above, SOBC Research Network members are implementing an experimental medicine approach, focused on rigorous and systematic identification of mechanisms underlying successful behavior change. Moreover, SOBC is identifying mechanisms of behavior change across multiple levels of analysis. Since virtually all human behaviors are multiply determined and complex, no single level of analysis deserves primacy in our research. Thus, most SOBC Research Network projects described in this Special Issue evaluate mechanisms at several levels of analysis, including genes, neural circuits, physiological systems, environments, and behavior

itself. This approach aligns well with other NIH initiatives, such as the NIMH Research Domain Criteria (RDoC) (Kozak & Cuthbert, 2016; National Advisory Mental Health Council Workgroup on Tasks and Measures for Research Domain Criteria, 2016), and permits a comprehensive analysis of how these mechanisms relate to behavior change.

Third, all of these efforts are open and transparent with respect to research that is currently underway. Recently, concerns regarding reproducibility of science have percolated, with a number of failures to replicate seemingly important findings across many fields (Munafò et al., 2017). At SOBC, we place rigor, reproducibility, and transparency at the forefront of our science. Accordingly, all SOBC Research Network teams post details of their projects on the Open Science Framework (<https://osf.io/zp7b4/>), making their hypotheses, methods—and in some cases data—available to the public. Our hope is that commitment to transparency from study inception to conclusion will improve reproducibility of research.

In this Special Issue, we profile SOBC and introduce exciting work that is underway as part of the SOBC Research Network. Papers included in this issue describe the mission of the SOBC Research Network, and the work of teams that comprise it. Some manuscripts provide contextual frameworks for these efforts, with one paper offering a historical perspective on behalf of the NIH on how SOBC came to be supported by the NIH Common Fund, and another systematic review highlighting the extent to which mechanisms—a key component of the experimental medicine approach—have historically been measured in NIH-funded trials. An additional six papers describe study protocols for constituent projects, thereby demonstrating how the experimental medicine approach can be applied to questions of behavior change. Finally, one paper reports preliminary findings from this initiative. Together, these contributions demonstrate how systematic and rigorous methods that span basic and applied research can be implemented to inform how to help people live longer, healthier lives.

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