Systems thinking: a different window on the world of implementation and global exchange of behavioral medicine evidence

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THE CHALLENGE

Building solid and user-friendly bridges from the science of the developed world to the realities of low- to middle-income countries is a “wicked problem” [14]. Not only are there profound differences in culture and context but we also may need fundamental change in how we think about the very nature of our science and how we work to improve implementation and exchange. An essential first step is to identify the major issues and begin the process of creating a common language and logic [1–3]. This brief commentary is intended as a beginning point for that journey.

THREE FUNDAMENTAL ISSUES

Understanding the problem

How we think about the problem of implementation and exchange is changing. We see three generations of thinking: (1) linear models, (2) relationship models, and (3) systems models [1, 3]. While there is no one model that could serve every situation, the field would be well informed by the holistic, population-based, ecological approach that is systems thinking [10, 16, 17]. Key features of complex systems that need to be taken into account for translational implementation and exchange include: they are self-organizing and constantly adapting to change; they are driven by interactions between systems components and governed by feedback; and they are nonlinear and often unpredictable, with changes on one part of the system producing unexpected changes in other parts [7]. As a consequence of these features, such systems often are policy-resistant [6, 9, 15]. Two conceptual shifts are particularly important:

1. The increased importance of taking context seriously and figuring out what it means for translational behavioral medicine and some of our most cherished concepts like randomization and fidelity. A number of the papers in this special issue explore this issue.
2. Acceptance of alternative methods for deepening our understanding about knowledge creation,

Implications

Practice: Practitioners embedded within a local context hold key knowledge elements and are critical participants for research translation efforts.

Policy: Policies encouraging flexibility and local context will be critical for the success of research translation efforts. A key issue will be allocation of adequate resources to support the translation and implementation process.

Research: Suggestions are made for changes in the way researchers think about, and approach, the conduct and translation of research, including the embrace of systems thinking.

synthesis, and application processes in a global context.

Understanding and embracing context

The problem of creating bridges between developed and low- to middle-income countries brings the issue of context into stark relief. Attempting to translate behavioral medicine findings and evidence to a very different context or country requires one to adapt one's thinking, assumptions, and language. However, this is hardly very surprising when one considers the adaptation process that is required, even when translating programs to different settings or populations within the same country or culture. Elements which have been demonstrated to be important in this transfer process include:

- Building flexibility into the process of translating research findings so as to allow for contextual differences
- Translation of findings can best be accomplished by identifying key themes, goals, or areas of activity and then applying local knowledge in the development of strategies and implementation efforts. It is the local context that will have the largest impact on success or failure of the translation initiative.

- Recognize that the "other" context is not static but will change over time, and any translation effort must also take that change into account.
- With respect to the area of scientific translation, historical context can often be as important to understand as the current context.

The "right" players will often look very different when moving between contexts, so it is important to have the appropriate players and program champions involved in any translational efforts. Each of these elements is critical to keep in mind as a challenge to the concepts of generalizability, fidelity, and replicability that so often constrain our thinking in program adaptation and translation.

Reconceptualizing science

The need for more impact-oriented research, in addition to acknowledging the importance of context in implementation and exchange, has pushed the boundaries of traditional science to create a new model of science aimed at solutions [1]. This has been referred to as a shift from Modes I to II science [4]. Mode I science is investigator-driven, discovery-oriented research designed to contribute to a generalizable body of knowledge. In contrast, Mode II research is problem-based enquiry, solution-focused, and created with implementation and exchange in mind. Mode II research findings are co-created between researchers and decision-makers, and the co-creation of knowledge allows for greater consideration of contextual factors [8, 16]. The results from Mode II research are typically context-specific, with an emphasis placed more on external validity, as opposed to internal validity. Knowledge resulting from both models of science is necessary, but currently, there is not enough Mode II research being conducted to complement the excellent efforts and production of Mode I knowledge.

So how are we to approach the issue of generalizability and fidelity versus context-specific adaptation? How can we best make use of the formidable progress in developed countries using well-controlled Type I research to better meet the needs of low- to middle-income countries? We need significant investment to ensure research and evaluation methods and tools that take context into account. Strategies like Pawson's [12, 13] realist evaluation and Patton's [11] developmental evaluation hold some promise.

STRATEGIES FOR MOVING FORWARD

Let us start with a simple value stream proposition. Given strong evidence of effectiveness in other cultural and health system contexts, might a four-step process improve our results?

- **Synthesis.** Critically review and succinctly summarize the research-based knowledge
- **Problem clarification.** Work with local stakeholders who can bring context to the table to blend research knowledge with context knowledge and clarify the problem(s) to be addressed.
- **Action research.** Rely on applied, participatory research and evaluation methods to test ways of adapting the evidence base for local contexts [5].
- **Implement, evaluate, and continuously learn.** Develop and nurture a learning network of both local stakeholders and international experts to work in the continuous improvement cycle almost certainly needed to gradually refine policy and program strategies and achieve results.

Figure 1 provides a schema of the required steps. It highlights the need to focus on system readiness before beginning the implementation and exchange process itself (ensuring necessary leadership, putting resources in place, developing capacity for end users

Fig 1 | Schema of the required steps

to implement). The next step is to co-create a program or logic implementation model that effectively blends knowledge about critical intervention components with the deep local wisdom about how to get things done. Finally, and only then, is it time to develop the interventions, structures, and day-to-day relationships necessary to achieve the desired outcomes. In reality, all of these steps often occur simultaneously. However, it can help to think about them as a process by which each step affects the potential and outcomes of the others.

This process is not easy. Essentially, full implementation of a systems thinking approach calls for a very different approach to innovation development, evaluation, and transfer in the fields of behavioral medicine and public health. We need to reconsider the ways that researchers and program implementers in developed countries are supported. To illustrate, universities often must revisit issues around tenure and promotion, intellectual property, commercialization, performance incentives, and intersectoral collaboration—they are not called the ivory tower for nothing! Leaders in health service delivery also must change. The systems must embrace transformative rather than incremental change, the need to either find new funding or to divert patient care monies to support applied research and evaluation, the critical importance of sustainable funding and the need not to rely on time-limited projects to create fundamental change, and the almost overwhelming need to invest time, money, and human resources in the process of capacity development and change. Finally, our research colleagues and funders must adapt. Action research and the system thinking proposed here calls for a shift from reductionist to holistic paradigms, new funding mechanisms, acceptance of limitations to traditional research methods, and a strategic priority on multilevel, multisectoral and international interventions and research initiatives.

CONCLUSION

System thinking offers a fresh perspective on how to bridge research in higher income countries to low- and middle-income countries. While there is a wealth of tools and experience drawn from other disciplines, behavioral medicine is challenged to adapt and further develop methods and ways of

working that ensure productive global partnerships and effective methods for knowledge synthesis, exchange, and implementation. Research methods themselves need considerable further development as we learn what works for the translation process in varied complex systems.

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