

Getting from Analysis to Action: Framing Obesity Research, Policy and Practice with a Solution-Oriented Complex Systems Lens



COMMENTARY

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ABSTRACT

Public policy aimed at reducing obesity is just one of many avenues that must be pursued to address the still-growing obesity pandemic. The complexity of the problem is illustrated in ecological frameworks and system maps of the determinants. These conceptual maps illustrate the complexity by acknowledging the influence of many different factors such as social norms and values; sectors of influence such as the food and beverage industries, media and transportation; behavioural settings including home and family, school and community; and individual factors such as genetics, psychosocial and other personal elements. But to solve such a complex problem, we need to move from an analysis of the determinants or causes of the problem to a solution orientation; the frameworks used to describe the problem may not be the right ones for building the “best” solutions. Solution-oriented frameworks, like those presented by Hobbs and Seeman, have been based on parameters such as the sector of influence (e.g.,

public policy) but would benefit from the consideration of complexity and the leverage points for intervention in complex systems, which are a function of parameters such as the structure of relationships and the presence or absence of feedback loops.

OVER THE PAST decade or more, public and private concerns over the problem of obesity have grown considerably. Media reports, government strategies, meetings and academic publications abound. In some places, dialogue has paved the way to action. Still, in many jurisdictions or spheres of influence, the overwhelming nature of the challenge has led to paralysis and inaction. The articles by Hobbs and Seeman in this issue of *Healthcare Papers* illustrate the complexity of the challenge of addressing obesity, specifically in the area of public policy, and they offer frameworks to help us consider some of our options. Although their respective approaches do not appear to be rooted in complex systems science, many of their suggestions are consistent with a framework arising from this discipline. A complex systems framework has the potential to help us understand how our various options fit together and to provide some common language and guidance for actions within and across diverse sectors and among a large variety of actors.

Complexity and Obesity

The obesity problem is often thought of as a simple problem of energy imbalance, with calorie intake exceeding energy expenditure. While there are still many people who believe the solution to the problem is as simple as telling people to reverse this balance for themselves, research demonstrates that energy balance is affected by a wide range of factors, from individual genetic and psychosocial factors, to local, regional and national government policies, to the behaviours of our close personal friends (Christakis and Fowler 2007, 2008; Glass and McAtee 2006; Institute of Medicine 2005; Kumanyika 2001). In 2001,

Kumanyika proposed the “causal web” to help illustrate the wide range of ecological factors affecting energy expenditure and food intake in individuals. This was the first serious attempt to provide a comprehensive conceptual model of obesity. The causal web groups societal influences into separate “black boxes” (e.g., school food and activity, public safety, media programs and advertising) and sorts them based on their proximity to the individual.

In ecological frameworks, the factors known to influence obesity are illustrated in logical groupings and therefore suggest ways we might break down the problem of obesity into more manageable pieces within sectors like transportation, healthcare and agriculture. Although necessary to achieve an understanding of the factors at play in the system, these models oversimplify and de-emphasize the relationships between the factors. The relationships in the causal web model are hypothetical and unidirectional, with no consideration of feedback loops.

Although the articles by Hobbs and Seeman focus specifically on the arena of public policy, both authors make reference to the complexity of the challenge of addressing the obesity epidemic. Hobbs reiterates the ecological perspective in a model that simplifies further the relationships between individuals, biology, behaviour and the social and physical environments. Although she provides us with a simplified model, she acknowledges that the challenge goes beyond what an individual can cope with and suggests that the “fix will require a holistic, systems approach and global co-operation.”

More recently, the Foresight program of the UK Government Office for Science has tried to unpack some of the determinants

within the black boxes or spheres of influence from the ecological models and to illustrate the linkages between the many factors that influence food- and physical activity-related behaviour. This system map has 108 system variables and 304 causal linkages that span human physiology, physical activity patterns, human psychology and the food environment (Vandenbroeck et al. 2007). Often described as looking like a “plate of spaghetti,” this obesity system map shifts the conceptual model by placing emphasis on the connections and feedback loops rather than the individual variables or groups of variables. The map has been used by policy makers to generate and examine options for intervention.

Facing the Complexity of Obesity

The overwhelming nature of a complex problem such as obesity often leaves us with a sense of despair, a need to find someone to blame and a desire to retreat and give up. Many of us can probably relate to this on a personal level when it comes to achieving or maintaining a healthy body weight. The complexity of obesity can also be overwhelming to us in our roles as parents, government policy makers or private sector decision-makers. Parents struggle with a loss of control over their child’s food-related behaviours, and food industry leaders struggle with balancing the demands of shareholders, customers and public opinion.

Fortunately, the growing concern over obesity, especially childhood obesity, has helped us to galvanize our collective efforts and to begin to work across sectors. In Canada, obesity has become a focus for many governmental and non-governmental organizations. In 2002, the Canadian Institutes of Health Research (CIHR) Institute of Nutrition, Metabolism and Diabetes put forth a strategic plan focused solely on obesity and increased CIHR investments in

obesity research seven- to eightfold since its creation in 2000. Other organizations that have focused on obesity and chronic disease prevention include the Heart and Stroke Foundation of Canada, the Chronic Disease Prevention Alliance of Canada, the Canadian Obesity Network, many local and regional governments (e.g., Saskatoon Health Region’s *in motion*, ActNow BC) and private sector organizations (e.g., Kellogg Canada Inc. and Concerned Children’s Advertisers).

Robinson and Sirard (2005) also recognize the complexity of the challenge and argue that solutions rooted in the reductionist paradigm are not cost-effective for large complex problems. These authors suggest we need to shift from a “problem-oriented” to a “solution-oriented” paradigm. The problem-oriented approach is reductionist in nature in that it pushes us to understand the detailed mechanisms that cause disease; in contrast, a solution-oriented approach moves us toward more integrative methods and pushes us to understand the causes of improved health. This paradigm shift encourages research with a more immediate relevance to human health and a shortened cycle of discovery. Robinson and Sirard highlight the cost-effective nature of such an approach by suggesting that a “litmus test” be applied to proposed studies. They suggest that research should only be performed if (1) you know what you will conclude from each possible result (whether positive, negative or null); and (2) the result could change how you intervene to address a specific problem.

Hobbs makes reference to the complexity of the problem of obesity, but her approach to the solution does not appear to be rooted in complex systems science. Hobbs details the many challenges arising from the complexity of actors and their relationships such as a lack of coordination, conflicts of interest and a lack of accountability. Her approach to solu-

tions, however, is not novel and includes a call for leadership, strategic management and planning, fiscal leadership and government accountability. In contrast, Seeman not only recognizes the complexity of changing public policies relevant to obesity, he also suggests a framework built more generally for complex policy problems. His presentation of Satin's 10 principles of post-partisanship puts a focus on the relationships that need to be built across political divides. The principles are applicable within government but also between government and other sectors, and among actors within other sectors. The focus on relationships in these principles is appropriate given the complexity of relationships within and across sectors suggested by the Foresight program's system map.

Recently, some authors have suggested that not only do we need to recognize the complexity of the problem of obesity, we need a complex systems approach to solving the problem. Resnicow and Vaughan (2006) describe the chaotic nature of behaviour change. They suggest that key principles of chaos theory and complex dynamic systems are applicable to understanding health behaviour change and have implications for how we think about why interventions work and for whom. In a forthcoming paper, Hammond (In Press) suggests that a complex systems approach is needed to understand and combat the obesity epidemic. He helps us understand how concepts from complex systems science such as "diversity matters" and "tipping points" are highly relevant when considering the solutions to the complex social, economic and biological systems that give rise to a problem like obesity.

Interestingly, Hammond's complex systems orientation leads him to advocate for bottom-up approaches and the importance that small changes can have in a complex adaptive system. Resnicow and Vaughan also

suggest that small changes in knowledge, attitude and self-efficacy may dramatically alter motivation and behavioural outcomes. In contrast, both Seeman and Hobbs argue that small changes are not enough and advocate for visible public leadership. Complex systems science can help to explain why small changes may be adequate, but it also helps to explain how top-down approaches can affect the behaviour of complex systems. Tools like system dynamics modelling, network analysis and agent-based modelling, which, as Hammond suggests, are "well suited to the study of the rich and complex dynamics of obesity," may also assist in identifying which solutions have the greatest promise. Unfortunately, Hammond remains steeped in the problem-oriented paradigm by suggesting the need to understand the causal relationships giving rise to obesity. The real power of complex systems science will be realized when it is applied with a solution orientation.

Solutions to Complex Problems

Seeman introduces a useful set of principles that Satin applies to complex policy problems. These principles zero in on the relationships aspect of complex problems but do not provide a systematic or comprehensive approach to a complex problem. A decade ago, Meadows suggested that a systems view of problems can give us common places to consider for intervention (Meadows 1999). These "places to intervene in a system" are built up from considering a generic complex system with "stocks and flows" and feedback loops. The leverage points target aspects such as length of delays, information flows and feedback loops and are ordered based on their potential effectiveness. The more effective solutions target larger aspects of the system but are, in turn, much harder to act on. The Foresight obesity program identified 56 policy options from its system map, narrowed

them down to 17 representative policies for further analysis and then sorted them according to Meadows's places to intervene in a system (Vandenbroeck et al. 2007). Sorting by leverage points provides a useful way to focus on the levels of system intervention, so as not to be overwhelmed by the number of options available.

More recently, Bar-Yam (2005) introduced a framework built out of his experience solving complex problems in diverse areas such as education, war and healthcare. Rather than building his perspective out of the common aspects of problems, he has built it from his common understanding of the solutions. This might classify as a true solution-oriented framework for solving complex problems.

Distilled from his text are the following actions that need to be considered when trying to "make things work":

- Consider that individuals matter.
- Match capacity to complexity.
- Set functional goals and directions for improvement.
- Distribute decision, action and authority.
- Form co-operative teams.
- Create competition and feedback loops.
- Assess effectiveness.

With either the causal web diagram or the Foresight program system map in mind, it is easy to see how each of these approaches can be useful. From these conceptual models, it is clear that there are many factors that contribute to a growing prevalence of obesity in many populations; but for any given individual in a population, only a subset of these factors will be important, and the subset is likely to differ for each individual. As such, individuals matter, and solutions must consider that different approaches will likely be necessary for different individuals. For a system to function well, the capacity of individuals within

the system must match the complexity of the tasks they are to perform. Hobbs points out that the challenge of obesity goes beyond what most individuals can cope with, so the notion that we need to make the healthy choice the easy choice makes sense.

Both Seeman and Hobbs point to solutions that enable co-operative teams to build relationships across sectors, set functional goals and "support a bias for action." They both emphasize the need to work across political divides in a co-operative fashion. Seeman's suggestions that a diversity of opinion is necessary and that "compromise is not the only endgame" are akin to the notion that decision, action and authority need to be distributed. Although neither author makes much reference to the need for competition or feedback loops, the references to accountability and self-criticism suggest that evaluations of the effectiveness of policies and programs are also important.

The articles by Seeman and Hobbs add to the growing calls for solution-oriented approaches to the epidemic of obesity. With the added lens of complex systems science, these frameworks will provide a useful guide to the broad range of actors who need to be engaged in tackling this sometimes-overwhelming challenge.

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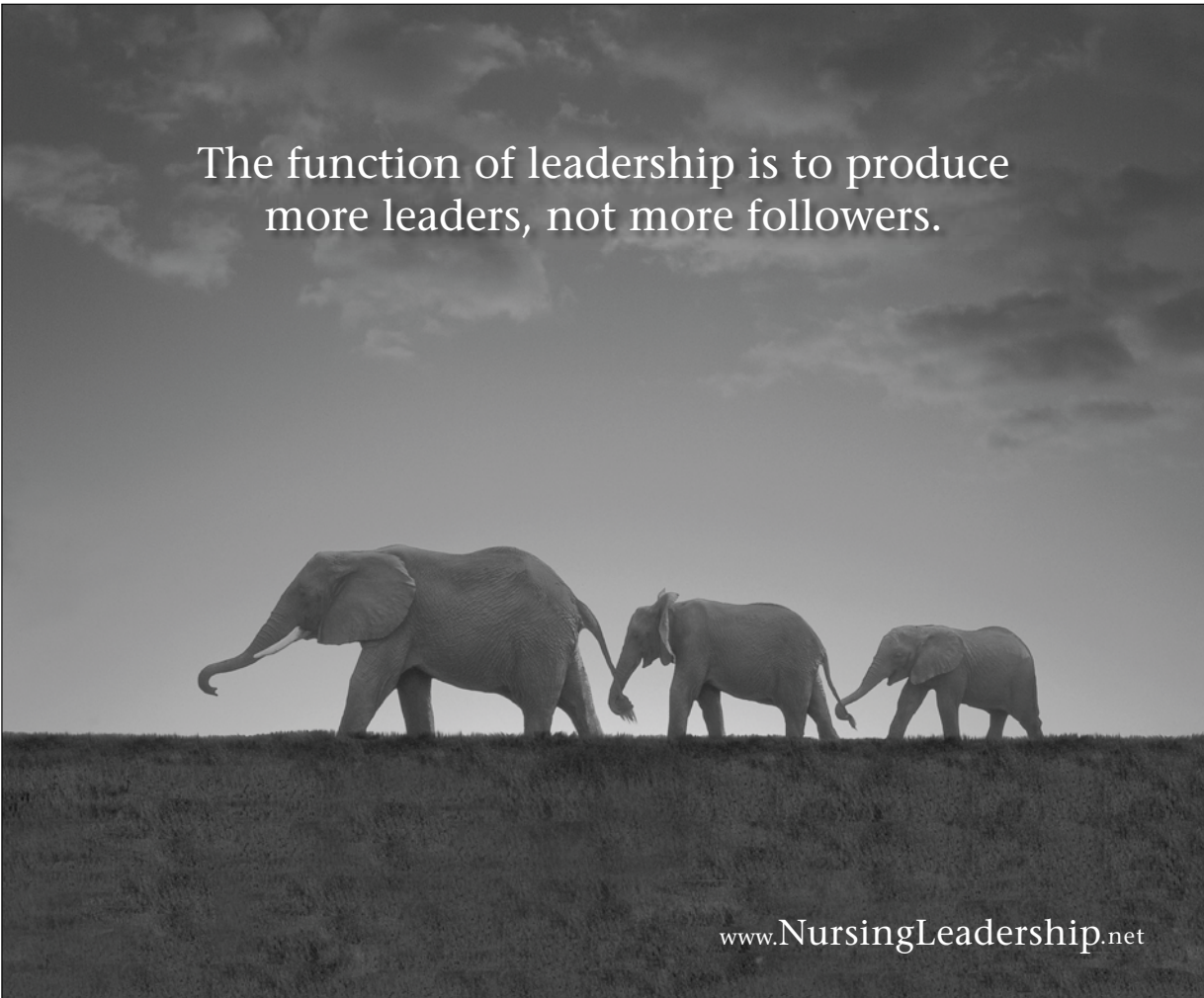
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