Use of System Dynamics Modeling to Explicate the Theory-of-Change of a Social Marketing Innovation

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Use of System Dynamics Modeling to Explicate the Theory-of-Change of a Social Marketing Innovation

by

Brian J. Birosacak

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy Department of Community and Family Health College of Public Health University of South Florida

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Abstract

Community coalitions are an important part of the public health milieu and thus subject to many of the same external pressures as public health organizations—including changes in required strategic orientation. Many funding agencies have shifted their funding agenda from program development to policy change. Thus, the Florida Prevention Research Center created the Community-Based Prevention Marketing for Policy Development framework to teach community coalitions how to apply social marketing to policy change. The dissertation research reported here was designed to explicate the framework’s theory-of-change. The research question was: “What are the linkages and connections between CBPM inputs, activities, immediate outcomes, intermediate outcomes, and ultimate impacts?” The author implemented a case study design, with the case being a normative community coalition. The study adhered to a well-developed series of steps for system dynamics modeling.

Results from model simulations show how gains in performance depend on a community coalition’s initial culture and initial efficiency, and that only the most efficient coalitions may see benefits in coalition performance from implementing Community-Based Prevention Marketing for Policy Development. Theoretical implications for social marketers—e.g., real-world example of how to work ‘upstream’—and system dynamics modelers—e.g., application of generic structures—are discussed. Practical implications for the framework’s developers—namely, the importance of managing the early expectations of framework adopters—are discussed as well.
Section 1. Introduction

Contemporary US society faces a vast array of social problems, many of which touch upon people’s health and well-being. Public health, which consists of organized efforts to improve conditions and the health of populations and communities (World Health Organization, 2013), encompasses many activities such as initiation of immunization programs and infectious disease control; ensuring food and drinking water quality; promoting family planning and reproductive health; and reducing deaths from chronic diseases including coronary heart disease, stroke, and cancer. Such activities are associated with the field of disease prevention and health promotion (Novick & Morrow, 2008) and typically are carried out by public sector organizations. However, community-based prevention efforts are also common, including those initiated by community coalitions; and as an important part of the public health milieu, community-based coalitions are subject to many of the same external pressures as public health organizations—including changing practices governed by scientific standards.

Foremost, effective health policies have a substantial impact on population health, making policy enactment one of the strategies recommended by the CDC for combating health problems at the population level (Faith, Fontaine, Baskin, & Allison, 2007; Frieden, Dietz, & Collins, 2010). For example, obesity prevention policies can change the environment to make healthy eating and physical activity more accessible and commonplace. Because policies can have long-lasting impact without the need for recurring funds (Mello, Studdert, & Brennan, 2006), many funding agencies (e.g., the Robert Wood Johnson Foundation) have shifted their funding agenda from program development to policy change (Ottoson et al., 2009). In part, this
reflects the realization that environmental and policy changes have the potential to be sustained longer and impact larger segments of the population than health programs targeting individual behavior change (Brownson, Haire-Joshu, & Luke, 2006); and community coalitions are a common vehicle through which policy interventions are implemented (Kegler & Swan, 2012; Reed, Miller, & Francisco, 2013).

Despite the (re)surgence of interest in policy implementation, community-based coalitions have had mixed success in effecting state and local health policy changes (F. D. Butterfoss, Goodman, & Wandersman, 1993; Hallfors, Cho, Livert, & Kadushin, 2002; Wandersman & Florin, 2003). In part, these results reflect the lack of a systematic framework to help them select and tailor evidence-based policies and advocate for adoption at the state and local level. Coalitions rarely have formal training in identifying and selecting evidence-based policies, tailoring them for local need, and promoting them (Snell-Johns, Imm, Wandersman, & Claypoole, 2003). As a result, policy analysis appears too daunting and time-consuming for many community-based coalitions to attempt. Moreover, even when actively involved in policy development, few coalitions have been successful in monitoring policy implementation, evaluating impact, and disseminating results in a way that enriches the evidence base needed to accelerate the translation from research to policy and practice (Brownson, Seiler, & Eyler, 2010).

To meet community coalitions’ need for a systematic planning framework with which to translate evidence-based policies into practice, the Florida Prevention Research Center at the University of South Florida developed Community-Based Prevention Marketing for Policy Development: an eight-step framework that teaches community coalitions how to apply social marketing to policy development (Carol A. Bryant et al., 2014). Again, due to concerns about how to sustain disease prevention and health promotion programs long enough for population
health improvements to be realized after initial funding decreases or disappears entirely, there has been renewed interest in policy development, which is believed to have greater (and longer lasting) impact than programs aimed only at individual behavior change. Although this framework has been tested with policies related to childhood obesity prevention, it does so for demonstration purposes only; the framework and training materials have been designed to assist coalitions working with a wide range of public health issues. Similarly, the dissertation research reported here was designed to explicate the framework’s theory-of-change, regardless of the public health issue for which the framework is being applied.

Statement of the Problem

The dissertation research reported here is part of the broader agenda of the Florida Prevention Research Center (FPRC) at the University of South Florida—developers of Community-Based Prevention Marketing for Policy Development (CBPM). The FPRC is one of 37 Prevention Research Centers (PRCs) nationwide. PRCs form a network of academic, community, and public health partners funded by the Centers for Disease Control and Prevention (CDC) that conduct applied public health research (Centers for Disease Control and Prevention, 2013). The FPRC’s mission is: “To develop, implement and evaluate evidence-based approaches to strengthen community capacity for sustained disease prevention and health promotion” (USF Health, 2013).

The FPRC is in the final year of its current funding period (2010–2014). For the next round of CDC funding (2015–2019), the FPRC has project-period goals in a number of domains, including ‘Evaluation.’ Project Period Goal 1 regarding ‘Evaluation’ is: “FPRC activities increase translation of research into practice to facilitate widespread use of evidence-based
programs and policies that enable changes to environmental systems.” The first project-period objective to be achieved in support of this goal is: “To complete developmental evaluation of FPRC’s CBPM for Policy Change framework by 09/29/2015.”

The aforementioned FPRC objective for Fiscal Year 2015 calls for testing the CBPM framework’s theory-of-change. Thus, the dissertation research reported here was designed to address the problem of how to explicate the framework’s theory-of-change so that it can be tested in practice. Deciphering the theory of change is also a precursor to summative evaluation (Patton, 2012). If CBPM is subsequently deemed ready for summative evaluation, found to have merit, and adopted by community coalitions, this project will have contributed to improved practice on the part of community coalitions.

Moreover, the field of social marketing will have an example of how to use its principles and techniques to work ‘upstream’ for social change. This dissertation challenges and seeks to shift current paradigms by moving beyond traditional approaches to social marketing. The primary knowledge gap that exists regarding an ‘upstream’ approach to social marketing concerns: “How to do it?” The dissertation research reported here is innovative in that it explicates the theory of change of an actual, ‘upstream’ social marketing initiative. Additionally, this project introduces social marketers to system dynamics modeling—a computer-aided approach to analysis and design that applies to dynamic phenomena arising in complex social, managerial, and ecological systems.
Nature of the Study

What follows is a brief description of the nature of this dissertation project. The dissertation is presented in the manuscript-style format, which has four sections: Section 1. Introduction; Section 2. First Manuscript; Section 3. Second Manuscript; and Section 4. Conclusions and Recommendations. Each manuscript follows the specific journal’s guidelines, and includes sections pertaining to an introduction, description of methods, presentation of findings, and discussion of implications. Although the dissertation is presented as two separate manuscripts, they are phases of one coherent study.

The present study was emergent; however, the dissertation proposal itself followed a linked, deductive sequence of presentation as laid out in Krathwohl and Smith (2005). Links to Previous Research. This dissertation links back to what is known about taking an ‘upstream’ approach to social marketing. The dissertation also touches upon the empirical evidence regarding the leading framework for the depiction of factors that affect community-coalition structures, processes, and outcomes: Community Coalition Action Theory (CCAT). Explanation, Rationale, Theory, or Point of View. Lack of evidence regarding how to take an ‘upstream’ approach to social marketing provided a supporting rationale for doing the study. In keeping with the manuscript-style dissertation guidelines, the appendices contain a comprehensive review of the literature regarding the evidence-based practice movement. Questions, Hypotheses, Models. With little published evidence regarding the topic of study, it was appropriate to pose a research question (vs. a hypothesis or model) describing the initial focus of attention for the study: “What are the linkages and connections between CBPM inputs, activities, immediate outcomes, intermediate outcomes, and ultimate impacts?”
This question formed the basis for the design of the study, the next link in the deductive sequence (Krathwohl & Smith, 2005). Beginning with a research question led to an emergent study—in this instance, a case study design. The author implemented a single-case design, with the case being a normative community coalition—i.e., relating to an ideal standard for CBPM usage. Procedures. The participants selected for the study included CBPM’s developers as well as coalition members in Lexington, KY involved with development of the framework.

Though emergent, the study adhered to a well-developed series of steps for system dynamics modeling (J. Sterman, 2000): (1) FPRC participants were engaged in group exercises to identify key variables, time horizons, and reference modes pertaining to CBPM dynamics; (2) the author then used extant data (e.g., coalition meeting transcripts) to develop causal diagrams of the feedback processes hypothesized to be responsible for the dynamics, and the dynamic hypothesis was revised with input from CBPM’s developers; (3) the causal diagram was then converted into a quantitative, computer simulation model in Vensim® PRO software; and (4) the simulation model was then validated using a variety of standard tests (e.g., comparison of model behavior to reference modes).

What is typically the fifth and final step of the modeling process, “Policy design and implementation” (J. Sterman, 2000), is beyond the scope of this dissertation. However, implications for this step are incorporated into the final section of the dissertation: Section 4. Conclusions and Recommendations. These conclusions will lead in turn to continuing the chain-of-reasoning (Krathwohl & Smith, 2005) as the findings will be built on during Fiscal Year 2015, when the FPRC plans to test the normative theory-of-change developed here by prospectively comparing it to the way that CBPM dynamics actually unfold in practice.
Theoretical Framework

In setting up the theoretical viewpoint that guided the dissertation, the above section included multiple references to the concept of ‘evidence.’ In the public health realm, Brownson, Fielding, and Maylahn (2009) have characterized evidence as “some form of data—including epidemiologic (quantitative) data, results of program or policy evaluations, and qualitative data—for uses in making judgments or decisions” (p. 177). A widely held assumption is that public health practice based on scientific evidence has a better chance of producing positive results than practice that is not evidence based.

Thus, a term that has received increasing attention in public health circles is ‘the research-practice gap.’ Stated simply, commentaries and empirical reports written about closing the research-practice gap refer to efforts to get the best evidence of what works for bringing about desired changes implemented in practice (e.g., Bero, et al., 1998; Green, Glasgow, Atkins, & Stange, 2009; Wandersman, et al., 2008). Regarding this gap, it is not as though the cupboards are bare in terms of efficacious public health interventions (Kreuter & Bernhardt, 2009; Thacker, et al., 2005). A number of stakeholders have lamented, however, that too often—positive findings from the testing of public health interventions do not make their way into disease prevention and health promotion practice (e.g., Carroll et al., 2007; Department of Health and Human Services, 2009).

The very nature of most public health interventions involves social and behavioral change, as noted by Barreto (2005): “The great majority of potential public health interventions whether behavioural, environmental, or social that could have a modifying effect on the population health…are outside of the sphere of biomedicine” (p. 345). Accordingly, the social and behavioral sciences are front and center in discussions about how to close the research-
practice gap. Ardent supporters of evidence-based practice tend to subscribe to a research-to-practice model—patterned after the approach to problem solving seen to dominate biomedical interventions (e.g., highly linear and predicated on wide applicability) (Green, 2008; Livingood et al., 2011; Ogilvie, Craig, Griffin, Macintyre, & Wareham, 2009)—as a way to close the research-practice gap. Others in public health have called for a research-to-practice model but one that is more sensitive to the complexity of community and public health practice settings—a viewpoint categorized here under the heading of practice-based evidence (e.g., Green, 2008; Green, Glasgow, et al., 2009).

While some might perceive the distinction as a dichotomous argument regarding the merits of evidence-based practice versus practice-based evidence, the two stances are not diametrically opposed. However, this section of the dissertation is not exclusively about the role of evidence in disease prevention and health promotion—it is about a much more fundamental concern. This dissertation reflects the possibility that many funding agencies, researchers, and practitioners do not understand the fundamental nature of the problems they try to address. For example, within the context of health care reform, Raisio (2009) has observed that “the planners of health care reforms do not always see the true form of the problems they are trying to solve. They do not take complexity sufficiently into consideration” (p. 478). Raisio continued: “planners mostly saw that the problems were very complex, but even then the solutions were only like solutions for tame problems” (Raisio, 2009, p. 491).

The next subsection contrasts one theoretical viewpoint (“the ecological perspective”) commonly used in public health for analyzing complex phenomena—e.g., community-coalition structures, processes, and outcomes—with one that is better suited for the task at hand (“the
systems perspective”). As noted above, a more comprehensive literature review is provided in Appendix A.

**The ecological perspective.** One approach to public health intervention research for what have been called “wicked problems” (H. Rittel, 1972; H. W. J. Rittel & Webber, 1973) is broadly referred to as the ecological perspective. Nearly 25 years ago, McLeroy, Bibeau, Steckler, and Glanz (1988) published what has since become a seminal piece of literature on disease prevention and health promotion (cited over 1,100 times according to Web of Science SM). Just as the language we use for addressing problems makes a difference—e.g., “solving” versus “managing” problems—McLeroy and colleagues cautioned that the lingo and frameworks of the time may have inadvertently served to “focus attention on changing individuals, rather than changing the social and physical environment which serves to maintain and reinforce unhealthy behaviors” (p. 353). Consequently, the authors proposed an ecological model for health promotion by positing that patterned behavior is determined by five different levels of factors: intrapersonal factors (p. 356), interpersonal processes (pp. 356-359), organizational factors (pp. 359-362), community factors (pp. 362-365), and public policies (pp. 365-366).

While acknowledging the work of McLeroy et al. (1988) as part of an emerging ecological perspective in health promotion research, Stokols (1992) sought to go one step further in noting that “the delineation of specific environmental leverage points for health promotion at each level of analysis remains an important task…the emphasis here is on developing a more environmentally explicit version of the ecological approach to health promotion” (p. 7). In the process, Stokols tabulated personal and environmental factors in health and illness under the
rubrics of biopsychobehavioral factors (biogenetic, psychological, behavioral) and sociophysical environmental factors (geographic, architectural and technological, sociocultural).

Another distinction between the work of McLeroy et al. (1988) and Stokols (1992) is the latter’s explicit references to social ecology. Whereas McLeroy et al. expressed an ecological viewpoint on health promotion, Stokols approached the subject from a social-ecological perspective. In noting the distinction, Stokols explained: “The field of social ecology gives greater attention to the social, institutional, and cultural contexts of people-environment relations than did earlier versions of human ecology” (p. 7). Stokols et al. (1992; 1996) articulated the social-ecological perspective’s core assumptions about the dynamic interrelations between people and their environments, along with noting the viewpoint’s inclusion of a variety of concepts derived from systems theory—e.g., “interdependence,” “homeostasis,” and “negative feedback” (more on systems theory below).

Writing within the same special issue of the American Journal of Health Promotion as Stokols (1996) were Green, Richard, and Potvin (1996), who reviewed the implications of ecological and systems theories for the development of health promotion programs. Like Stokols, the authors noted the importance of the systems concept of “interdependence.” In a commentary one decade later, Green (2006) himself wrote: “Public health asks of systems science…that it help us unravel the complexity of causal forces in our varied populations and the ecologically layered community and societal circumstances of public health practice” (p. 406).

Thus, although McLeroy et al. (1988) make multiple references to the term “system,” it appears to be used only in a general sense of the word. This point serves here to distinguish between two overlapping areas of ecological thinking in the disease prevention and health promotion literature over the past several decades—i.e., authors who do or do not invoke
concepts from systems theory. For example, Maibach, Abroms, and Marosits (2007) proposed a framework based on contemporary ecological models of health to describe how the disciplines of communication and marketing could be used to advance public health objectives. However, by privileging modern ecological models of health, the authors—along with many others (e.g., D. A. Cohen, Scribner, & Farley, 2000; Ockene et al., 2007; Sallis et al., 2006)—emphasized the idea of multilevel determinants of patterned behavior to the exclusion of other concepts from systems theory. Hawe, Shiell, and Riley (2009) may have best summarized the distinction in perspectives as follows:

It is hard these days to find a health promotion program that does not claim to take an ecological approach. But for the most part ecological is simply taken to mean that the intervention has multiple strategies directed at multiple levels…Other than the idea that ‘the more levels, the better the effect’, there is little theory put forward about how these levels impact the unfolding of the intervention or how they affect intervention outcomes. (p. 269)

Hence, it can be argued that the criticisms of an ecological perspective put forth by abovementioned authors are generally directed toward viewpoints that equate “multilevel” with “ecological.” Such viewpoints tend not to be rooted in general systems theory. As early as a decade and a half ago, Green (1996) put forward some potential limitations of an ecological view in health promotion, including the potential for practitioner despair over whether one could ever do enough to make a difference in a world of such complexity; possible practitioner frustration regarding the acknowledgment that the ecosystem in which one might intervene is itself just a
subsystem of a larger system; and, concerning the “slice” of a system in which a practitioner might ultimately decide to intervene, the dynamic nature of ecosystems renders the chosen slice a “time-dependent set of observations” (p. 273).

Of course, even if one acknowledges the above, the complex phenomenon of interest remains—i.e., a ‘wicked problem’ does not go away simply because it induces frustration and anxiety on the part of those charged with its management. More fundamentally, Livingood et al. (2011) have noted: “Although the ecologic model acknowledges multiple levels and dimensions of social determinants, it offers limited guidance on the dynamic interactions of these factors and on the unique elements of settings, all of which create unpredictability” (p. 526). Or to put matters in the context of what is arguably the most heavily-publicized issue within public health today:

In sum, the obesity epidemic is a particularly challenging problem because it results from a system containing a diverse set of actors, at many different levels of scale, with differing individual motivations and priorities. This system has many moving parts and operative pathways, which interact to produce rich variation in outcomes that cannot be reduced to a single mechanism. Taken together, these features are classic characteristics of a complex adaptive system (CAS). (Hammond, 2009, p. 2)

The systems perspective. Another approach to public health intervention research in a world of ‘wicked problems’ is generally referred to as the systems perspective. An accessible definition of a system is “a set of things—people, cells, molecules, or whatever—interconnected in such a way that they produce their own pattern of behavior over time” (Meadows, 2008).
Whereas “systems thinking” and “systems science” have become popular terms (Forrester, 2007a), they are both rather nonspecific and have been used to cover a variety of brands from the systems perspective (e.g., social network analysis, agent-based modeling, and system dynamics modeling) (Mabry, Olster, Morgan, & Abrams, 2008). Hawe, Shiell, and Riley (2009) have stated that in contrast to viewpoints that equate multilevel with ecological (see previous section), a “dynamic, ecological-systems perspective stresses the importance, among other things, of linkages, relationships, feedback loops and interactions among the system’s parts” (p. 269).

A full discussion of the entire systems perspective is beyond the scope of this dissertation. Thus, the focus here is on a particular thread of feedback thought, what Richardson (1999) has labeled the servomechanism thread, that spawned the primary methodology of the dissertation research reported here: system dynamics modeling.

Feedback thought. According to Richardson (1999), “there is a unifying loop concept underlying a number of superficially diverse ideas in the social sciences…Underlying all these representations…is the concept of a closed loop of causal influences” (p. 5). The ubiquity of feedback control was strongly suggested by Forrester (1958), the founder of system dynamics: “Systems of information feedback control are fundamental to all life and human endeavor…A feedback control system exists whenever the environment causes a decision which in turn affects the original environment” (p. 39).

In line with Richardson (1999), visual aids are used here to give meaning to the loop concept underlying feedback thought. In Figure 1, an arrow drawn from $X$—e.g., “Preference for RCTs (randomized controlled trials) in public health research”—to $Y$—e.g., “Prevalence of research questions answerable by RCTs”—is taken to mean that $X$ causally influences $Y$. At the
center of the loop is a symbol which designates the polarity of the loop. According to Richardson (1999), “It is the concept of polarity that gives the causal loop its perceived analytic and explanatory power” (p. 5). The polarity of a feedback loop reflects the loop’s tendency either to reinforce (“R” for reinforcing; Figure 1) or to counteract (“B” for balancing) a change in any one of its elements.

In Figure 1, the loop depicts a self-reinforcing process in which preference for a particular study design feeds on its own partiality. An increase in preference for RCTs in public health, traced around the loop, tends to increase formulation of research questions answerable only by RCTs, which increases the proportion of the public health evidence base comprised of RCTs, which in turn tends to increase preference for an individual-level focus in disease prevention and health promotion (i.e., the result of an evidence base rooted in RCTs), providing additional support for the preference for RCTs in public health research.

Figure 1. Example of a positive (reinforcing) feedback loop
In addition to positive or reinforcing loops (Figure 1), there are also negative or balancing loops (Figure 2). Most readers are probably familiar with the term “homeostasis” from their high school biology coursework. According to Richardson (1999), “To some in the social sciences, the feedback concept became identified, virtually synonymous, with homeostasis” (p. 48). In a negative or balancing loop such as with homeostatic processes (e.g., blood pressure dynamics), an increase in $X$ feeds around the loop and tends to cause $X$ to slow or reverse its increase; likewise a decrease in $X$ tends to cause $X$ to slow or reverse its decrease.

Figure 2 depicts a balancing process in which the discrepancy between actual and desired levels of implementation of evidence-based practices (EBPs) leads to action (e.g., federal mandates regarding implementation of certain EBPs) intended to bring the system in line with a desired state. Figure 2 is a normative depiction of what ought to be, for example, according to the strong form of the evidence-based practice thesis. An increase in implementation discrepancy,
traced around the loop, tends to increase action (e.g., federal training on implementation of EBPs), which increases actual levels of implementation, which in turn reduces the discrepancy (or gap) between current and desired levels.

According to Richardson’s (1999) historiography of feedback thought in systems theory, two lines of feedback thinking emerged between the mid-1940s and ‘50s. One line focused on the role of feedback loops in dynamic behavior—i.e., the servomechanisms thread—and the other on the role of feedback in communication and control of society—labeled the cybernetics thread. There are many definitions of cybernetics. The American Society for Cybernetics (n.d.) states that “Cybernetics takes as its domain the design or discovery and application of principles of regulation and communication.” Richardson summarized a number of tendencies of the beginnings of the cybernetics thread, notably that the use of the feedback concept was predominantly limited to loops of negative (balancing) polarity.

This tendency of the cybernetics thread was one feature that distinguished it from the servomechanisms thread. A contemporary definition of a servomechanism is “An automatic feedback control system for mechanical motion; it applies only to those systems in which the controlled quantity or output is mechanical position or one of its derivatives” (Engineering Dictionary, 2012). Richardson (1999) traced the works of a number of early authors through which the mathematics of servomechanisms entered the social sciences and systems theory. According to Richardson, “these authors are linked and distinguished significantly in the way they made use of the feedback concept...they focused on the role of feedback in creating the patterns of movement in dynamic systems” (p. 159). The story is continued below with the efforts of the founder of system dynamics modeling—Jay W. Forrester—who participated in the early development of servomechanisms for the control of military applications.
System dynamics modeling. According to the System Dynamics Society’s website, “System dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems -- literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality” (System Dynamics Society, 2011) The first system dynamics writing can be found in Forrester’s 1958 article, “Industrial dynamics—a major breakthrough for decision makers” (Forrester, 1958). Forrester came to the Massachusetts Institute of Technology (MIT) in 1939 and participated in the early development of servomechanisms for the control of military applications (e.g., radar antennas and gun mounts). He transferred to the MIT School of Industrial Management (later renamed the Sloan School of Management) in 1956 and started the development of system dynamics. Forrester (2007a) explains how just prior to “Industrial dynamics” he found himself in conversation with people from General Electric® about why their household appliance factories experienced fluctuations in work shifts:

After talking with them about how they made hiring and inventory decisions, I started to do some simulation…It became evident that there was potential for an oscillatory or unstable system whose behavior was entirely internally determined…That first inventory-control system with pencil and paper simulation was the beginning of the system dynamics field. (p. 347)
In the above passage, we see hints of what Richardson (1999, 2011) has referred to as the system dynamicist’s “endogenous point of view.” Forrester (1968) came to express the composition of the system dynamics approach as a four-tiered structural hierarchy:

- Closed boundary around the system
  - Feedback loops as the basic structural elements within the boundary
    - Level (state) variables representing accumulations within the feedback loops
    - Rate (flow) variables representing activity within the feedback loops
    - Goal
    - Observed condition
    - Detection of discrepancy
    - Action based on discrepancy

Richardson (1999, 2011) states that the first item on the list signals Forrester’s endogenous point of view—a view enabled and given structure by feedback loops. Richardson (1999) has characterized the endogenous point of view as one that “looks inside a complex system for the causes of its own significant behavior patterns. It can be contrasted to an exogenous point of view, in which problems are seen to be caused by forces external to the system” (pp. 15-16). According to Richardson (2011), “feedback loops are really a consequence of the endogenous point of view” (p. 221); and the endogenous view instructs us “to build models that are capable of deriving the dynamic behavior of interest solely from variables and interactions within some appropriately chosen system boundary” (p. 220). This perspective should not be misconstrued as
equivalent to that of a closed system in general systems theory; instead, Forrester’s concept represents “a system that is not ‘materially closed,’ but rather ‘causally closed’—the closed boundary separates the dynamically significant inner workings of the system from the dynamically insignificant external environment” (Richardson, 1999, p. 297).

Summary

In summary, one approach for gaining a better understanding of the determinants of public health problems prior to intervening is to use an ecological perspective. For the most part, however, disease prevention and health promotion initiatives based on an ecological approach tend to amount to little more than multiple strategies directed at multiple levels. There now seems to be sufficient recognition that public health interventions are actually attempted within complex systems (Hunter, 2009; Milne & Law, 2009). Thus, another strategy for helping us manage ‘wicked problems’ through an improved understanding of their dynamics is offered by the systems perspective—in particular, system dynamics modeling.

System dynamics practice can be characterized principally as the use of “systems thinking, management insights, and computer simulation to

- hypothesize, test, and refine endogenous explanations of system change, and
- use those explanations to guide policy and decision making” (Richardson, 2011, p. 241).

The reader can interpret system dynamicists’ use of the term “policy” broadly to encompass courses of action at various system levels—e.g., organizational, institutional, municipality, and so on.
Coincidentally, one or more of the above levels might be targeted by a community coalition that adopts and implements the CBPM framework which, again, seeks to provide community coalitions with a social marketing-driven planning framework and toolkit for policy development (Carol A. Bryant et al., 2014). The dissertation research reported here was designed to use system dynamics modeling to explicate the CBPM framework’s theory-of-change, so that subsequently this theory can be tested in practice as a precursor to summative evaluation. The research question is: “What are the linkages and connections between CBPM inputs, activities, immediate outcomes, intermediate outcomes, and ultimate impacts?” The dissertation aims are as follow:

Aim 1. To identify key CBPM variables and characterize their behavior over an appropriate time horizon
Aim 2. To formulate a dynamic hypothesis that accounts for the behavior of key CBPM variables
Aim 3. To formulate a computer simulation model to test the dynamic hypothesis
Aim 4. To validate the computer simulation model

The dissertation is presented in the manuscript-style format. Aims 1–2 will be addressed in the first manuscript of the dissertation, and Aims 3–4 will be covered in the second manuscript. In the first manuscript, this case study of the CBPM framework is framed as an illustration of developmental evaluation and systems thinking. It will be submitted to Social Marketing Quarterly. The reason for this selection is that Social Marketing Quarterly is more practitioner-oriented—which fits with the theme of the first manuscript—whereas Journal of
Social Marketing is oriented more towards academics. The second manuscript is placed within the context of ‘upstream’ social marketing, of which CBPM is an example, and computer simulation modeling.

Each manuscript follows the specific manuscript guidelines, and includes sections pertaining to an introduction, description of methods, presentation of findings, and discussion of implications. Although the dissertation is presented as two separate manuscripts, they are phases of one coherent study.
Section 2. Applying Systems Science to Evaluate a Community-Based Social Marketing Innovation: A Case Study

The first manuscript will be submitted to Social Marketing Quarterly. The working title is: “Applying Systems Science to Evaluate a Community-Based Social Marketing Innovation: A Case Study.”

Introduction

In 2002, social marketing consultant, teacher, and author Alan Andreasen wrote a thought-provoking article entitled, “Marketing Social Marketing in the Social Change Marketplace” (Andreasen, 2002). In it he argued that due to several barriers, which were in part problems of perception, social marketing was in danger of not realizing its full potential. Andreasen continued: “The barriers are also the result of the absence of a clear understanding of what the field is and what its role should be in relation to other approaches to social change” (p. 3).

Although it may not have been Andreasen’s (2002) original intention, what is perhaps best remembered from his article are the six benchmarks put forward as a means “for identifying an approach that could be legitimately called social marketing” (p. 7). The benchmarks (paraphrased) were the following: (1) behavior-change focus; (2) customer orientation; (3) audience segmentation; (4) exchange facilitation; (5) marketing mix; and (6) competitive frame of reference. To this set, the National Social Marketing Centre (2010) has added (paraphrased): (7) theory based and (8) customer-insight driven.
On the surface, there appears to be a glaring omission from both sets. There is no benchmark solely devoted to evaluation. However, if one examines the source documents, it can be found. For example, as stated in Andreasen’s (2002) first benchmark: “1. Behavior-change is the benchmark used to design and evaluate [italics added] interventions” (p. 7). From the National Social Marketing Centre (2010) document: “Other factors, such as strategic planning, partnerships, stakeholder engagement and monitoring and evaluation [italics added], are also important” (p. 1).

Thus, even though it has not been accorded its own benchmark, ‘evaluation’ is clearly an important element of social marketing practice (Andreasen, 1995; Hastings, 2007; Kotler & Lee, 2008; Siegel & Lotenberg, 2007). However, there are many different types of evaluation. For example, evaluation thought leader Michael Quinn Patton (2012) has tabulated over 70 alternative ways of focusing evaluations. This article reports the findings of a case study of a community-based social marketing innovation, in order to introduce readers to a hybrid approach to evaluation that applies complexity concepts: utilization-focused developmental evaluation.

Background and Literature

As noted above, there are multiple evaluation approaches, with some more appropriate for given situations than others. The American Evaluation Association (n.d.) has adopted a set of program evaluation standards. There are standards for accountability that “encourage adequate documentations of evaluations and a meta-evaluative perspective”; accuracy standards that are “intended to increase the dependability and truthfulness of evaluation representations, propositions, and findings”; propriety standards that are meant to “support what is proper, fair,
legal, right and just in evaluations”; and feasibility standards “intended to increase evaluation effectiveness and efficiency”.

Listed first among the standards is utility: “The utility standards are intended to increase the extent to which program stakeholders find evaluation processes and products valuable in meeting their needs” (American Evaluation Association, n.d.). As Patton (2012) has observed, “producing an evaluation report is not the purpose of evaluation. Evaluation is not an end in itself. The purpose is to inform thought and action” (p. 4). This quote is exemplified by the evaluation approach termed utilization-focused evaluation, which served as the guiding framework for the case study reported here.

Utilization-focused evaluation. Utilization-focused evaluation (U-FE) emerged from the observation that “much of what has passed for program evaluation has not been very useful” (Patton, 2012, p. xx). U-FE occurs as a series of 17 steps that is not neatly linear and sequential. U-FE prioritizes on ‘intended use by intended users,’ and is highly personal and situation dependent. Thus, the importance of context for the evaluation of social innovations becomes clear.

In fact, one of the early U-FE steps (Step 4) entails a situation analysis conducted jointly with primary intended users of the evaluation findings. In program evaluation, situation recognition involves “matching an approach or intervention to the nature of the situation” (Patton, 2011, p. 84). There is a subtype of U-FE that is particularly appropriate for situations characterized by complexity. First, though, it is necessary to look at the implications of distinguishing simple, complicated, and complex situations for evaluating social marketing innovations (Westley, Zimmerman, & Patton, 2006).
Figure 3 is meant as a heuristic to facilitate situation recognition (adapted from Patton, 2011, p. 90). Simple situations are those in which there is near certainty as well as agreement about what to do in a given situation (e.g., how to bake a cake). Technically complicated situations are those in which technical knowledge and expertise are needed to solve complicated problems (e.g., sending a rocket to the moon). Socially complicated situations involve many different stakeholders with differing perspectives and values (e.g., abortion).

Figure 3. Situation recognition heuristic (Adapted from: Developmental evaluation: Applying complexity concepts to enhance innovation and use, Patton, M.Q. ©2011. Copyright Guilford Press. Reprinted with permission of The Guilford Press)
Complex situations are characterized by both high uncertainty and high social conflict. For example, a social marketer charged with developing an initiative to alter the built environment in order to increase residents’ levels of outdoor physical activity would find themselves operating in the zone of complexity (Figure 3). Complex situations such as these are ripe for a subtype of U-FE known as developmental evaluation.

Developmental evaluation. By selecting a situation-appropriate evaluation approach that is congruent with the nature of a program intervention, the likelihood of utility is increased (Patton, 2012). Developmental evaluation is especially appropriate for “situations with a high degree of uncertainty and unpredictability” (Patton, 2012, p. 257). Beyond informing program improvements, developmental evaluation supports intervention ‘development’ to guide innovators in adapting to emergent and dynamic realities in complex environments (Patton, 2011).

In situations that most closely resemble the ‘complex’—e.g., community-based social marketing initiatives—the top-down approach to social change is inappropriate. The top-down approach is epitomized by the dissemination of best practices, also known as ‘evidence-based practice’ (e.g., Bero et al., 1998; Green, Glasgow, Atkins, & Stange, 2009; Patton, 2011; Wandersman et al., 2008). Others have called for a research-to-practice approach that is more sensitive to the complexity of community and practice settings—a viewpoint known as ‘practice-based evidence’ (e.g., Green, 2008; Green, Glasgow et al., 2009). The latter viewpoint dovetails with developmental evaluation (Patton, 2011); and this article reports the findings of a case study that employed a hybrid evaluation design—utilization-focused developmental evaluation—to explicate the theory-of-change of a new, community-based social marketing innovation.
Community-Based Prevention Marketing for Policy Development. The research presented here is a case study of the Community-Based Prevention Marketing (CBPM) for Policy Development framework. CBPM for Policy Development (hereafter referred to as CBPM) is an eight-step framework that teaches community coalitions how to use social marketing for policy development (Carol A. Bryant et al., 2014). To meet coalitions’ need for a systematic planning framework and toolkit with which to translate evidence-based policies into practice, the Florida Prevention Research Center at the University of South Florida (USF Health, 2013) adapted its original framework for program development (C. A. Bryant et al., 2007) to help community coalitions create strategic marketing plans to promote and implement evidence-based policies.

Briefly, CBPM is a community-driven planning process that blends elements of evidence-based decision making, social marketing, and policy advocacy to enhance coalitions’ capacity to promote policy change at the organizational, local, and state levels. Community coalition members not only select the policies they want to promote, but also learn social marketing research and strategy techniques for gaining insights into factors that influence how policy beneficiaries, stakeholders, and decision makers view and make decisions about policy change. These insights enable coalitions to modify evidence-based policy elements and frame issues to build common ground, optimize support, and more effectively influence decision makers.

As shown in Figure 4, each step directs the coalition’s attention to key issues as it progresses through the framework: (1) Build a strong foundation for success; (2) Review evidence-based policy options; (3) Select a policy to promote; (4) Identify priority audiences among beneficiaries, stakeholders, and policymakers; (5) Conduct formative research with
priority audiences; (6) Develop a marketing plan for promoting the policy; (7) Develop a plan for monitoring policy implementation and evaluating impact; and (8) Advocate for policy adoption.

Figure 4. Community-Based Prevention Marketing for Policy Development

From September 2010–2014, the FPRC’s social marketers worked with a community-based, obesity-prevention coalition in Lexington (Kentucky) to pilot test the CBPM framework. After following the eight-step CBPM planning process, the coalition launched two policy initiatives. Better Bites: Snack Strong is a set of branded, nutritious menu items adopted by governmental food vendors (e.g., public pool concession stands, schools, and State Parks), restaurateurs, and private retailers. The Good Neighbor Store initiative incentivizes and brands
small stores located in ‘food deserts’ that increases availability and sales of healthy foods, and
makes changes to improve store cleanliness, safety, and community engagement.

This demonstration project generated various types of evaluation data over a period of almost four years. Those data were inputs for the present case study.

**Objectives.** The objective for the present case study was to figure out the CBPM framework’s theory-of-change. The research question is: “What are the linkages and connections between CBPM inputs, activities, immediate outcomes, intermediate outcomes, and ultimate impacts?” This is a complex research question; thus the abovementioned decision to use developmental evaluation. One of the tools within the developmental evaluation toolkit for handling such complexity is *system dynamics modeling*. According to the System Dynamics Society’s website, “System dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems -- literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality” (System Dynamics Society, 2011). A number of authors have argued for the utility of systems science methods in general (Livingood, et al., 2011; Luke & Stamatakis, 2012; Mabry, et al., 2008) and system dynamics modeling in particular (Homer & Hirsch, 2006; J. D. Sterman, 2006) for understanding complex phenomena such as community-based innovations.

The author believes that the field of social marketing would benefit from learning about and integrating systems science into its evaluation repertoire. This paper covers the first phase of CBPM theory-of-change work and addresses two aims, which correspond to the first two steps of system dynamics modeling (J. Sterman, 2000), respectively:
Aim 1. To identify key CBPM variables and characterize their behavior over an appropriate time horizon

Aim 2. To formulate a dynamic hypothesis that accounts for the behavior of key CBPM variables

Method

The research strategy for the present work is most closely related to case study research (Woodside, 2010; Yin, 2009). An important first step related to sampling within a case study design is to decide upon the unit of analysis. The unit of analysis here was at the level of a community coalition. Another distinction in designing case studies is between single- and multiple-case designs (Yin, 2009). The present study employed a single-case design, with the case being a community coalition. The context in which the case study was done is normative (Keller, 1989)—i.e., relating to an ideal standard for CBPM adoption and implementation.

Beginning in January 2013, the author initiated a utilization-focused evaluation (U-FE) (Patton, 1997, 2012) with the developers of the CBPM framework. There are 17 U-FE steps in total, each with its own premises, primary tasks, and facilitation challenges. Completion of tasks was facilitated with a combination of face-to-face meetings and online exercises. Some modification of U-FE steps was required as they were designed for evaluation of programs, whereas it was used here for evaluation of a social marketing framework. However, both are examples of social innovations and thus require evaluation priorities to be determined.

One of the U-FE steps (Step 7) entails focusing priority evaluation questions. The CBPM framework’s developers decided that a priority evaluation question was: “What are the linkages
and connections between CBPM inputs, activities, outcomes, and impacts?” This is a question regarding CBPM’s theory-of-change and, given the complexity of both the framework and its usage context—i.e., a coalition embedded within a community—is ripe for developmental evaluation. As noted above, one of the tools within the developmental evaluation toolkit for handling complexity is system dynamics modeling. The methods used here follow the general approach to system dynamics modeling detailed in Sterman (2000), which has been cited more than 1,200 times in Web of ScienceSM. The steps of the modeling process are listed in Table 1 (J. Sterman, 2000, p. 86).

System dynamics modeling. Briefly, the research presented here covers Steps 1–2 for system dynamics modeling (Table 1). Group model-building (Vennix, 1996, 1999) was used during each of the steps, which is a highly participatory approach to system dynamics modeling.

Step 1. Problem Articulation (Boundary Selection): The author engaged group model-building participants in exercises to identify key variables, time horizons, and reference modes pertaining to CBPM dynamics. Step 2. Formulation of Dynamic Hypothesis: The author used extant data—e.g., observation notes from meetings where the initial coalition (Lexington, KY) to test CBPM was trained on the framework—to develop causal diagrams of the feedback processes hypothesized to be responsible for CBPM dynamics; and the dynamic hypothesis was revised with input from model-building participants.

An application was submitted to the University of South Florida Institutional Review Board (IRB) but the proposed research was deemed exempt from IRB oversight.
Table 1. Steps of the system dynamics modeling process

<table>
<thead>
<tr>
<th>Originator</th>
<th>Steps of the Modeling Process</th>
<th>Key Activities</th>
</tr>
</thead>
</table>
| Sterman (2000) | 1. Problem Articulation (Boundary Selection) | • Theme selection  
• Key variables identification  
• Time horizon specification  
• Dynamic problem definition (reference modes) |
| | 2. Formulation of Dynamic Hypothesis | • Initial hypothesis generation  
• Causal mapping |
| | 3. Formulation of a Simulation Model | • Specification of model structure  
• Estimation of parameters |
| | 4. Testing | • Comparison to reference modes  
• Robustness under extreme conditions  
• Sensitivity testing  
• …Many other tests (see Sterman) |
| | 5. Policy Design and Evaluation | • Scenario specification  
• Policy design  
• “What if …” analysis  
• Policy interaction assessment |

Steps 3–4 of the system dynamics modeling process will be reported in a subsequent publication. However, for the sake of comprehensiveness, they are briefly described here. **Step 3.** Formulation of a Simulation Model: The qualitative, causal diagram generated from Steps 1–2 will be converted into a quantitative, computer simulation model. **Step 4.** Testing: The simulation model will be validated using a variety of standard tests (e.g., comparison of model behavior to reference datasets). What is typically the fifth and final step of the modeling process, **Step 5.** Policy Design and Implementation—e.g., using the model to implement decisions and
strategies to improve the CBPM framework—is beyond the scope of this project. However, the Florida Prevention Research Center will address this step in the coming fiscal year.

**Problem articulation (boundary selection).** The most important step in system dynamics modeling is articulation of the real problem, not just the symptom of difficulty (J. Sterman, 2000). The author modified the first step from Kim and Andersen (2012) for systematically eliciting causal structures from extant data (Table 2). The data analyzed during this step of the modeling process were of five types: (1) transcripts (n=10) from meetings where the initial coalition to test the framework (Lexington, KY) was trained in each of the CBPM steps; (2) observation notes from the just-mentioned coalition meetings; (3) transcripts (n=4) from interviews with coalition members; (4) transcripts (n=5) from mini-focus group sessions with CBPM developers and coalition members; and (5) a transcript (n=1) from a joint presentation by the leaders of the Florida Prevention Research Center and Lexington coalition.

<table>
<thead>
<tr>
<th>Stage of the process</th>
<th>Main technique</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovering themes in the data</td>
<td>Content analysis; group model-building</td>
<td>Raw text data</td>
<td>Definition of problem and system boundary</td>
</tr>
<tr>
<td>Identifying variables and their causal relationships</td>
<td>Open coding; causal links</td>
<td>Data segments (each segment = one argument + supporting rationales)</td>
<td>Coding charts</td>
</tr>
<tr>
<td>Transforming text into words-and-arrow diagrams</td>
<td>Causal links; causal maps</td>
<td>Coding charts</td>
<td>Simple word-and-arrow diagrams</td>
</tr>
<tr>
<td>Generalizing structural representations</td>
<td>Axial coding; causal maps</td>
<td>Simple word-and-arrow diagrams</td>
<td>Final causal map</td>
</tr>
<tr>
<td>Linking maps to the data source</td>
<td>Map/data ID numbers</td>
<td>Coding charts and final causal map</td>
<td>Data source reference table</td>
</tr>
</tbody>
</table>
Discovering themes in the data. The first stage of data analysis began with open coding (Kim & Andersen, 2012) (Table 2). This was performed using content analysis. Content analysis is a nonreactive research method in which “the content of a communication medium is systematically recorded and analyzed” (Neuman, 2006, p. 44). A content analysis proceeds by organizing or coding data into categories on the basis of themes, concepts, or similar features. As described by Neuman (2006): “Coding is two simultaneous activities: mechanical data reduction and analytic categorization of data. The researcher imposes order on the data” (p. 460).

The five types of data described above were content analyzed using Leximancer® software. The software enables the user to navigate the complexity of text in a semi-automated fashion and identify concepts and themes within the text. Aside from detecting the overall presence of a concept in the text (conceptual analysis), the software was used to determine the frequency of co-occurrence between concepts (relational analysis) to generate concept maps—i.e., a visual display of concepts and their relationships to each other. Concepts are clustered into higher-level themes. Themes are shown as heat-mapped circles to indicate importance, and are comprised of concepts that appear together often in the same pieces of text (Leximancer, 2011). Leximancer® has been used by other social marketing researchers (e.g., Dann, 2010). Validation of the output of Leximancer® using a set of evaluation criteria taken from content analysis principles and techniques has been reported elsewhere (A. Smith & Humphreys, 2006).

Content analyses generated one table—containing themes, concepts, and excerpts—and one concept map for each type of data. Examples of a table and concept map are included as Table 3 and Figure 5, respectively. Some theme names were changed to be more intuitive (in parentheses). For reference, the community coalition that generated these findings was dedicated to making healthy eating accessible to residents where they live, work, and play.
Table 3. Example of content analysis themes, concepts, and excerpts

<table>
<thead>
<tr>
<th>Themes</th>
<th>Concepts</th>
<th>Excerpts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (environmental change)</td>
<td>• stores</td>
<td>“If they’re willing to consign it, it also reduces the cost of stocking the corner store with all the foods.”</td>
</tr>
<tr>
<td></td>
<td>• corner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• corner AND stores</td>
<td></td>
</tr>
<tr>
<td>2. (formative efforts)</td>
<td>• talking</td>
<td>“You have to find out how to get to talk to the people that we’re trying to impact – the neighborhood’s groceries.”</td>
</tr>
<tr>
<td></td>
<td>• work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• program</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• trying</td>
<td></td>
</tr>
<tr>
<td>3. (consumer orientation)</td>
<td>• people</td>
<td>“If we don’t see it like an owner does, if we don’t see it – and this is why it’s so great to have Billie here – we don’t see it like people who live in the neighborhood, we’re not going to plan it in a way that will work for you or those groups and if we don’t understand how policymakers will get it, we’re really unlikely to succeed in lobbying that.”</td>
</tr>
<tr>
<td></td>
<td>• owners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• neighborhood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• stores AND owners</td>
<td></td>
</tr>
<tr>
<td>4. (behavior change)</td>
<td>• food</td>
<td>“…certain percentage of their shelf space devoted to healthy food.”</td>
</tr>
<tr>
<td></td>
<td>• healthy</td>
<td></td>
</tr>
<tr>
<td>5. (community prevention marketing)</td>
<td>• community</td>
<td>“We call it community based policymaking and marketing and the marketing part is because unlike other coalitions around the country that are taking on similar issues in obesity prevention, we’re trying to see if a marketing framework adds anything.”</td>
</tr>
<tr>
<td></td>
<td>• policy</td>
<td></td>
</tr>
<tr>
<td>6. kids</td>
<td>• kids</td>
<td>“They’ve put fruit in all of these stores and they marketed it toward kids in the schools so yes, we might ride this Better Bites wave.”</td>
</tr>
<tr>
<td>7. (positioning)</td>
<td>• issue</td>
<td>“We’ll be able to frame the issue because we’ll know our audiences so well.”</td>
</tr>
<tr>
<td>8. (consumption)</td>
<td>• buy</td>
<td>“They buy their fruits and vegetables from Wal-Mart and Kroger.”</td>
</tr>
<tr>
<td>9. school</td>
<td>• school</td>
<td>“…and then shelling out to all the schools but they don’t have the transportation for the produce to the schools.”</td>
</tr>
<tr>
<td>10. place</td>
<td>• place</td>
<td>“They don’t have a place to keep the produce and if it’s potatoes, that’s one thing.”</td>
</tr>
<tr>
<td>11. money</td>
<td>• money</td>
<td>“They funded the produce, they brought in packs to do demos, and they made money.”</td>
</tr>
<tr>
<td>12. research</td>
<td>• research</td>
<td>“…prepare us to conduct research with them.”</td>
</tr>
</tbody>
</table>
Figure 5. Example of content analysis concept map
As recommended by Kim and Andersen (2012), the abovementioned analyses continued until several dominant patterns of themes were observed in the data and it was possible to narrow down the problem to be addressed. When considered in their totality, the content analysis results from the five types of extant data (e.g., Table 3 and Figure 5) were summarized under the key theme of “the marketing orientation of a community coalition that adopts the CBPM framework.” This key theme and the content analysis results were shared with the CBPM framework’s developers in a group model-building session (Luna-Reyes, et al., 2006; Vennix, 1996).

The author facilitated a group model-building session with the developers of CBPM (n=7). The author created a manual of scripts for different model-building activities to guide the session. Following a brief refresher on system dynamics modeling—and group modeling as a particular approach—the theme of “marketing orientation” was introduced. Next, the CBPM developers refined the key theme, articulated the boundary of the system, and estimated references modes for key variables. Based on the results of the group model-building session, as well as sifting of relevant data segments for further analysis, the problem to be modeled was revised as: “How does implementing the CBPM framework improve coalition performance?”

Formulation of dynamic hypothesis. Once the problem (i.e., phenomenon) of interest was articulated, a dynamic hypothesis was formulated to account for the behavior of the system (Figure 6). To the list of five data types outlined above, the author also analyzed: (6) the transcript (n=1) from the abovementioned group model-building session and (7) transcripts (n=9) from means-ends hierarchy sessions. Regarding the latter, as part of the U-FE process, the author facilitated group exercises with the CBPM framework’s developers to construct means-ends
hierarchies (Patton, 2012). These exercises were carried out for each CBPM step and concluded in January 2014. The sessions were audio recorded for transcription.

![Figure 6. Qualitative hypothesis to assess change in performance](image)

**Figure 6. Qualitative hypothesis to assess change in performance**

The author followed the remaining steps in Kim and Andersen (2012) for systematically eliciting causal structures from qualitative data (Table 2). A modification to the approach of Kim and Andersen was the creation of a formal code book (ATLAS.ti 6.2®). The author created the first code book using a sample of each type of data. Through this process it was determined that only six of the seven types of available data (#’s 2–7) would yield causal arguments.

In addition to face validity—see *Generalizing the structural representations* below—the author attempted to ensure reliability. An instruction guide was created and two other data coders were trained. Transcripts were independently coded by two team members. There were a total of
three coders in all. Double coding was performed for one-third of all transcripts. Discrepancies between coders were addressed through discussions with the other team member.

Identifying variables and their causal relationships. In this second step of coding, the data were analyzed even further to identify causal structures. The unit of analysis was a single argument made about the system’s structure and/or behavior that originated from a speaker’s mental model. Using a coding chart as shown in Table 4, the data were broken down into small segments that contained one argument about the system. During this process, the location of the data in the transcript was recorded through the assignment of a Conversation Identification Number (CIN) to every page/line number. The following segment was coded and generated the coding chart shown in Table 4:

Well our coalition used Community-Based Prevention Marketing with – when we started our coalition and I’ve been doing public health nutrition work for a number of years and we thought we did pretty well at it, but it really upped our game. The sophistication with which we approach our work has greatly improved. We have a much better understanding of our target audience. We frame our programs much better. We got more impact; we got more community support, more community visibility when we use CBPM.

A chart similar to Table 4 was created for every argument in the dataset that revealed the mental models of the system’s actors. These tables have multiple columns summarizing the supporting rationales. As a result, the coding process generated a large number of coding charts.
Table 4. Coding chart example

**Speaker name:** Respondent  
**Transcript page:** 01  
**CIN:** 01-11

**Main argument:** The change in strategic orientation (i.e., marketing orientation) increased coalition effectiveness, which increased their community support.

<table>
<thead>
<tr>
<th>Causal structures</th>
<th>Cause variable:</th>
<th>Effect variable:</th>
<th>Relationship type:</th>
</tr>
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<tr>
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<td></td>
<td>CONSUM.ORIENT</td>
<td>EFFECTIVE</td>
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<tr>
<td></td>
<td>(MKTG.ORIENT)</td>
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<tr>
<td></td>
<td>SEGMENT</td>
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<td></td>
<td>POSITION</td>
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<td></td>
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<tr>
<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Variable behavior</th>
<th>Cause variable:</th>
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</tbody>
</table>

**Information source:** Speaker’s own experience

**Note:** “Strategic orientation” is implied (parentheses) by reference to benchmarks of social marketing. “Effectiveness” is implied by reference to upping their game. “Community support” is implied by reference to brand visibility.
Transforming text into words-and-arrow diagrams. The next step was to transform the variables recorded in the coding charts (e.g., Table 4) into words-and-arrow diagrams (Kim & Andersen, 2012). This phase in coding was guided by the purpose to generate a causal diagram that is consistent with the nomenclature of system dynamics modeling. Once words-and-arrow diagrams were created for a corresponding coding chart, they were connected together to create a composite diagram as illustrated in Figure 7, which was generated from Table 4.

In system dynamics modeling, stock (or level) variables determine the state of the system (Coyle, 1996; J. Sterman, 2000). In Figure 7, Strategic Orientation is an example of a stock variable. Whereas stocks represent conserved quantities (tangible or intangible), rate variables (or flow variables) represent changes to conserved quantities (Coyle, 1996; J. Sterman, 2000). For every coding chart generated in the previous stage of the coding process, a diagram similar to Figure 7 was produced.

Figure 7. Connecting words-and-arrow diagrams

Generalizing the structural representations. The next step was to generalize the individual pieces of causal structure so that the structures generated from different data segments
could be merged into one causal map. Hundreds of causal pieces like Figure 7 could not be integrated until they were generalized. To combine multiple causal pieces, the structures must share common variables. An initial causal map was shared via separate group model-building sessions—first with the CBPM developers at the Florida Prevention Research Center, and then with the community coalition members in Lexington, Kentucky who were the first to test the CBPM framework.

The causal map changed quite a bit following the abovementioned group model-building sessions. The author subsequently used a generic structure as an aid to system conceptualization. System conceptualization refers to “the processes by which ideas and theories about the structure of a system and its consequent behaviour begin to be proposed and debated” (Lane & Smart, 1996, p. 102). Qualitative data (e.g., interviews) are almost never sufficient for developing causal diagrams and must be supplemented by other sources of information—including the published literature (J. Sterman, 2000). Hovmand and Gillespie’s (2010) model for considering how innovation implementation (e.g., CBPM implementation) impacts organizational performance (e.g., community coalition performance) was used here for generalizing the structural representations.

*Retaining links between the maps and the data source.* As noted above, during the process of conceptual generalization, the data are reduced and simplified into one causal map. However, the map can easily become disconnected from its original data sources (Kim & Andersen, 2012). Kim and Andersen (2012) recommend a combination of the abovementioned CINs as well as Map Identification Numbers (MINs). An MIN is assigned to each causal link in the map. The author thus created a map reference table, where all CINs are listed in rows and all
MINs are listed in columns. The map reference table becomes handy when one needs to trace the data source of a specific part of the causal map (Kim & Andersen, 2012).

Findings

In this section, the author presents findings from use of the above-described coding methods for systematically eliciting causal structures from qualitative data. The causal diagrams represent the structure of the system for a normative coalition that adopts the CBPM framework, in the expectation that it would improve coalition performance over time.

Reorientation. The causal map in Figure 8 shows the mechanism labeled “Reorientation” (denoted B1). The model represents the process of reorientation in a manner identical to Hovmand and Gillespie (2010) where the coalition responds to a gap between the current and required strategic direction.

The decision to adopt and implement CBPM has two components: the strategic decision to adopt and implement the framework and the goal of improving coalition performance. Strategic reorientation is a balancing process that counteracts the initial gap between the Required and current Strategic Orientation of a community coalition (P. S. Hovmand & Gillespie, 2010). A coalition’s Strategic Orientation is defined in terms of ‘the business the coalition is in and how it competes’ (Pala & Vennix, 2001); and can be described by the set of coalition activities.

At any point in time, a coalition’s environment may demand a different strategic direction from the coalition. In the present case, the adoption of the CBPM framework demands a different strategic direction from the coalition. In the following quote, one of the framework’s developers
discusses the early incongruence between the *Required Strategic Orientation* (e.g., CBPM’s policy orientation) and the *Strategic Orientation* of the coalition that pilot-tested the framework (e.g., program orientation):

*It was really funny because when we first started the selecting a policy thing, we looked at all those different policies. When we proposed corner stores to them, the coalition was like, ‘Oh. We could do like cooking classes.’ Then we were all like, ‘No. We can’t do that because it’s a program. It’s not a policy.’ We had to like backtrack and really like reorient ourselves to policy.*

**Figure 8. ‘Reorientation’ feedback loop**

Thus, the *Required Strategic Orientation* represents the set of external criteria that are applied to the coalition and used to evaluate its effectiveness (P. S. Hovmand & Gillespie, 2010). The larger is the *Strategic Orientation Gap*, the lower is the coalition’s *Effectiveness* and hence
Performance. In the following passage, one of the CBPM framework’s developers explains how a Strategic Orientation Gap (e.g., a coalition relying on facts rather than marketing positioning techniques) can negatively influence coalition Effectiveness:

That is true and I think that’s really important to underscore that not only in public health but a lot of coalitions that come together around the topic think the facts are going to make them win. They do not get it that you have to stop and frame it in a way that may make it look totally different than why you want it to happen.

In Figure 8, there is a delay (||) between Performance and Perceived Performance—i.e., it takes time for a coalition to perceive a change in its performance. Continuing with the causal tracing from above, the lower is the coalition’s Performance and hence Perceived Performance, the greater its Performance Shortfall. The Performance Shortfall represents the difference between a coalition’s Perceived Performance and Desired Performance. If the Performance Shortfall increases, then this increases the Pressure to Change (P. S. Hovmand & Gillespie, 2010); and if Pressure to Change increases, then the size of Change in Strategic Orientation increases beyond what it would have been otherwise—counteracting the initial increase in the Strategic Orientation Gap (i.e., a balancing process (B1)).

The next several Figures build upon these fundamental dynamics. New feedback loops added are shown as thick lines.

Implementation. The mechanism labeled “Implementation” is shown in Figure 9 (denoted R1) and is an example of a reinforcing process. Again, if Pressure to Change increases,
then the size of *Change in Strategic Orientation* increases beyond what it would have been otherwise (Figure 8). That is, if a coalition feels like there is more pressure on them to make a change, then the extent of change they undergo to relieve the pressure will increase beyond what it would have been otherwise.

![Figure 9. ‘Implementation’ feedback loop](image)

If the magnitude of *Change in Strategic Orientation* increases, then *Commitment* decreases beyond what it would have been otherwise. *Commitment* refers to attachment to or determination to reaching a goal by using a newly adopted innovation (e.g., CBPM) (Repenning, 2002). For example, in this passage from observation notes of the coalition being trained in use of the CBPM framework, the *Change in Strategic Orientation* (e.g., from a program-based approach to a policy orientation) is connected to member *Commitment*:

46
The purpose of Step 5 is to conduct research on the selected policy. Group members appeared more upbeat compared to the previous meeting. However, the selected policy topic (corner stores) was not the main topic of discussion. The results of interviews with corner store owners and community members were presented to the group. It seemed as if several members of the coalition felt other projects were more of a priority than the corner store policy work.

Reductions in member Commitment can then lead to a reduction in Implementation of CBPM. This was put bluntly by a coalition member in a focus group facilitated by the framework’s development team:

You got to be serious if you’re doing this. Stop messing around.

If CBPM Implementation goes down, coalition Efficiency and Performance also go down (i.e., after an initial delay). Performance is a function of coalition Effectiveness and Efficiency (P. S. Hovmand & Gillespie, 2010; Letts, Ryan, & Grossman, 1999). Thus, if Performance and Perceived Performance decrease as a result of reduced Efficiency, then the Performance Shortfall and Pressure to Change increase. Then the magnitude of Change in Strategic Orientation increases beyond what it would have been otherwise, thereby reinforcing the initial increase in Change in Strategic Orientation (denoted R1 in Figure 9).
**Maintenance.** The causal map in Figure 10 shows the mechanism labeled “Maintenance” (denoted R2), which refers broadly to a process of sustaining coalition member involvement and fostering *Collaborative Synergy*. *Coalition Culture* refers to the pattern of basic assumptions that a coalition has adopted in learning to cope with problems, and that have worked well enough to endure because they have meaning for members of the coalition (Martin, 2002; Schein, 1984).

![Figure 10. ‘Maintenance’ feedback loop](image-url)
Continuing with the causal tracing from above, if the *Change in Strategic Orientation* increases (Figure 9), then strength of *Coalition Culture* decreases beyond what it would have been otherwise (Figure 10). This causal link is illustrated in the following interview with a coalition member regarding his/her experience with the CBPM framework:

*My hardest part of the whole thing was even the earliest discussions which I don’t even think are on - I guess they are kind of step two of policy options - is the debates that we had or the discussions probably more accurately that we had about what constitutes a policy. That was the unique piece of this. This is a switch from the previous framework before I was involved and so I was happy because the rest of the people who have been on the coalition for a while were also like “Where is this policy piece coming in?”*

If strength of *Coalition Culture* decreases (as above), then *Collaborative Synergy* decreases beyond what it would have been otherwise. For example, if *Coalition Culture* decreases as a result of the *Change in Strategic Orientation*—e.g., a large change in the way the coalition makes strategic decisions can weaken organizational culture—then *Collaborative Synergy* can decline, as illustrated by this observation from the framework’s development team:

*Okay. But this is a real important issue because in the previous iterations too we had some contentious decision-making…and so we had to come up with a consensus-reaching method to save the day and we could’ve just blown up right there and even here you could see some people would nominate things that played right to their organizational*
mission and would've eliminated. They had no interest to others so we were very nervous about this stuff.

Thus, if Collaborative Synergy decreases, then Efficiency and Perceived Performance decrease. If Perceived Performance decreases as a result of reduced Efficiency, then the Performance Shortfall and Pressure to Change increase. Then the magnitude of Change in Strategic Orientation increases beyond what it would have been otherwise, thereby reinforcing the initial increase in Change in Strategic Orientation (denoted R2 in Figure 10).

Figure 11. ‘Institutionalization’ feedback loop
**Institutionalization.** As a coalition “Institutionalizes” (denoted R5 in Figure 11) its processes, *Coalition Culture* is strengthened even further. Continuing with the causal tracing from above, if the *Change in Strategic Orientation* increases (Figure 9), then strength of *Coalition Culture* decreases beyond what it would have been otherwise (Figure 10). This sets up a reinforcing process where *Coalition Culture* continues to weaken (Figure 11).

![Figure 12. ‘Ability to change’ feedback loop](image)

**Ability to change.** The causal map in Figure 12 shows the mechanism labeled “Ability to change” (denoted R3), which refers broadly to the coalition’s ability to change its orientation
regarding the delivery of community initiatives. If *Coalition Culture* weakens, then *Adaptive Capacity* increases beyond what it would have been otherwise, which in turn increases its ability to alter the magnitude of *Change in Strategic Orientation*. If the *Change in Strategic Orientation* increases (Figure 9), then strength of *Coalition Culture* decreases beyond what it would have been otherwise—reinforcing the initial decline in *Coalition Culture* (loop R3).

**Funding.** Coalition “Funding” is a balancing process (see B2 in **Figure 13**) where the coalition seeks to increase *Community Support* by changing its *Strategic Orientation* (P. S. Hovmand & Gillespie, 2010). If the *Strategic Orientation Gap* decreases, the higher is the coalition’s *Effectiveness*. Community coalitions depend on a community being willing to support its initiatives. The effect of *Community Support* is mediated by funding (P. S. Hovmand & Gillespie, 2010), as illustrated by this quote from the community coalition to test CBPM:

> Well, I think because we've gotten so well known, we’re getting money from a number of places…and I believe, I’ll say now, it’s all these preliminary work that we did. Because we listened, because we talked to so many people, people know who we are and that has never happened so easily in my work…because we went so slowly, we built our base and so money is coming in to support this.

An increase in *Community Support* and funding increases the available resources per resident. Thus, if *Collaborative Synergy* increases, then *Performance* increases; *Pressure to Change* decreases; and *Change in Strategic Orientation* decreases, thereby counteracting the initial increase in *Effectiveness* (denoted B2 in Figure 13).
Figure 13. ‘Funding’ feedback loop
Three other causal loops are added to the dynamic complexity in Figure 14 (see R4, B3 and B4). The “Demand” mechanism (labeled R4) represents a reinforcing process where an increase in Community Support leads to an increase in the coalition’s Workload. Workload is conceptualized as the number of residents being targeted by the coalition. If Workload increases, then the Ratio of Available to Needed Resources decreases beyond what it would have been otherwise. Because Collaborative Synergy is dependent on a coalition having sufficient resources, a reduction in available resources leads to reductions in Collaborative Synergy, Efficiency, and Performance. However, as a result of loop B1 (”Reorientation”) in Figure 8, the lower is the coalition’s Performance then this increases the Pressure to Change and the size of Change in Strategic Orientation. If the Strategic Orientation Gap decreases, then coalition Effectiveness increases followed by an increase in Community Support (reinforcing loop).

Discussion

A dozen years have passed since Andreasen’s (2002) caution that social marketing was in danger of not reaching its full potential. In some ways, social marketing as a field is showing signs of growth as evidenced by, for example, the formation of a global social marketing association (C. Lefebvre, 2009a); the inclusion of social marketing objectives in Healthy People 2020 (B. Birosck et al., 2014; C. Lefebvre, 2009b); and the celebration of the 23rd occurrence of the University of South Florida’s social marketing conference (University of South Florida, 2014). Despite these highlights, though, the findings of systematic reviews suggest room for improvement in social marketing practice (e.g., Gordon, McDermott, Stead, & Angus, 2006; Stead, Gordon, Angus, & McDermott, 2007).
Figure 14. Complete causal loop diagram
One of the practice areas in need of improvement is evaluation. This article reports the findings of a case study of the Community-Based Prevention Marketing for Policy Development (CBPM) framework, in order to introduce readers to utilization-focused developmental evaluation (in general) and system dynamics modeling (in particular). The goal was to introduce social marketers to this hybrid evaluation approach so they could learn about and integrate it into their own practice. In some respects, this approach should be familiar to social marketers. For example, one of the final steps in utilization-focused evaluation is to follow up with primary intended users of the evaluation findings to facilitate and enhance use (Patton, 2012). This sort of course is a natural fit with social marketers’ customer orientation. Similarly, one of the situations and purposes particularly appropriate for developmental evaluation is where social innovators desire frequent feedback about the extent to which a potentially scalable model is emerging (Patton, 2011). Social marketers are adept at monitoring their initiatives to constantly look at what is happening.

In other respects, however, developmental evaluation will seem foreign to many social marketers—particularly the emphasis on applying complexity concepts to enhance social innovations (Patton, 2011). In an attempt to flatten the learning curve, the author presented a case study of an actual social marketing innovation. Again, CBPM is an eight-step framework that teaches community coalitions how to use social marketing for policy development. This case study begins to explicate the CBPM framework’s theory-of-change so that subsequently it can be tested in practice, as a precursor to summative evaluation. Julian (2005) has expounded the utility of theory-of-change evaluation for enhancing the quality of community practice. Due to the complexity of the CBPM framework, as well as the context in which it will be implemented, the author turned to system dynamics modeling. System dynamics modeling was appropriate as
it can be used not only for retrospective system analysis but also prospective system design (Peter S. Hovmand, Kreuter, & Deering, 2012)—i.e., developmental evaluation of social innovations.

**Implications.** What does this causal diagram (see Figure 14) imply for the developers and users of the CBPM framework? First, it is important to recognize the promise and limitations of qualitative or graphical models. The type of model presented here allows one to explore insights such as identifying the components of a system; describing how the components are related through feedback mechanisms; and postulating where one could intervene.

One possible implication relates back to the dynamic hypothesis depicted in Figure 6. As a result of going through the process of formulating a dynamic hypothesis, it was revealed that a community coalition’s performance may temporarily decline as a result of adopting and implementing the CBPM framework. As noted by Hovmand and Gillespie (2010), whose model provided a generic structure for the present model, “When implementation disrupts the very features of an organization that made it successful, organizational performance can decline” (p. 80). In the present case, the change in Required Strategic Orientation causes a temporary decline in Effectiveness, which contributes to temporary reductions in Performance both directly and indirectly via reduced Community Support (see Figure 14).

For the CBPM framework’s developers, it could be important to intervene and ensure that adopters are (a) aware of the potential decline in performance and (b) not attributing the decline to a defect in the framework. According to the disconfirmation paradigm (Hoyer & MacInnis, 2007), consumers (e.g., a community coalition) compare the performance of an innovation with their expectations about how the innovation will perform. If a coalition’s performance is less
than expected following implementation of the CBPM framework, a negative disconfirmation and dissatisfaction will result. Therefore, the framework’s developers might intervene to redesign CBPM in a way that community coalitions’ expectations are appropriate.

**Limitations.** There are limitations in this study that need to be addressed in future research. First, the work so far has considered only qualitative modeling. That is why the findings above have been framed as provisional findings. To be certain, there are limitations to the extent of inferences that can be made based on qualitative modeling (J. Sterman, 2000). In general, only formal simulation models can be used to solve analysis problems (P. Hovmand, 2012). However, the resulting qualitative model will become the basis for quantitative modeling and will be presented in a subsequent paper.

Second, the qualitative model of the CBPM theory-of-change was developed with less than 100 percent double-coding of transcripts. One third of transcripts were double-coded with a total of three coders. Therefore, some of the author’s coding decisions might differ from the other coders’ had there been a census. However, the theory-of-change presented here is not being represented as the final theory. Causal diagrams are never final, but always provisional (J. Sterman, 2000). Rather, it will inform a quantitative model in a subsequent paper.

A final limitation relates to the generalizability of the qualitative model. The case study presented here was designed to represent a singular, normative coalition for CBPM adoption and implementation. It remains to be seen how closely the real-world dynamics match what has been hypothesized here. Moreover, the original community coalition that pilot tested the CBPM framework was asked to test the framework, and therefore, *Reorientation* from a program to
policy orientation was a required feature of the partnership. This will not match the experience of other coalitions that adopt and implement the framework. Furthermore, the evaluation data that informed the qualitative model were based on the experiences of a coalition that implemented the CBPM framework following in-person training sessions for each of the eight steps. The new training modality is the CBPM website (http://health.usf.edu/publichealth/prc/policy/index.htm), which gives coalitions practical planning tools—e.g., worksheets, group exercises, links to helpful websites, and other resources—to guide them in the policy development process. It remains to be seen what influence this web-based facilitation strategy has as a moderator of implementation fidelity.

Conclusion

Despite the abovementioned limitations, this study has much to offer. For social marketers who work with community-based coalitions, this case study illustrates the importance of attending to the strategic aspects of implementation fidelity (e.g., P. S. Hovmand & Gillespie, 2010) versus solely the tactical (e.g., Blomberg, Duner, & Hasson, 2012; Carroll, et al., 2007). Additionally, this study illustrates the value of alternative approaches to evaluating initiatives (e.g., developmental evaluation) and specific tools within those approaches (e.g., system dynamics modeling). For social marketers, these types of evaluation offer a powerful approach to monitoring and supporting innovation development. Perhaps they can help social marketers not only set themselves apart from other social change agents but also ensure that the field realizes its full potential.

The second manuscript will be submitted to *Journal of Social Marketing*. The working title is: “Evaluation of an ‘upstream’ social marketing innovation: A systems science approach.”

**Introduction**

According to social marketing thought leader Alan Andreasen (2006), social marketing grew in popularity during the 1990s due in part to its effectiveness at bringing about behavior change in people with “bad behaviors” (e.g., smokers, litterbugs, etc.). However, prominent social marketers—including Andreasen himself (e.g., Andreasen, 1997; Andreasen, 2006; Hastings, MacFadyen, & Anderson, 2000)—have argued for some time now that our craft is applicable anywhere a need exists to influence the behavior of a target audience. In the opinion of Andreasen (2006):

> For social improvement to take place, *someone has to take action* (p. 8)…social change ultimately boils down to *influencing* individual behavior—sometimes getting someone to start something, someone else to stop, and still others to just keep doing what they are already doing. (p. 10)

Thus, social change requires individuals to act—i.e., individuals other than just those who are (prone to) exhibiting a deviant behavior. That *someone* will be problem specific but might
include, for example, bystanders who refuse to ignore intimate partner violence and thus call the police when they witness abuse; health care professionals who pledge to not accept money from the pharmaceutical industry so that their patients are not harmed taking prescriptions unnecessarily; and community members who reject gang violence and thus join a coalition aimed at making their neighborhood safer.

All of the above individuals and actions are at least one step removed from the proximal ("bad") behavior of interest; and social marketing directed at such opportunities has often been labeled ‘upstream’ social marketing. But what exactly is meant by an ‘upstream’ approach to social marketing? In the next section, the author reviews the published literature and identifies knowledge gaps, which provide a supporting rationale for the present research—a case study of a social innovation that teaches community coalitions how to take a social marketing approach to policy development.

**Background and Literature**

The term ‘upstream’ has appeared in social marketing writings for quite some time now (e.g., Andreasen, 1997; Goldberg, 1995; Hastings et al., 2000). However, the concept itself is certainly much older. For example, as renowned evaluation consultant Michael Quinn Patton (2011) recounted:

> For decades three stories have been endlessly repeated: one about the stream of ambulances at the bottom of the cliff instead of building fences at the top; one about the numerous dead bodies floating down the river while all we do is build more impressive
services for fishing them out; and one about giving someone a fish versus the value of teaching that person how to fish. (p. 11)

That first story will be familiar to many readers. In the recent social marketing text by Hastings (2007), the poem, “The (social marketing) Ambulance Down In The Valley” was adapted from the original for the book’s opening pages.

Despite the concept’s older beginnings, the mid-1990s is when the ‘upstream’ concept became more visible in social marketing writings. References to the term were preceded—and perhaps spurred on—by several critiques of social marketing appearing earlier that decade by media advocacy expert, Larry Wallack and his colleagues (1990; 1993). According to Wallack (1990), one limitation of social marketing at the time was that it “largely assumes the negative aspects of the media environment to be a given and does not attempt to alter the pervasive antihealth education messages implicit in advertising and television programming” (p. 375). More broadly, Wallack also wrote that “some people view social marketing as basically a reductionist approach to understanding health, which tends to reduce serious health problems to individual risk factors” (p. 375). Reiterating many of the same points several years later, Wallack et al. (1993) added that social marketing of the time tended to “ignore the proven importance of the social and economic environment as major determinants of health” (p. 23).

Wallack and colleagues’ (1990; 1993) thought-provoking critiques were picked up on by a number of contemporaries (e.g., Goldberg, 1995; E. Maibach & Holtgrave, 1995). First among them was Goldberg (1995), who characterized upstream social marketing as “altering the institutions that form the social system” (p. 365). He expounded:
The truly upstream public policy issues, such as basic housing, employment, education, health care, and personal security, may or may not fall within the purview of the social marketer. But a second level of upstream issues includes a focus on marketing variables: advertising and promotion, pricing, product development, and product availability. These are the purview of the social marketer. (p. 359)

Similar to early skepticism of Kotler and Levy’s (1969a) initial idea of a broadened concept of marketing (e.g., Luck, 1969), some disagreed with Goldberg’s (1995) call for a broadened concept of social marketing. For example, Wells (1997) strongly disagreed with Goldberg’s urging to enter the political arena to advance the implications of upstream research. However, Goldberg did have allies. In a response to Goldberg’s paper, Andreasen (1997) argued that the “truly upstream public policy issues” mentioned by Goldberg (e.g., basic housing, employment, etc.) were within the purview of the social marketer:

Goldberg (1995) neglected an issue that is, in a sense, even further upstream (or perhaps on the banks upstream) and that is, How does one bring about social structural change? Wallack and his colleagues put heavy emphasis on the media and community mobilization as the means to induce such changes. But if one recognizes that the instruments of change here are people…who will have to act if upstream changes are to come about, then another important role for social marketing becomes clear. (p. 194)

Perhaps unaware of Andreasen’s (1997) response to Goldberg (1995), Hastings, MacFadyen, and Anderson (2000) nonetheless appeared to be in agreement with the former:
The defining feature of social marketing is its focus on behavior change…However, it is time that the social marketing community reflect upon whose behavior we should be trying to change. Should we restrict our efforts to individuals to give up smoking…Or should we also be trying to influence the policy makers, politicians, regulators or educators to restrict access to tobacco. (p. 47)

Hastings et al. conceptualized the determinants of health behavior as residing at both individual (e.g., goals, aspirations, self-efficacy) and environmental levels, with the latter divided into two domains: the “immediate environment” (e.g., friends, family, local community) and the “wider social context” (e.g., social mores, economic conditions, cultural norms). The authors included several examples of the applicability of social marketing for addressing these immediate and wider social domains—both focusing on influencing the behavior of individuals (e.g., retail staff who decide in-store product positioning).

**Knowledge gaps.** Having briefly reviewed the published literature regarding what is meant by an ‘upstream’ approach to social marketing, this author perceives two main gaps in the social marketing knowledge base regarding an upstream approach. First, there is the issue of the behavioral unit of interest: There seems to be an implicit assumption within social marketing that we are only in the business of changing people’s behavior. For example, as Hastings et al. (2000) assert: “it is time that the social marketing community reflect upon whose behavior we should be trying to change” (p. 47). However, this author asks: Why must it be ‘individual’ behavior?
That is, there are other behavioral units of interest that might be better choices for intervention in a given problem. For example, one can think in terms of dyadic behavior (e.g., intimate partners in an abusive relationship). There is also an entire field of study by the name of organizational behavior. Basil (2000) used the term “upstream” in distinguishing between structural upstream and individual downstream factors that can influence the creation of change in organizations—such as the acceptance of social marketing within a state health department (B. Birosck et al., 2014).

The social marketing writings to date seem to focus on the upstream behavior of individuals. A possible exception is Andreasen (2006) who makes reference to the concept of “public will.” In regard to the work of Coffman (2002), he notes:

Coffman (2002) makes a distinction between efforts to affect individual behavior and public communication campaigns designed to promote the public will for change…In her view, too many public information campaigns simply provide information and do not pay enough attention to turning this awareness into action through what she calls ‘public will.’ I argue that this, too, is a role for social marketing. (p. 7)

Thus, Andreasen seems to suggest that social marketing can be used for influencing behaviors of more than just the individual variety. However, the author believes there is an opportunity to generalize all of the above (e.g., dyadic behavior, organizational behavior, etc) under the rubric of system behavior. In regard to the comments of Australian action research scholar and practitioner Yolande Wadsworth (2010), Patton (2011) notes that references to thinking upstream “are reminders about our repeated tendency to go for the short-term quick fix rather than to
examine, come to understand, and take action to change how a system is functioning that creates the very problems being addressed” (p. 11).

The second (but related) knowledge gap regarding an upstream approach in social marketing concerns ‘how to do it.’ In the opinion of Andreasen (2006) at the time: “The issue now before us is not just whether we should consider upstream interventions but how to do so’” (p. 7). Early advice from social marketers could be characterized as conceptual. For example, the guidance from Goldberg (1995) went as follows:

Using an exchange theory perspective, one can examine the costs and benefits to the individual and make a judgment as to whether an advocated change is likely to be easy to adopt by the individual. When this is the case, a downstream change is warranted…There are, however, instances when the behavior in question seems more difficult or costly to adopt…In these circumstances, if the cost to society remains high, then we are guided to an upstream policy/regulatory approach. (p. 361)

A few year later, Smith (1998) followed with advice for social marketing practitioners. In regard to the question, “Do we focus on the individual or the structural environment surrounding that individual?” Smith noted that while it is fine (strategically) to say “we need both,” tactically one cannot always afford both. Briefly, his advice entailed a sequence of queries in five areas of program planning: (1) agree upon desired social outcomes of the program; (2) define the structural or non-behavioral alternatives that would make it unnecessary for audience members to change their behavior and still protect them from X; (3) define the behavioral alternatives; (4)
identify the structural determinants of the behavior; and (5) identify the perceptual determinants of the behavior.

Early examples that went beyond the conceptual realm, however, still seemed to be in the developmental phase at the time of their publication (e.g., Hastings et al., 2000; MacAskill, Stead, MacKintosh, & Hastings, 2002). Over the course of the past decade, guidance for the application of social marketing at levels other than just the intrapersonal—i.e., where those who are (prone to) exhibiting a deviant behavior reside—has become more concrete. For instance, Kotler and Lee (2008) presented an example of an upstream social marketing plan, and Hastings (2007) presented an example of an execution that combines both upstream and downstream elements.

Andreasen (2006) comes closest to providing a self-contained treatment of social marketing’s potential to work upstream. Andreasen devotes chapters to “vertical perspectives” to help the reader understand what he describes as a set of stages through which most social issues progress (e.g., “Inattention,” “Discovery,” “Climbing the agenda,” and so on). In later chapters, he turns to a “horizontal perspective” to consider the range of actors who have to take action for a social problem to be overcome (e.g., community leaders, lawmakers, business allies, etc). Andreasen is explicit in his assumption that social change requires action on the part of individuals at many levels. However, as even he notes, “the examples are hypothetical, for the most part. The objective is simply to show how social marketing might be used, not to present specific examples of applications” (p. x). He concludes: “To induce more applications…This will require the creation and promulgation of both hypothetical (as in this book) and real applications in as many domains as possible” (p. 219).
Community-Based Prevention Marketing for Policy Development. To this end, the research presented here is a case study of an upstream social marketing project: Community-Based Prevention Marketing for Policy Development. To meet community coalitions’ need for a systematic planning framework and toolkit with which to translate evidence-based policies into practice, the Florida Prevention Research Center at the University of South Florida (USF Health, 2013) adapted its original Community-Based Prevention Marketing framework (C. A. Bryant et al., 2007) in order to help community coalitions select evidence-based policies and create strategic marketing plans to promote and implement them.

Community-Based Prevention Marketing for Policy Development (hereafter referred to as CBPM) is a community-driven planning process that blends elements of evidence-based decision making, social marketing, and policy advocacy to enhance coalitions’ capacity to promote policy change at the organizational, local, and state levels. Community coalition members not only select the policies they want to promote, but also learn social marketing research and strategy techniques for gaining insights into factors that influence how policy beneficiaries, stakeholders, and decision makers view and make decisions about policy change. These insights enable coalitions to modify evidence-based policy elements and frame issues to build common ground, optimize support, and more effectively influence decision makers.

The CBPM framework is comprised of eight steps and divided into three phases: Get Ready (Steps 1–3); Get Set (Steps 4–6); and Go (Steps 7–8). Each step within a phase directs the coalition’s attention to key questions. The purpose of each of the eight steps is as follows: (1) Build a strong foundation for success; (2) Review evidence-based policy options; (3) Select a policy to promote; (4) Identify priority audiences among beneficiaries, stakeholders, and policymakers; (5) Conduct formative research with priority audiences; (6) Develop a marketing
plan for promoting the policy; (7) Develop a plan for monitoring implementation and evaluating impact; and (8) Advocate for policy adoption.

From September 2010–2014, the Florida Prevention Research Center initiated a demonstration project to test the CBPM framework with a community coalition in Lexington, Kentucky. That project generated various types of evaluation data over a period of almost four years. Those data were inputs for the present case study. In the sections below, each of the CBPM steps is described briefly and then illustrated with the pilot project implemented by the coalition.

**Step 1: Build a strong foundation for success.** The initial step is designed to help a coalition understand the CBPM process and the resources needed to implement it successfully. The framework assumes that a coalition has selected a public health issue for which evidence-based policies exist. The primary goal of the Lexington community coalition was obesity prevention among local youth.

**Step 2: Review evidence-based policy options.** In this step, the coalition reviews evidence-based policies and eliminates those it is either unwilling or unable to promote. During the Lexington meeting, coalition members were invited to nominate policies they felt should remain on the list, and speak briefly about the reasons their policy deserved further consideration. Six policy options remained on the short list (e.g., requiring government agencies to purchase local foods; increasing access to healthy foods in food deserts; and zoning for/promotion of facilities allowing the processing and preparation of local foods by small scale entrepreneurs).
**Step 3: Select a policy to promote.** Once a set of policy options is defined, the concept of “return on investment” (ROI) is applied to these options to help the coalition select a policy (or possibly, two policies) for which to advocate. For this demonstration project, the university social marketing team gathered information on each of the six policy options selected for further consideration and prepared a summary to equip the coalition with information needed to assess the potential ROI of each. The majority of members indicated that they believed “increased access to healthy foods in small stores serving food deserts” would have a significant impact and strong likelihood of success.

**Step 4: Identify priority audiences among beneficiaries, stakeholders, and policymakers.** In this step, the coalition identifies groups and individuals that: (1) will be affected directly by the policy (*beneficiaries*), (2) have a stake in its outcome (*stakeholders*), or (3) decide if it is enacted (*policymakers*). The coalition identified three audience groups: (1) owners of small stores in food deserts; (2) residents living in these communities; and (3) local politicians, including council members and the mayor.

**Step 5: Conduct formative research with priority audiences.** With priority segments in mind, the coalition conducts formative research (“listening sessions”) to gain understanding of how beneficiaries, stakeholders (potential supporters and opponents), and policymakers view the policy issues. Some coalition members volunteered to make the initial contacts, and nine members participated in interviews.
Step 6: Develop a marketing plan for promoting the policy. The coalition uses research findings from each priority segment to make the marketing decisions that comprise an integrated strategic marketing plan. University-based social marketers prepared a strategy workbook that summarized key formative research findings (Step 5) for each of the strategy components comprising an integrated marketing plan for policy development. Subsequently, they facilitated a six-hour meeting in which coalition members used these findings to discuss a series of marketing questions corresponding to each marketing plan component.

Step 7: Develop a plan for monitoring implementation and evaluating impact. As part of the marketing plan, the coalition develops an evaluation plan to use in monitoring progress, identifying the need for mid-course revisions to ensure strategic "on-message" direction, and assessing policy impact. As the momentum of pilot activities grew in the demonstration project, attention was diverted from developing a systematic evaluation and monitoring plan to launching the pilot projects.

Step 8: Advocate for policy adoption. The marketing plan serves as a blueprint for the coalition’s advocacy activities. A chairperson or subcommittee helps members communicate with others about successes (e.g., media coverage, sponsorship by key stakeholders, etc.) and obstacles that must be overcome so advocacy strategies are adjusted to fit the changing policy scene. In the demonstration project, the coalition readily became focused on planning events and coordinating pilot efforts instead of always referring to the marketing plan.
Objectives. To recap, the CBPM framework provides community coalitions with a systematic approach and toolkit to select evidence-based policies and prepare marketing strategies to promote policy change. The present case study employed evaluation data collected over a period of almost four years, from a demonstration project to test the CBPM framework. Although the present study goes beyond the conceptual realm, the framework is still undergoing developmental evaluation (Patton, 2011). The author’s goal was to explicate the framework’s theory-of-change so that subsequently it can be tested in practice. The research question is: “What are the linkages and connections between CBPM inputs, activities, immediate outcomes, intermediate outcomes, and ultimate impacts?”

This is a complex research question; and one of the tools within the developmental evaluation toolkit for handling such complexity is system dynamics modeling. According to the System Dynamics Society’s website, “System dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems -- literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality” (System Dynamics Society, 2011). A number of authors have argued for the utility of systems science methods in general (Livingood, et al., 2011; Luke & Stamatakis, 2012; Mabry, et al., 2008) and system dynamics modeling in particular (Homer & Hirsch, 2006; J. D. Sterman, 2006) for understanding complex phenomena such as community-based innovations.

The author believes that the field of social marketing would benefit from learning about and integrating a system dynamics approach. The author (B. J. Biroscak, T. Schneider et al., 2014) previously published findings from the first phase of CBPM theory-of-change work—i.e., problem articulation and dynamic hypothesis formulation. This paper covers the second phase
and addresses two aims, which correspond to the next two steps of system dynamics modeling (J. Sterman, 2000), respectively:

Aim 1. To formulate a computer simulation model to test the dynamic hypothesis of the CBPM framework’s theory-of-change

Aim 2. To validate the computer simulation model

Method

The research strategy for the present work is most closely related to case study research (Woodside, 2010; Yin, 2009). An important first step related to sampling within a case study design is to decide upon the unit of analysis. The unit of analysis here was at the level of the community coalition. Another distinction in designing case studies is between single- and multiple-case designs (Yin, 2009). The present study employed a single-case design, with the case being a community coalition. The context in which the case study was done is normative (Keller, 1989)—i.e., relating to an ideal standard for CBPM adoption and implementation.

The methods used here follow the general approach to system dynamics modeling detailed in Sterman (2000), which has been cited more than 1,200 times in Web of ScienceSM. The steps of the modeling process are listed in Table 5 (J. Sterman, 2000, p. 86).

System dynamics modeling. Briefly, the research presented here covers Steps 3–4 of the system dynamics modeling process. Research covering Steps 1–2 was reported in a prior publication (B. J. Biroscak, T. Schneider et al., 2014). However, for the sake of comprehensiveness, they are briefly described here. Group model-building (Vennix, 1996, 1999)
was used during each of the steps, which is a highly participatory approach to system dynamics modeling. **Step 1. Problem Articulation (Boundary Selection):** The author engaged group model-building participants in exercises to identify key variables, time horizons, and reference modes pertaining to CBPM dynamics. **Step 2. Formulation of Dynamic Hypothesis:** The author used extant data—e.g., observation notes from meetings where the initial coalition (Lexington, KY) to test CBPM was trained on the framework—to develop causal diagrams of the feedback processes hypothesized to be responsible for CBPM dynamics; and the dynamic hypothesis was revised with input from modeling participants.

**Table 5. Steps in the system dynamics modeling process**

<table>
<thead>
<tr>
<th>Originator</th>
<th>Steps in the Modeling Process</th>
<th>Key Activities</th>
</tr>
</thead>
</table>
| Sterman (2000) | 1. Problem Articulation (Boundary Selection) | • Theme selection  
• Key variables identification  
• Time horizon specification  
• Dynamic problem definition (reference modes) |
| | 2. Formulation of Dynamic Hypothesis | • Initial hypothesis generation  
• Causal mapping |
| | 3. Formulation of a Simulation Model | • Specification of model structure  
• Estimation of parameters |
| | 4. Testing | • Comparison to reference modes  
• Robustness under extreme conditions  
• Sensitivity testing  
• “...Many other tests (see Sterman)” |
| | 5. Policy Design and Evaluation | • Scenario specification  
• Policy design  
• “What if…” analysis  
• Policy interaction assessment |
Again, the research presented here covers Steps 3–4 of system dynamics modeling. **Step 3.** Formulation of a Simulation Model: The qualitative, causal diagram generated from Steps 1–2 was converted into a quantitative, computer simulation model. **Step 4.** Testing: The simulation model was validated using a variety of standard tests (e.g., comparison of model behavior to reference datasets). What is typically the fifth and final step of the modeling process, **Step 5.** Policy Design and Implementation—i.e., using the model to implement decisions and strategies in the real world—is beyond the scope of this project.

**Formulation of a simulation model.** Based on research covering Steps 1–2 (B. J. Birosck, T. Schneider et al., 2014), the problem to be modeled was identified as: “How does implementing the CBPM framework improve coalition performance?” To address this question, the author developed a computer simulation model of implementation of CBPM and its impact on coalition performance. The feedback mechanisms explicated during Steps 1–2 (B. J. Birosck, T. Schneider et al., 2014) are operationalized through a system of integral equations representing a theory of implementation and coalition performance.

Simulation model equations were based on system dynamics models identified in the literature. That is, the author used a generic structure as a precursor to building a model of the current problem (Lane & Smart, 1996). Specifically, Hovmand and Gillespie’s (2010) simulation model for considering how innovation implementation impacts organizational performance was used here. The structural representations generated in Step 2 (B. J. Birosck, T. Schneider et al., 2014) were integrated with Hovmand and Gillespie’s model in an iterative manner. Qualitative data (e.g., interviews) are almost never sufficient for developing causal diagrams and must be
supplemented by other sources of information—including the published literature (J. Sterman, 2000).

In system dynamics modeling, stock variables (or level variables) determine the state of a system (Coyle, 1996; J. Sterman, 2000). Whereas stocks represent conserved quantities (tangible or intangible), rate variables (or flow variables) represent changes to conserved quantities (Coyle, 1996; J. Sterman, 2000). Table 6 lists the major stock variables in the model along with their general definition and source of definition. The definitions of stock variables were adapted from the sources indicated in the table.

Because stocks determine the state of a system, their initial values are of import. Identical to Hovmand and Gillespie (2010), initial conditions for each of the stocks were calculated to start the simulation in dynamic equilibrium for coalitions at full strength of coalition culture (see Table 6). Delphi groups conducted with the co-creators of the CBPM framework were used to elicit parameters and nonlinear relationships. During the first Delphi round, the author asked each participant to individually give an estimate for an unknown parameter (e.g., “Percentage change in X with respect to differences in Y”). After summarizing individual judgments for the group, the author administered a second Delphi round. The Delphi technique was executed using Qualtrics® online survey software.

Also similar to Hovmand and Gillespie, the dynamic behavior of the factual case (CBPM implementation) was compared against the dynamic behavior of the counterfactual case (no implementation). Thus, the difference was calculated as shown in Figure 15. The system dynamics model was developed using Vensim® PRO software. A detailed listing of the equations is beyond the scope of this paper. However, a complete listing of equations is available upon request.
**Table 6. Main variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coalition culture</td>
<td>Pattern of basic assumptions that a community coalition has adopted in learning to cope with its problems, and that have worked well enough to endure because they have meaning for members of the coalition</td>
<td>Adapted from Martin (2002) and Schein (1984)</td>
</tr>
<tr>
<td>Commitment</td>
<td>Attachment to or determination to reaching a goal by using a newly adopted innovation</td>
<td>Adapted from Repenning (2002)</td>
</tr>
<tr>
<td>Perceived performance</td>
<td>Function of perceived coalition effectiveness and perceived coalition efficiency</td>
<td>Adapted from Hovmand and Gillespie (2010)</td>
</tr>
<tr>
<td>Strategic orientation</td>
<td>Defined in terms of “the business the coalition is in and how it competes”; can be described by the set of coalition activities</td>
<td>Adapted from Pala and Vennix (2001)</td>
</tr>
<tr>
<td>Workload</td>
<td>Number of community residents being targeted by the coalition with its community initiatives</td>
<td>Adapted from Hovmand and Gillespie (2010)</td>
</tr>
<tr>
<td>Pressure to change</td>
<td>Pressure on coalition leader(s) to improve coalition performance</td>
<td>Adapted from Hovmand and Gillespie (2010)</td>
</tr>
</tbody>
</table>
**Figure 15. Quantitative hypothesis to assess change in performance**

*Model testing*. The complexity of change in dynamic systems—such as a community-based coalition adopting a multistage innovation like CBPM—makes model testing essential (Coyle, 1996; J. Sterman, 2000). Model testing is an iterative process, as outlined by Sterman (2000). This included assessing the model for dimensional consistency (i.e., consistency of equation units) and comparing simulated behaviors against known behavior patterns from organizational theory (P. S. Hovmand & Gillespie, 2010). Comparisons were also made between the model structure and behavior and arguments made about the system’s structure and behavior.
that originated from the mental models of CBPM’s developers and users (B. J. Birosck, T. Schneider et al., 2014)—i.e., a form of face validity check.

Findings

In this section, the author presents findings from the use of both qualitative and quantitative data for systematically formulating and testing the CBPM framework’s theory-of-change. As a reminder, this represents the author’s best estimate of the theory-of-change, to be tested in subsequent research. First, an overview of the model’s most important feedback loops is presented, followed by a discussion of the computer simulation results.

Overview of model. The complete, formal simulation model based on the causal loop diagram presented in Birosck et al. (2014) and rooted in Hovmand and Gillespie (2010) contains many interacting feedback loops. However, only a small set of dominant feedback loops is usually required to understand the general pattern of system behavior (Meadows, 2008). The results presented here primarily involve three feedback mechanisms: reorientation, community support, and maintenance (Figure 16). The first is identical to the general model adapted from Hovmand and Gillespie (2010), whereas the other two mechanisms have been slightly modified. As in Hovmand and Gillespie, Table 7 lists the three main feedback mechanisms along with brief descriptions and validation from the comments of developers of the CBPM framework and members of the coalition in Lexington, Kentucky that tested the framework.
Reorientation mechanism. Strategic reorientation (see B1 in Figure 16) is a balancing process that counteracts the initial discrepancy between the required and current strategic orientation of a community coalition. “Strategic orientation” is defined in Table 6, along with the other stock variables. The model represents the process of reorientation in a manner identical to Hovmand and Gillespie (2010), which was based on the model by Sastry (1997), where the coalition takes action following recognition of a gap between the current and required strategic
direction. At any point in time, a coalition’s environment may demand a different strategic direction from the coalition.

The required strategic direction represents the set of external criteria that are applied to the coalition and used to evaluate its effectiveness (P. S. Hovmand & Gillespie, 2010). If the gap between the required strategic direction and coalition’s strategic direction increases, its effectiveness and hence performance decrease below what they would have been otherwise. This increases the pressure to change (P. S. Hovmand & Gillespie, 2010).

**Community support mechanism.** Community support is a balancing process (see B2 in Figure 16) where the coalition seeks to increase the amount of support it receives from the community by changing its strategic direction (P. S. Hovmand & Gillespie, 2010). Community coalitions depend on a community being willing to support its initiatives (Golub, Charlop, Groisman-Perelstein, Ruddock, & Calman, 2011; Kegler, Steckler, Malek, & McLeroy, 1998). The effect of community support is mediated by funding. Reductions in coalition effectiveness can lead to a decline in community support and funding, which lowers both the available resources per resident and collaborative synergy.

**Maintenance mechanism.** Maintenance refers broadly to a process whereby coalition member involvement is sustained and collaborative synergy created (Butterfoss & Kegler, 2009) (see R1 in Figure 16). This process is represented as a function of increasing coalition culture. As the coalition’s culture strengthens and increases collaborative synergy, efficiency and perceived performance increase, which reduces the pressure to change. With less pressure to change, coalition members become acculturated; and the coalition becomes more stable.
Table 7. Main feedback mechanisms

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Label</th>
<th>Description</th>
<th>Key Informants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reorientation</td>
<td>B1</td>
<td>Coalition changing its strategic orientation to meet the demands of its environment</td>
<td>“Everyone’s [sic] is telling us to do policy. It’s the buzzword we all know that it’s the place where we’re going to have the most leverage, but we don’t know how to do it and it’s scary. It’s new territory, to have something systematic to guide us is very helpful. I think we could just get in and flounder if we didn’t have these set of steps to follow.”</td>
</tr>
<tr>
<td>Community support</td>
<td>B2</td>
<td>Coalition changing its strategic orientation to increase community support, expand initiatives, and obtain resources needed</td>
<td>“…it’s made us listen more and to engage the people that were [sic] serving more…we opened up more for them to be a part of the conversation…many of them have become advocates as they were engaged in this process not as coalition members but as advisors and then - it feels like something - it just brought our community together in a way that I’ve never experienced before.”</td>
</tr>
<tr>
<td>Maintenance</td>
<td>R1</td>
<td>Maintaining coalition member involvement and creating collaborative synergy</td>
<td>“…the power of a coalition really comes out when you get to action. They’re sitting there and we’re training and leading them through the first paces and then all of a sudden, it’s time to go do…and they just - there’s no way my university could have gotten in three months that program up and running. There’s no way with 100 students. I mean, we just couldn’t have done it but they had 50 people with 50 friends with business [sic] and they - boom, they had all these action outlets overnight.”</td>
</tr>
</tbody>
</table>
Simulation results. Figure 17 shows the simulation results for the counterfactual case (see Figure 15) in the form of an input-output object, which readers may interpret as sort of a ‘dashboard.’ The left-hand side of Figure 17 displays a number of key parameters. Listed underneath “Planned Organizational Changes” are parameters tied to Required Strategic Orientation, Desired Increase in Performance, and Efficacy (see Figure 16). Located underneath “Planned Organizational Changes” are parameters related to the initial conditions of the model.

As noted above, the decision to adopt and implement the CBPM framework has two components: the strategic decision to adopt and implement CBPM and the goal of improving coalition performance. The decision to adopt and implement CBPM means that the coalition changes the basis of its legitimacy to one based on evidence-based decision making, business principles (e.g., marketing), and policy advocacy. However, in the counterfactual case, a community coalition might undergo a self-directed change in strategic orientation. This was represented as a 30% change in the Required Strategic Orientation following an approach similar to Hovmand and Gillespie (2010) and Sastry (1997). Likewise, change in Desired Increase in Performance was represented as a 30% increase relative to initial performance. Lastly, Percent Change in Efficacy is shown as being equal to zero as this is the counterfactual case (i.e., no CBPM implementation).

The right-hand side of Figure 17 displays the behavior over time of the three key outcome variables for a community coalition’s performance: Effectiveness, Efficiency, and Perceived Performance. At month 12 of the simulated scenario, the abovementioned changes in parameters occur. The immediate result is a drop-off in all three outcomes. Over time, all three rebound; but coalition Effectiveness does not rebound to its pre-changes value.
Figure 17. Input-output object: counterfactual case
Figure 18. Input-output object: factual case
Figure 18 displays the results when the implementation case (i.e., factual) is compared against the no-implementation case (see Figure 15). In the factual case, Percent Change in Efficacy is shown as being equal to approximately 30 percent (i.e., effect of CBPM implementation). The system behavior representing the counterfactual is now displayed with the red line, and the factual with the blue line. The behavior-over-time graphs reveal that any disparities in Effectiveness are offset by gains in Efficiency and Perceived Performance from CBPM implementation.

Discussion

This article began by noting the assertion that social marketing grew in popularity during the 1990s due in part to its effectiveness at bringing about behavior change in people with “bad behaviors” (e.g., overeating, sedentary living, etc) (Andreasen, 2006). This observation is a bit ironic when one considers what was happening in the field of public health at the time. Nearly 25 years ago, McLeroy, Bibeau, Steckler, and Glanz (1988) published what has since become a seminal piece in the literature on disease prevention and health promotion (e.g., cited over 1,100 times according to Web of ScienceSM). McLeroy and colleagues cautioned that the lingo and frameworks of the time may have inadvertently served to “focus attention on changing individuals, rather than changing the social and physical environment which serves to maintain and reinforce unhealthy behaviors” (p. 353). Consequently, the authors proposed an ecological model for health promotion by positing that patterned behavior is determined by different levels of factors—i.e., intrapersonal factors, interpersonal processes, organizational factors, community factors, and public policies.
Similar to how public health professionals may have focused too much on “changing individuals,” social marketers may have focused too much on ‘downstream’ marketing. In the literature review above, the author identified two knowledge gaps in the social marketing literature regarding an ‘upstream’ approach. First, it was noted that the ‘upstream’ social marketing writings to date seem to have focused on the behavior of individuals. However, the present case study has demonstrated that different levels of upstream social marketing are possible. That is, the developers of the CBPM framework could have, for example, attempted to prevent obesity in Lexington, Kentucky directly by developing a social marketing initiative targeting ‘tweens’ in the community. Instead, the Florida Prevention Research Center went ‘upstream’ to influence the behavior of a community coalition. Moreover, the coalition in Lexington could have addressed its target audience (‘tweens’) directly with a social marketing initiative; but instead they used the CBPM framework to work ‘upstream’ for policy change.

The second but related gap in the knowledge base concerned how to do ‘upstream’ social marketing. Again, the dangers of an excessive focus on ‘downstream’ social marketing have been well articulated. For example, Donovan (2011) identified as one of social marketing’s mythunderstandings: “social marketing’s first and foremost defining characteristic is that it is about behaviour change” (p. 10), which “might inhibit attempts to look ‘upstream’ for what is influencing the behaviours of interest” (p. 10). Although it was noted above that early advice about how to do ‘upstream’ social marketing was largely conceptual, it does not appear that the field has experienced much growth in terms of empirical, upstream applications. From the perspective of Wymer (2011) regarding social marketing textbooks: “After dedicating a chapter to upstream issues, authors commit the rest of the book to treat social problems with individual
behavioral change solutions” (p. 21). The author hypothesizes that this is due in part to a lack of case studies from which social marketers can draw upon.

To address this deficiency, the author’s goal was to explicate the CBPM framework’s theory-of-change so that subsequently it can be tested in practice as a precursor to summative evaluation. It is important to reemphasize that the present model represents the author’s best estimate—the model still needs to be tested longitudinally. However, the approach is illustrative of how social marketers can open up the ‘black box’ of upstream interventions.

In each of the simulation analyses, Pressure to Change appears to be a leverage point for whether or not the coalition was able to complete the reorientation process (feedback mechanism B1) before the maintenance process (feedback mechanism R2) took effect. The higher is the Pressure to Change, the faster is the reorientation process and the greater is the likelihood that the coalition would be able to close the gap between the coalition’s actual and required strategic direction. Success depends on the implementing organization being able to complete the change in strategic direction before the maintenance process takes over (P. S. Hovmand & Gillespie, 2010).

The results suggest that early declines in community support (B2)—due to early reductions in effectiveness—cause an initial decline and recovery in coalition performance, followed by a period where the reorientation process (B1) dominates, and then the maintenance process (R1) takes over as coalition culture begins to rebuild. Depending on how fast the reorientation process is relative to the maintenance process: that determines whether or not the coalition experiences an overall benefit from the implementation process (P. S. Hovmand & Gillespie, 2010). However, if the maintenance process takes over before the reorientation process
is sufficiently complete, then the coalition essentially locks into limits on how far it can improve the way it delivers initiatives for its community.

**Limitations.** There are limitations that need to be addressed in future research. A first limitation is that the case study presented here is based on a singular, normative coalition for CBPM adoption and implementation. It remains to be seen how closely the real-world dynamics match what has been hypothesized here. Moreover, the original community coalition that pilot tested the CBPM framework was asked to test the framework, and therefore, “Reorientation” (loop B1 in Figure 16) from a program to policy orientation was a required feature of the partnership. This will not match the experience of other coalitions that adopt and implement the framework.

Furthermore, the evaluation data that informed the qualitative model were based on the experiences of a coalition that implemented the CBPM framework following in-person training sessions of each step. The current training modality is the CBPM website (http://health.usf.edu/publichealth/prc/policy/index.htm), which gives coalitions practical planning tools—e.g., worksheets, group exercises, links to helpful websites, and other resources—to guide them in the policy development process. However, it is important to recall the purpose of the present research, which is to inform the real-world testing of the CBPM framework’s theory-of-change so that it can eventually be tested in practice.

A second limitation concerns the estimation of values for system dynamics equations. Delphi groups conducted with the co-creators of the CBPM framework were used to elicit several parameters and nonlinear relationships. The author stopped after two rounds of Delphi surveys. It has been reported that a reasonable level of agreement can be expected after three or
four rounds (Luna-Reyes & Andersen, 2003). Anecdotally, a few of the Delphi participants reported difficulties providing estimates. Therefore, a better approach may have been to supplement the Delphi technique with the conduct of interviews with experts from the field (e.g., community coalition researchers). However, sensitivity analysis tools were used in Vensim PRO® to examine the sensitivity of results to assumptions about uncertainty in the values of parameters.

Conclusion

This paper is offered as one example of how social marketers can go ‘upstream.’ CBPM is certainly not the only framework. For example, Farrell and Ross (2012) have demonstrated “how the critical social marketing framework can be applied in practice, to inform social marketing activity in the upstream and downstream environment” (p. 138). Gordon (2011) has also noted, “The ability of critical social marketing to inform the research and evidence base, as well as upstream and downstream activity” (Gordon, 2011, p. 82). These quotes should serve as important reminders that we be careful about not letting the pendulum swing too far in the direction of ‘upstream’ social marketing. That is, ‘downstream’ social marketing still holds much value. The author agrees with Hoek and Jones (2011) in that upstream and downstream social marketing should be seen as complementary. Nevertheless, given the dearth of real-world applications of upstream social marketing, the present case study is a valuable contribution to the literature.
Section 4. Conclusions and Recommendations

Since 1998, the Florida Prevention Research Center (FPRC) has been uniquely positioning itself to equip state and local public health practitioners and their community partners to influence policy- and environmental-oriented change because of its innovative planning approach: Community-Based Prevention Marketing (CBPM). The CBPM portfolio recognizes the importance of addressing determinants at the individual, interpersonal, organizational, community, and societal levels to bring about desired change. It is based on the premise that individual behavior change is enhanced by multilevel changes that make it easier, less expensive, and more appealing for individuals to practice healthy behaviors.

To date, the FPRC has developed frameworks to help community-based coalitions design behavior change programs—*CBPM for Program Development* (C. A. Bryant et al., 2007; C. A. Bryant et al., 2010; C. A. Bryant, Forthofer, McCormack Brown, Landis, & McDermott, 2000)—and policy change strategies—*CBPM for Policy Development* (Carol A. Bryant et al., 2014). The focus of the present case study is the latter framework. A couple of attempts have been made to evaluate the merits of the CBPM for Policy Development framework (hereafter referred to as CBPM). For example, Mayer and colleagues (2013) assessed the academic-community collaboration between the FPRC and Lexington (Kentucky) Tweens’ Nutrition and Fitness Coalition. To assess this collaboration, the partners co-created an instrument to measure the partnership’s various dimensions. Also, Mayer and colleagues (In press) have prepared a book chapter on the overall framework. However, CBPM has yet to be subjected to a summative evaluation that judges the overall effectiveness of the framework.
The dissertation research reported here was designed to address the problem of ‘how’ to explicate the framework’s theory-of-change so that subsequently it can be tested in practice. Deciphering the theory of change is also a precursor to summative evaluation (Patton, 2012). If CBPM is subsequently deemed ready for summative evaluation, found to have merit, and adopted by community coalitions, this project will have contributed to increased community capacity. Although these are unknown outcomes at this point, what is more certain are the implications— theoretical and practical—of the dissertation findings.

Implications

This section includes a discussion of the implications involved in interpretation of the dissertation findings. The implications of the dissertation findings for the field of social marketing relate primarily to the abovementioned material on ‘upstream’ social marketing. Given the brief historical review of ‘upstream’ social marketing presented above, here the author will elaborate on the discipline’s past, present, and future.

Social marketing historiographies. Previous authors have attempted to trace the history of social marketing theory and thought using a variety of perspectives (e.g., Andreasen, 2003; R. C. Lefebvre, 1996; Shoreibah, 2009). Andreasen examined the history of social marketing through the use of analogy. The life trajectory of social marketing was compared to the growth and maturity of human beings. One problem with such an approach is that human beings eventually die—a fate that social marketers hope to avoid for their field. More recently, Shoreibah borrowed the marketing period labels used by Bartels (1962) and applied them to periods delineated by accomplishments in the field of social marketing. A potential problem with
this approach is that it assumes (a) Bartels’ periods are appropriate for marketing in general and (b) social marketing proceeds though exactly the same periods of development.

It is from a diffusion of innovations perspective that the author approaches this social marketing historiography. Rogers (2003) defines an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p. 12); thus, social marketing may be considered an innovation. One criticism of past diffusion studies is that they typically begin with an examination of the very first adopters of an innovation (Rogers, 2003). However, diffusion is but a later phase of the overall sequence through which an innovation proceeds. The process typically begins with the recognition of a problem or need and ends with the consequences of the diffusion process. The entire sequence of pre- and post-diffusion activities and decisions is an important part of the innovation-development process.

However, the innovation-development process appears to share much in common with new-product development and product life-cycle strategies from commercial marketing (G. Armstrong & Kotler, 2007). For example, the most obvious connection is in the similarities between new products and innovations in general. The author will select from each theoretical framework—diffusion of innovations and product-life cycle—as appropriate. The foci here is on the origins of social marketing thought and practice; distinctions between academic and practitioner approaches to the subject; and suggestions for future research and theory development in social marketing.

**The genesis of an innovation.** Some authors have claimed that social marketing existed long before the term was coined (R. C. Lefebvre, 1996; Shoreibah, 2009). However, this claim seems tenuous. For example, Shoreibah provided the example of the United Kingdom’s National
Council for Combating Venereal Diseases as an early example (1910s and 1920s) of social marketing. As presented, this case is nothing more than an example of health education or social advertising (e.g., posters, pamphlets, and lectures). In an attempt to reach as far back into history as possible so as not to miss any early social marketing events, authors need to be careful that what they grab is actually social marketing.

Where did social marketing come from? More generally, where do any innovations come from? Again, according to a diffusion of innovations perspective, innovations begin with recognition of a problem or need (Rogers, 2003). Similarly, the product-life cycle perspective suggests that new-product development begins with idea generation—i.e., the systematic search for new-product ideas (G. Armstrong & Kotler, 2007). The author combines the diffusion of innovations and product-life cycle perspectives in this early phase to examine the origins of social marketing. It will be argued that there was first a recognition of a problem or need, followed by development of the product concept that would eventually be known as social marketing.

**Recognition of a problem or need.** The innovation-development process often begins with recognition of a problem or need, which stimulates a systematic search for solutions (i.e., new-product ideas). Recognition of the problem or need that eventually led to the concept of social marketing actually came from outside of the marketing discipline. In the Winter 1951-1952 edition of *Public Opinion Quarterly*, G.D. Wiebe famously asked: “Why can’t you sell brotherhood and rational thinking like you sell soap?” (p. 679). At the time, Wiebe was a Research Psychologist for the CBS Radio Network and Lecturer in psychology at The City College of New York. The fact that Wiebe was a marketing outsider may have allowed him to
recognize a problem—and plant the seed for a potential solution—theretofore unnoticed by marketing academicians.

In the study of consumer behavior, “problem recognition” is defined as the perceived difference between an ideal and actual state (Hoyer & MacInnis, 2007). In Wiebe’s case, the ideal state was the successful use of advertising media for the purpose of assisting efforts designed for “molding behavior and habit patterns in such areas as citizenship responsibility and community participation” (1951-1952, p. 679). The implied actual state was that social scientists were generally less effective at achieving social objectives than their marketing counterparts were at achieving commercial objectives. Wiebe suggested that problem resolution was possible using advertising media; but this was dependent on a minimum set of conditions known to influence the selling of commodities. For example, he asserted that radio and television advertising alone were unlikely to bring about pro-social behavior change (e.g., adherence to a healthy diet). The role of the social advertiser interested in facilitating such change, as Wiebe described it, was that the advertiser “sets up, or affiliates with, a social mechanism in which the behavior motivated by his advertising may be consummated with a minimum expenditure of energy” (p. 680). While he presented a number of case studies to illustrate his line of thinking, it would be almost 20 years before any marketing academicians further developed Wiebe’s idea.

**Concept development and testing.** According to diffusion of innovations theory, the second phase in the innovation process is *basic and applied research*. That is, an innovation may result from “a sequence of (1) basic research, followed by (2) applied research, leading to (3) development” (Rogers, 2003, p. 140). However, a product-life cycle perspective, which suggests that an attractive idea (e.g., “selling brotherhood like soap”) first must be developed into a
product concept and then tested with groups of target consumers (G. Armstrong & Kotler, 2007), seems more appropriate for the history of social marketing.

**Concept development.** A product concept is a detailed version of a new-product idea stated in meaningful consumer terms (G. Armstrong & Kotler, 2007). The first designers credited with developing the concept of social marketing were Philip Kotler and Sidney Levy in their seminal paper on broadening the concept of marketing. Kotler and Levy (1969a) described what they saw as a failure by marketing academicians of the time to recognize that marketing was “a pervasive societal activity” with principles and strategies that were “transferrable to the marketing of services, persons, and ideas” (p. 10). According to Kotler and Levy, because every organization performed marketing-like activities (e.g., persuading target audiences to engage in a particular behavior) whether or not they were recognized as such, marketers had much to offer non-business organizations. In order for their vision to be realized, Kotler and Levy called for a broadened concept of marketing—one of “serving and satisfying human needs” (p. 15).

Two years later, Kotler collaborated with Gerald Zaltman to give social marketing its name. In “Social marketing: An approach to planned social change” (Kotler & Zaltman, 1971), the authors set out to demonstrate the applicability of marketing concepts to a range of social problems. In the process, they described the limitations of an excessive reliance on advertising to achieve social objectives (i.e., social advertising). That is, an experienced commercial marketer would not rely on a promotional strategy to the exclusion of any product, price, and placement considerations. To emphasize this point, the authors provided the first known definition of social marketing: “Social marketing is the design, implementation, and control of programs calculated
to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution, and marketing research” (p. 5).

Kotler and Zaltman (1971) then examined each of these variables in terms of some well-known social issues to illustrate the promise of a social marketing framework for planning and implementing social change. Not only did this article contain the first known definition of the term, but it also contained the first proposed social marketing planning system. The authors were careful in noting that a social marketing approach would not necessarily guarantee achievement of a particular social objective. However, the sentiment of the authors was clear—social marketing was seen as a useful framework for change. Of note, that first definition did not specify “behavior change” as the bottom-line for social marketing initiatives.

In looking back at the initial development of the concept, Andreasen (1994, 1997) reiterated that social marketing’s roots from within marketing were part of broader efforts by faculty at Northwestern University’s School of Business to achieve two overlapping goals: (a) broaden the conception of marketing beyond commercial transactions and (b) establish something akin to a generic type of marketing. However, not everyone within the marketing establishment was ready to accept Northwestern’s vision of an expanded role for marketing.

*Concept testing.* Concept testing is the exploration of new-product concepts with a group of target consumers to find out if the concepts have strong consumer appeal (G. Armstrong & Kotler, 2007). The target consumers at the time of social marketing’s conception would have been other marketing academicians. As “Luck” would have it, at least one marketing scholar was ready to put the social marketing concept to the test. Approximately six months after the publication of Kotler and Levy’s (1969a) paper calling for a broadened concept of marketing,
David Luck (1969) wrote a rejoinder that took exception to a concept such as social marketing. For example, he suggested that a broadened concept of marketing like that proposed by Kotler and Levy might result in marketing no longer being “bounded in terms of either institutions or the ultimate purpose of its activities” (Luck, 1969, p. 53). It was rejoinder time as Kotler and Levy (1969b) responded to Luck’s comments within the same issue of *Journal of Marketing*. Responding to Luck’s assertion that the aim of marketing is “the ultimate purchase-and-sale of a product or service,” the authors responded with the following: “The form in which these products and services are paid for is less relevant than the exchange relationship itself” (p. 57).

If, as described above, concept testing is used to find out if a concept has strong consumer appeal, then the succession of journal articles over the years since Kotler and Levy’s (1969b) and Luck’s (1969) rejoinders would seem to suggest at least one thing—that broadening the marketing concept to encompass social marketing had appeal among academics in terms of debating its merits (e.g., Arndt, 1978; Enis, 1973; Laczniak & Michie, 1979). However, while some academicians continued to ponder the merits of a broadened concept, many other academics, practitioners, and organizations set about the task of developing the social marketing concept into a product for potential use.

**Academics vs. practitioners.** In the area of social marketing, it is not so easy to distinguish between academic and practitioner approaches to the subject. For example, in commercial marketing there are trade publications where practitioners might publish articles highlighting their approach to particular issues such as qualitative research. In social marketing, there are no trade publications or the like; and peer-reviewed journals tend to be the province of academics.
In keeping with the diffusion and product-life cycle perspectives utilized above, it appears that social marketing is still very much in the product development phase. Thus, one can think of academics and practitioners as each belonging to separate R&D departments, in order to think about how the two tend to employ different approaches to social marketing.

First, Andreasen (1993, 1994) has described what he perceives as a shortcoming of social marketing efforts carried out in the field: a failure to mind the bottom line (i.e., influencing behavior). In comparison to academic approaches to social marketing, practitioners seem to be more comfortable entering the political arena to advance their social objectives. For example, Goldberg (1995) urged social marketing academics to enter the political arena to advance the implications of their work. This may not be as easy for academics, however, due to lobbying restrictions on academics with grant funding. Additionally, social marketing practitioners are probably better versed than academics when it comes to engaging the community in a social marketing initiative. Community participation builds local ownership of an initiative and can help increase the sustainability of programs (Walsh, Rudd, Moeykens, & Moloney, 1993).

**Academics, practitioners and community members.** As the dissertation research presented here demonstrates, the above distinctions between academics, practitioners, and community members do not preclude the three working together. To meet community coalitions’ need for a systematic planning framework with which to translate evidence-based policies into practice, the Florida Prevention Research Center (FPRC) at the University of South Florida developed Community-Based Prevention Marketing for Policy Development. For Fiscal Years 2015–2019, the FPRC has developed an evaluation plan related to numerous outcomes: e.g., translation of research to practice; environmental system changes; and enhanced community
capacity for health promotion and disease prevention. These outcomes can be conceptualized as occurring at three levels—field of disease prevention and health promotion, FPRC communities served, and FPRC operations.

The FPRC’s **Project Period Goal 1** is: *FPRC activities increase translation of research into practice to facilitate widespread use of evidence-based programs and policies that enable changes to environmental systems.* Progress toward achieving this project period goal will be assessed via **Long-Term Measure of Success 1**: A minimum of six community coalitions use the FPRC’s model, *CBPM for Policy Development*, to completion, and a minimum of five demonstrate achievement of structural change objectives. The first project-period objective to be achieved in support of this goal is: “To complete developmental evaluation of FPRC’s Community-Based Prevention Marketing (CBPM) for Policy Development framework by 09/29/2015.”

The aforementioned FPRC objective for Fiscal Year 2015 calls for *testing* the CBPM framework’s theory-of-change. Thus, the dissertation research reported here has *explicated* the framework’s theory-of-change so that subsequently it can be tested in practice during Fiscal Year 2015. Again, if CBPM is consequently deemed ready for summative evaluation, found to have merit, and adopted by community coalitions, this project will have contributed to improved practice on the part of community coalitions.

**Limitations**

An evaluation of the strengths and weaknesses of the research was provided with each dissertation manuscript (above). Therefore, the limitations covered here will address the primary
methodologic choices in this dissertation: (1) case study design and (2) system dynamics modeling.

**Case study design.** A potential limitation of this dissertation pertains to the generalizability of findings. The research strategy for the present work is most closely related to case study research (Woodside, 2010; Yin, 2009). An important first step related to sampling within a case study design is to decide upon the unit of analysis. Defining the unit of analysis or “case” should flow from the question(s) the researcher is trying to answer; it is also related to one’s need to generalize (Yin, 2009). In the words of Yin (2009): “A fatal flaw in doing case studies is to conceive of statistical generalization as the method of generalizing the results of your case study…the mode of generalization is analytic generalization” (p. 38). Another distinction in designing case studies is between single- and multiple-case designs (Yin, 2009). The present study employed a single-case design, with the case being a community coalition. The context in which the case study was done is normative (Keller, 1989)—i.e., relating to an ideal standard for CBPM usage.

Yin (2009) suggests three criteria for selecting a case study research strategy. First, the type of inquiry should be of the ‘how, why?’ variety. In the opinion of Woodside (2010), “*deep understanding* of the actors, interactions, sentiments, and behaviors occurring for a specific process through time should be seen as the principal objective by the case study researcher” (p. 6). Yin’s second criterion regarding the appropriateness of case study research pertains to the extent of control the researcher has over the behavioral events under study, which was minimal here. Lastly, Yin suggests that case studies are fitting when the focus of research is on
contemporary rather than historical events. For the above reasons, a case study design was suitable here.

**System dynamics modeling.** The author previously described system dynamics modeling and its appropriateness for the present research (B. J. Birosck, A. D. Panzera et al., 2014; B. J. Birosck, T. Schneider et al., 2014). Briefly, system dynamics modeling can be characterized as the use of systems thinking, management insights, and computer simulation to hypothesize, test, and refine explanations of system change and use those explanations to guide decision making (Richardson, 2011). A dynamic, systems perspective stresses the importance, among other things, of linkages, feedback loops, and interactions among the system’s parts over time (Hawe et al., 2009).

In **Table 8**, the author has gone on to collect a number of criteria for deciding whether system dynamics modeling might be appropriate for a given problem. These have been culled from a variety of sources (e.g., Jackson, 2000; Lane, 2000; Luna-Reyes & Andersen, 2003; Pidd, 1998; Richardson, 1999; Vennix, 1996). Not included in the table but worth mentioning is a question that sometimes arises regarding system dynamics modeling—namely, “Is it necessary to use system dynamics modeling in light of the fact that more traditional modeling approaches have capabilities regarding feedback relationships?” The answer to this question could consume an entire chapter on its own—and in fact, it has (e.g., P.S. Hovmand, 2003). For the sake of brevity, and before moving on to a discussion of some limitations of the approach, the author acknowledges that other modeling approaches have capabilities regarding feedback relationships. But system dynamics is more than a modeling methodology—if embraced, it becomes an integral part of one’s worldview.
<table>
<thead>
<tr>
<th>Dimensions</th>
<th>When to Use</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit of description</td>
<td>Pattern of system behavior</td>
<td>Approaches for studying the behavior of individual agents can be incorporated into system dynamics models (e.g., via agent-based modeling).</td>
</tr>
<tr>
<td>Representation</td>
<td>Continuous</td>
<td>The choice of time horizon is relative to the problem under study—e.g., small-scale processes taking place over seconds can still be modeled with system dynamics.</td>
</tr>
<tr>
<td>Unit of analysis</td>
<td>Causal loop, link and loop polarity</td>
<td>If the problem of interest operates over a time horizon too narrow for feedback to be active, system dynamics modeling may be unnecessary.</td>
</tr>
<tr>
<td>Pattern of behavior</td>
<td>Nonlinear</td>
<td>Linear trends may be accommodated with simpler methods.</td>
</tr>
<tr>
<td>Process under study</td>
<td>‘Partially’ deterministic</td>
<td>The distinction between stochastic and deterministic systems is more a statement of the amount of knowledge about a system or the amount of control over that system exercised by an observer.</td>
</tr>
<tr>
<td>Types of data</td>
<td>Quantitative or qualitative</td>
<td>The largest store of data for the model building process resides in the system actors’ mental models (qualitative).</td>
</tr>
<tr>
<td>Purpose</td>
<td>Varies</td>
<td>System dynamics modeling can be used for describing (e.g., system structure), explaining (e.g., causes of system behavior over time), anticipating (i.e., anticipating the effect of intervention decisions), and designing systems.</td>
</tr>
</tbody>
</table>
The system dynamics modeling approach used here followed the general approach outlined in Sterman (2000). Each step has been annotated (below) with some of the strengths and weaknesses of the method.

**Step 1. Problem articulation (boundary selection).** Despite system dynamicists’ slight differences in terms of categorizing the steps to modeling (Luna-Reyes & Andersen, 2003), there seems to be widespread agreement that the most important step in modeling is problem articulation (J. Sterman, 2000; Vennix, 1996). System dynamics is especially suited for the types of problems characterized as “wicked” (see “Literature Review” in Appendix A), which is a strength of the discipline. However, this also hints at the intricacy of the modeling process. There is no cookbook approach to system dynamics modeling.

Moreover, establishing a clear model purpose is seen as a critical ingredient for a successful modeling experience. In the words of Sterman (2000): “The art of model building is knowing what to cut out, and the purpose of the model acts as the logical knife” (p. 89). The purpose as well as the initial characterization of the problem is usually developed with the input of the client. Again, this is a strength, especially when viewed through the practice-based evidence lens (see “Literature Review” in Appendix A). However, working with a client team to elicit information needed to define the problem dynamically requires more time up front.

The aforementioned weaknesses seem trivial in comparison to the benefits of characterizing the problem dynamically. “Events” are positioned at the top of the pyramid in **Figure 19** to symbolize their relative insignificance for understanding complex phenomena. Yet an event-oriented view of the world is what one receives each day from most of the news media.

In the words of Taleb (2005), “the world becomes more and more complicated and our minds are
trained for more and more simplification” (p. 39). However, the system dynamicist creates a reference mode showing the history of the problem over time. In the words of Sterman (2000): “Reference modes (so-called because you refer back to them throughout the modeling process) help you and your clients break out of the short-term event-oriented worldview so many people have” (p. 90). Once the problem has been characterized over an appropriate time horizon, the modeler develops a dynamic hypothesis to account for the behavior of the system.

**Figure 19. Events, patterns, and system structures**

**Step 2. Formulation of dynamic hypothesis.** As explained by Sterman (2000): “Your hypothesis is dynamic because it must provide an explanation of the dynamics characterizing the problem in terms of the underlying feedback and stock (i.e., levels) and flow (i.e., rates) structure of the system” (J. Sterman, 2000, p. 95). In practice, steps 1 and 2 overlap; thus, any interaction
the modeler has with stakeholders in articulating the problem will inevitably reveal their hypotheses about the source of the problem. A number of elicitation techniques have been developed to facilitate the involvement of stakeholders in dynamic hypothesis formulation (Ford & Sterman, 1998; Vennix, 1996). Again, working with members of the system to elicit information has its pluses as well as minuses, particularly for contentious issues (which is the rule rather than the exception for wicked problems).

System dynamics modelers seek endogenous explanations for phenomena. The endogenous viewpoint conditions dynamicists to build models that are capable of deriving the dynamic behavior of interest solely from variables and interactions within an appropriately chosen system boundary (Richardson, 2011; J. Sterman, 2000). One limitation of the endogenous view is the potential for system dynamicists to create models that only ‘appear’ insulated from the random shock of exogenous events. This is a tricky issue that will not be resolved here. Richardson (2011), in discussing the example of floods, points out the value of an endogenous view of the dynamics of flood damage that accounts for the role of human agency in creating property vulnerable to such damage (e.g., economic development pressures, property tax needs, etc.). However, by drawing a system boundary and excluding or treating as exogenous certain variables, modelers may run the risk of being caught off guard by the occasional ‘Black Swan.’ In the words of Taleb (2007): “Black Swan logic makes ‘what you don’t know’ far more relevant than what you do know” (p. xix).

Wherever one decides to draw the boundary for a particular dynamic hypothesis, there are a variety of tools for capturing the important feedback loops and causal linkages. Causal loop diagrams show the links among variables with arrows from a cause to an effect. Stock and flow diagrams emphasize the underlying physical structure of the system (J. Sterman, 2000).
**Step 3. Development of a simulation model.** As with any research that follows the scientific method, once a hypothesis has been conjectured it must be subjected to refutation. In systems modeling, however, most dynamic hypotheses and the conceptual tools that represent them (e.g., stock and flow diagrams) are so complex that the modeler needs to specify a formal simulation model to be run on a computer—complete with equations, parameter estimates, and initial conditions of the system (J. Sterman, 2000). Again, this step routinely overlaps with the preceding ones as many modelers write some equations and estimate parameters early in the process of articulating a problem and formulating a dynamic hypothesis.

As the reader might suspect, development of a simulation model is no easy task. This is a necessary drawback of system dynamics modeling—necessary because messy problems are difficult by nature (J. Sterman, 2000). However, it may be that a formal simulation model is unnecessary. The need for a simulation model is predicated on the depth of system insight required. For example, if the purpose of a particular system dynamics project is simply to help a client team learn that the problem they are experiencing is endogenously determined (i.e., driven by a system of interrelated feedback structures), then a causal loop diagram or stock and flow map may suffice.

**Step 4. Validation and model testing.** Of course, model validation is an important aspect of many model-based methodologies used by marketing researchers (e.g., structural equation modeling). Within a system dynamics approach, testing may include a comparison of the behavior of the simulated model to the behavior of the actual system over time. Models that do not hold up under extreme conditions, for example, can lead to reformulation and subsequent
retesting of the dynamic hypothesis. But hypothesis testing in system dynamics modeling involves far more than the replication of historical behavior (J. Sterman, 2000). According to Barlas (1996), “the ultimate objective of system dynamics model validation is to establish the validity of the structure of the model” (p. 188). In the past, system dynamics had been criticized for its perceived overreliance on subjective validation procedures; but as noted by Barlas (1996), “Model validity and validation in any discipline have to have semi-formal and subjective components…it is impossible to define an absolute notion of model validity divorced from its purpose” (pp. 183-184).

**Step 5. Policy design and evaluation.** As the purpose of many system dynamics modeling projects is to better manage a system, once confidence in the structure and behavior of the model has been established, it can be used to design and evaluate policies for improvement. The reader need not interpret ‘policy’ in the narrowest sense to include only public policy. However, as noted by Sterman (2000): “Since the feedback structure of a system determines its dynamics, most of the time high leverage policies will involve changing the dominant feedback loops…eliminating time delays…or fundamentally reinventing the decision processes of the actors in the system” (p. 104). However, system dynamicists have been criticized for not being more successful at getting high-leverage recommendations accepted and implemented (Jackson, 2000)—something that might be remedied by upstream social marketing.

Lastly, a word of caution: System dynamicists are not in the business of prediction. That is, the emphasis is on forecasting patterns of system behavior (e.g., periods, trends, phase legs, etc) rather than event (or point) prediction (Barlas, 1996; J. D. Sterman, 2001). Though it may be tempting to refer to system dynamics models’ inability to forecast specific future conditions as a
limitation, the reasons why such forecasting is futile are fundamental to the nature of complex systems. As framed by Taleb (2007): “You would expect our record of prediction to be horrible: the world is far, far more complicated than we think” (p. 135). In the words of the discipline’s founder (Forrester, 2007b): “The emphasis on forecasting future events diverts attention from the kind of forecast that system dynamics can reliably make...A properly designed system dynamics model is effective in forecasting how different decision-making policies lead to different kinds of system behavior” (p. 364).

Conclusion

In conclusion, a widely held assumption is that public health practice based on scientific evidence has a better chance of producing positive results than practice that is not evidence based. Thus, increasing attention has been paid to closing ‘the research-practice gap.’ Ardent supporters of evidence-based practice tend to subscribe to a research-to-practice model—patterned after the approach to problem solving seen to dominate biomedical interventions. Others in public health have called for a research-to-practice model but one that is more sensitive to the complexity of community and public health practice settings—i.e., practice-based evidence.

More fundamentally, this dissertation reflects the possibility that many funding agencies, researchers, and practitioners do not understand the fundamental nature of the problems they try to address. This dissertation contrasts one theoretical perspective (“the ecological perspective”) commonly used in public health for analyzing complex phenomena—such as the CBPM framework—with one that is better suited for the task at hand (“the systems perspective”). The author believes that the field of social marketing would benefit from learning about and
integrating systems thinking into the way its practitioners develop and evaluate social innovations—as demonstrated by the present use of system dynamics modeling to explicate the theory-of-change of an ‘upstream’ social marketing innovation.
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Appendices
Appendix A: Literature Review

Advocates of evidence-based practice within public health tend to subscribe to a research-to-practice model—patterned after the approach to problem solving seen to dominate biomedical interventions (e.g., highly linear and predicated on wide applicability) (Green, 2008; Livingood, et al., 2011; Ogilvie, et al., 2009)—as a way to close the research-practice gap. Others in public health have called for a research-to-practice model but one that is more sensitive to the complexity of community and public health practice settings—a viewpoint categorized here under the heading of practice-based evidence (e.g., Green, 2008; Green, Glasgow, et al., 2009).

Advocates’ positive opinion of evidence-based practice is likely influenced (at least in part) by what they encounter from reading the public health literature—e.g., “We in public health should strive to keep pace with medicine through more scientific-based decisions and hold ourselves to at least the same, if not higher, standards. This requires us to use our science to perform evidence-based public health” (Scutchfield & Lamberth, 2010, p. 632). Even within the field of medicine, however, evidence-based practice is not without its critics.

A number of medical authors continue to struggle with multiple issues regarding the use of an evidence-based approach. That such debates exist within evidence-based medicine has implications for the arguments put forth by proponents of evidence-based practice in public health. Within each main section that follows, the author presents what is seen as the thesis of each movement—i.e., evidence-based practice and practice-based evidence—as well as the main points that constitute each thesis. These main points involve a number of sub-points which are made explicit.
Again, though, this exercise merely sets the stage for the dissertation project. It will be argued here that much of the research-practice gap in public health may be a distraction from a more fundamental concern—namely, our misunderstanding of the nature of the problems we face. The concept of *wicked problems* will be presented as fitting for much of what we encounter in public health. The definition and characterization of wicked problems then sets up systems science—and *system dynamics modeling* in particular—as an appropriate aid for managing many such problems.

**The “evidence-based” movement.** Despite discordance in the public health literature on the appropriate role of evidence in disease prevention and health promotion, there seems to be little disagreement that the precursor to the evidence-based movement in public health occurred in clinical medicine. A 1992 paper in the *Journal of the American Medical Association* describes McMaster University academic clinicians’ commitment to educate their medical residents in the practice of evidence-based medicine (Evidence-Based Medicine Working Group, 1992). As portrayed by the authors at that time: “Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision-making, and stresses the examination of evidence from clinical research” (p. 2420).

Usage of the phrase “evidence-based medicine” began to increase dramatically in English-language publications at around that time (Brownson et al., 2009); as indicated, for example, by the Google Ngram Viewer (Michel et al., 2011) ([Figure A1](#)). Sackett, Rosenberg, Gray, Haynes, and Richardson (1996) subsequently characterized evidence-based medicine as “the conscientious, explicit, and judicious use of current best evidence in making decisions about
the care of individual patients” (p. 71). As it is not the goal here to attempt a historiography of the evidence-based movement, the interested reader is referred elsewhere for a discussion of its evolution in medicine (e.g., Bradt, 2009) and in public health (e.g., Brownson et al., 2009). Suffice it to say, though, that the evidence-based practice movement has now spread to many medical specialties such as addiction treatment (e.g., Rieckmann, Bergmann, & Rasplica, 2011) and nursing (e.g., Twycross, 2011), as well as to social work (e.g., Regehr, Stern, & Shlonsky, 2007) and, of course, public health (e.g., Brownson, Baker, Leet, Gillespie, & True, 2011).

Regarding one country’s experience with the spread of evidence-based practice from medicine to public health, Kelley et al. (2010) recounted the experience of the National Institute of Health and Clinical Excellence (NICE) in the UK of adding public health guidance to their
The principles of protecting the public from harm, of maximizing health improvement, and of finding the best available evidence to answer the questions were paramount in exactly the same way as they were for evidence-based clinical medicine” (p. 1059). Published recommendations about evidence-based interventions of relevance to public health are now widely available. For example, disease prevention and health promotion professionals currently have access to *The Guide to Community Preventive Services* (Centers for Disease Control and Prevention, 2012), *The Cochrane Collaboration* reviews (2012), and *The Campbell Collaboration* library (n.d.). Thus, the evidence-based practice movement is not restricted to evidence of what works but also encompasses the dissemination and implementation of innovations.

Moreover, health care reform in the US continues to move disease prevention efforts closer towards evidence-based practice. On June 16, 2011, members of the National Prevention, Health Promotion, and Public Health Council announced the release of the National Prevention and Health Promotion Strategy (US Department of Health and Human Services, 2011). The National Prevention Strategy is a component of the Affordable Care Act. The former is a comprehensive plan designed to increase the number of Americans who are healthy at each stage of the life course. The importance of the concept of “evidence” comes through very clearly in the National Prevention Strategy. The National Prevention Council has pledged to oversee continual monitoring of the evidence base and update recommendations regarding promising practices and approaches to disease prevention and health improvement. In fact, each recommendation for improving health and wellness is described as being “based on the best recent scientific evidence” (US Department of Health and Human Services, 2011, p. 12).
Thesis. Although cuts to the Prevention and Public Health Fund could hamper the research-informed efforts of the National Prevention Council (e.g., Haberkorn, 2012), said cuts would not likely change the core views of adherents to evidence-based practice. Before explicating the thesis of evidence-based practice in public health, it is important to clarify what is meant by the term “practice” within the realm of population-based disease prevention and health promotion. According to Merriam-Webster (2012a), the verb form of “practice” connotes the idea of performing an act habitually, repeatedly, or customarily. In evidence-based medicine, this usage makes sense in the context of regularly seeing many patients with the same condition and thus needing to make recurrent treatment decisions.

In the case of disease prevention and health promotion practice, however, the term means something slightly different. For example, an emergency room physician treating dozens of patients per day differs in a number of regards from a state health department program manager making decisions regarding population-based interventions. For example, the latter’s decisions are greater in scope, are made less frequently, have delayed feedback, and so on. Thus, the “practice” part of evidence-based practice does not mean the same thing in public health as in medicine. The term “practice” will continue to be used here to refer to decision making in public health; but the noted distinction has potential implications, for example, regarding the applicability of some innovation concepts to the public health context (e.g., “routinization” (Rogers, 2003), “normalization” (May et al., 2010), etc.).

The evidence-based practice thesis can be stated as follows: In public health, disease prevention and health promotion practitioners should implement innovations in a structured manner—i.e., innovations that have been systematically researched, developed, and disseminated in a controlled manner. This is a prescriptive thesis with three constituent parts. First, the
evidence-based practice thesis prescribes that the research and development of solutions to public health problems (i.e., innovations) should proceed in a systematic manner. Second, the spread of evidence-based solutions should be controlled (i.e., dissemination) rather than left to more natural processes (e.g., diffusion). Finally, evidence-based interventions should be implemented by practitioners in a structured manner (e.g., with fidelity).

Point #1: Public health solutions should be researched and developed in a systematic manner. The strong form of this first point endorses the use of the scientific method and the elimination of alternative causal explanations as the foundation of intervention development in public health (e.g., Moore & Morris, 2011; Scutchfield & Lamberth, 2010). As stated by Kessler and Glasgow (2011) in the related realm of preventive medicine: “Randomized controlled efficacy trials using precisely defined interventions and highly selected participants have been the preferred and often exclusive design of choice” (p. 637). Such restrictiveness is often seen as the hallmark of efficacy (or “explanatory” (Thorpe et al., 2009)) trials. Moreover, the strong form of point #1 endorses systematic reviews as the approach to evidence synthesis and (presumably) improved decision making in public health. According to The Cochrane Handbook for Systematic Reviews of Interventions, “A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias” (Higgins & Green, 2011).

While some of the criticisms of evidence-based medicine (e.g., Kerridge, 2010; Miles, 2009; Tanenbaum, 2009; Tobin, 2008; Tonelli, 2006) may be well-known to readers of medical publications, public health professionals may not be as familiar with the critiques. Foremost,
public health researchers and practitioners may have an inflated view of the preeminence of randomized controlled trials (RCTs). Point #1 of the evidence-based practice thesis in public health rests on an important sub-point, namely that the research-practice gap exists because public health researchers have not adhered to a systematic approach to intervention development.

As noted above, the evidence-based practice movement in public health was transplanted from the field of medicine. At the core of the evidence-based medicine movement is the “evidence hierarchy” (or “hierarchy of evidence”) (Borgerson, 2009; Braveman, Egerter, Woolf, & Marks, 2011; Karanicolas, Kunz, & Guyatt, 2008; Upshur, 2003). (Note that there is not just one hierarchy of evidence (West et al., 2002). For example, the Centre for Evidence-Based Medicine in Oxford in the UK has published “levels of evidence” as one approach for systematizing the decision making process (Phillips et al., 2008).) For questions of therapy/prevention, the framework ranks systematic reviews of RCTs higher than individual trials, which are in turn ranked above cohort studies, case-control studies and so on, with case-series and expert opinion ranked lowest.

According to multiple authors (Borgerson, 2009; Miles, 2009; Tobin, 2008), there are very few explicit justifications offered for the various hierarchies of evidence. Tobin (2008) has argued that the grading of evidence is flawed on the grounds that grading is detached from scientific theory, and that similar attempts at grading of research in other disciplines have failed. With reference to the aforementioned framework by Oxford researchers, Borgerson (2009) states: “It is assumed that higher-ranked evidence on this scale is better than lower-ranked evidence, and that such evidence provides greater justification for clinical action” (p. 219). As for what is meant by “better” evidence, Borgerson claims that hierarchies rank evidence
according to two interrelated criteria: evidence derived from methods thought to be better at isolating causal relationships as well as methods for minimizing bias.

The principal division in most evidence hierarchies appears to be between randomized and nonrandomized studies (Borgerson, 2009; Tobin, 2008). It is generally claimed that randomized studies are superior at balancing treatment and control groups on confounding factors, and thus are better for isolating cause-effect relationships (C. H. Brown et al., 2009)—although nonrandomized evaluations can also be very beneficial (Colditz & Taylor, 2010). While noting that randomization indeed makes it less likely that confounding factors are at play, it has been argued that the value of RCTs is much more limited than generally recognized:

Claims that RCTs isolate causes, while other methods identify merely correlations, have resulted in undefined and undefended accounts of causation that unfairly denigrate mechanistic causes, depend on problematic arguments about the ability of randomization to balance groups on known and unknown factors, and rely on characterizations of ideal RCTs (such as the indefinite repetition of the trial) that are never attainable in practice.

(Borgerson, 2009, p. 223)

To be fair, evidence (e.g., as derived from systematic reviews of RCTs) is not the sole decision-making criterion prescribed by all evidence-based medicine proponents—at least not in its more recent incarnations (Djulbegovic, Guyatt, & Ashcroft, 2009; Karanikolas, Kunz, & Guyatt, 2008). (Note that the same can be said of evidence-based decision making in public health (Brownson, et al., 2009; Carter, et al., 2011; Rychetnik, Hawe, Waters, Barratt, & Frommer, 2004).) In addition to evidentiary considerations, modern definitions of evidence-
based medicine include components related to clinical expertise, patient values, and patient circumstances (Bradt, 2009; Satterfield, et al., 2009).

Although the rightness of evidence-based medicine also has been argued on ethical grounds (e.g., harm avoidance), this assertion has been questioned by some authors (e.g., Gupta, 2009; Tobin, 2008). As noted by Carter et al. (2011), the generation of scientific evidence—even within the context of highly controlled, seemingly objective trials—is not value free. The influence of evidence-based practice has been characterized as capable of introducing a number of biases at any stage of the research process including agenda setting, formation of research questions, and conduct of trials (Borgerson, 2009; Crowther, Lipworth, & Kerridge, 2011).

Regarding the influence of the evidence-based practice movement on agenda setting in public health, Kohn and Fleming (2011) have labeled today’s health department employees as “virtual federal staff” (p. 115) and characterized federal policymakers as “the dominant force shaping agendas and programs” (p. 116). While the availability of federal funds is no doubt welcomed by health departments’ budget personnel, financing for evidence-based public health programs may ignore the input of practitioners and the populations they serve, as well as inhibit the creativity of communities to design solutions that work for them.

The influence of the evidence-based practice movement is also reflected in the current system of knowledge creation and synthesis, which appears to support a reinforcing feedback loop that favors the conduct of evermore RCTs (Figure 1). As stated by Kessler and Glasgow (2011): “The system that is built stifles creativity and thinking by holding that efficacy RCTs are always the highest or only type of evidence considered” (p. 638). The enthusiastic support for RCTs (e.g., via promulgation of evidence hierarchies) leads many researchers to develop questions that are answerable only by said study designs (Carter et al., 2011; Green, Glasgow et
al., 2009). As such research questions lead to the conduct of additional RCTs that overwhelmingly target individual behaviors, the evidence base and thus public health practice become even more populated by individually-focused programs (Milne & Law, 2009).

A number of authors have noted the limitations of such a restricted approach to intervention development for addressing the complexities of many real-world problems (e.g., Kessler & Glasgow, 2011; Livingood, et al., 2011). What is more, the breadth of evidence generated by public health research is normally greater than that produced by clinical medicine research (Brownson, et al., 2009; Kelly, et al., 2010). This is reflected not only in the units of analysis and intervention for many public health trials (e.g., beyond individual biology or cognition) (Kelly et al., 2010) but also in a more diverse evidence base—epistemologically and methodologically (B. J. Carter, 2010; Kelly, et al., 2010).

Lastly, a number of authors have lamented that even in the case of evidence situated at the top of most hierarchies, published reports often suffer from a number of deficiencies as well as outright biases (Chalmers & Glasziou, 2009; Glasziou, et al., 2010; McKenzie, Herbison, Roth, & Paul, 2010). Although the evidence-based practice movement might not be culpable, such limitations complicate attempts to develop practice guidelines and recommendations and disseminate said products to stakeholders. These deficits are very much related to point #2 of the evidence-based practice thesis in public health.

**Point #2: The spread of evidence-based solutions should be controlled rather than left to more natural processes.** This part of the thesis states that information regarding evidence-based solutions should be methodically distributed (i.e., dissemination) rather than left to less-structured processes (e.g., diffusion). Whereas the former is generally understood to mean
planned attempts to communicate information about an evidence-based program, the latter normally refers to more-organic processes whereby an innovation spreads among the members of a social system (Green, Ottoson, Garcia, & Hiatt, 2009; Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008). A number of articles have hit upon the distinctions between dissemination and diffusion (e.g., Dearing & Kreuter, 2010; Green, Ottoson, et al., 2009), thus this review moves to a discussion of an important sub-point on which point #2 of the evidence-based practice thesis rests, specifically that the research-practice gap exists because public health solutions have not been strategically distributed.

According to Kreuter and Bernhardt (2009), “The ultimate dissemination goal for public health program developers is to get their evidence-based products into use by organizations whose job it is to deliver effective public health programs” (p. 2123). Many dissemination barriers have been proffered (e.g., Addis, Wade, & Hatgis, 1999; S. Bowen & Zwi, 2005; Glasgow & Emmons, 2007; McKay, Vaca, Field, & Rhodes, 2009). Arguments that the spread of evidence-based solutions should be strategically managed (point #2) assume that the research-practice gap exists partly because past efforts have neither been well-planned nor -managed. In fact, public health authors have argued that existing knowledge on effective disease prevention and health promotion is not systematically disseminated (Jacobs, Dodson, Baker, Deshpande, & Brownson, 2010; Kerner, Rimer, & Emmons, 2005). Thus, that there exists a research-practice gap does not seem to be in much dispute as demonstrated, for example, by government and foundation initiatives (Green, Ottoson, Garcia, & Hiatt, 2009). For instance, Program Announcement (PA) Number PAR-10-038 “encourages investigators to submit research grant applications that will identify, develop, and refine effective and efficient methods, structures, and
strategies to disseminate and implement research-tested health behavior change interventions” (Department of Health and Human Services, 2009).

Upon closer examination, it may be overly simplistic to refer to a singular ‘gap’ between evidence and practice. Green and colleagues (Green, 2001, 2008; Green, Ottoson, et al., 2009) have used a funnel analogy to point out various leaks in the pipeline that is supposed to control the flow of research findings to potential end users. As Dearing and Kreuter (2010) have critically noted in writing about knowledge-to-practice research traditions: “Knowledge is generated, innovations are created, technologies are produced, evidence is weighted, and information is disseminated” (p. S102). While differences in what knowledge translation means to different stakeholders have been pointed out by other authors (Ogilvie, Craig, Griffin, Macintyre, & Wareham, 2009), the aforementioned activities as well as the pipeline analogy epitomize dissemination strategies that rely on push of innovations.

As characterized by Dearing and Kreuter (2010): “It is a history characterized by trying to do more: more messages, more channels, more support and outreach staff, more control and process monitoring, more partnerships and meetings and coordinated action. That is push” (p. S102). The push of innovations as a dissemination strategy is also related to what Hill (2009) has labeled the directional gap: “Communication is often conceived as communication to members of the public, to patients, to health consumers, to informal caregivers. Communication comes from health professionals, governments, researchers, health companies, etc” (p. 648). Aside from distribution channels, Meisel and Karlawish (2011) have suggested that experts’ sterile approach to presentation of scientific findings does not aid in dissemination of evidence-based recommendations either.
As noted by Green, Glasgow, Atkins and Stange (2009): “The ‘supply-driven’ pipeline for getting evidence into practice has had its successes but risks losing sight of the ‘demand’ side of the problem” (p. S187). In fact, of Glasgow and Emmons’ (2007) 32 barriers to dissemination of evidence-based interventions, nine were related to features of the intervention being disseminated (e.g., difficult to learn or understand), and another 10 related to the situation or context of the intended target audience (e.g., program imposed from outside). This lends support to the decision to treat implementation as a distinct part of the disease prevention and health promotion literature (Green, Ottoson et al., 2009)—an area turned to next.

**Point #3: Evidence-based solutions should be implemented in a structured manner.** The third and final point of the evidence-based practice thesis dictates that public health practitioners should implement evidence-based interventions as prescribed by researchers, reviewers, and/or funders. As an antecedent to implementation, adoption has been defined as “the decision of an organization or a community to commit to and initiate an evidence-based intervention” (Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008, p. 118). In the context of explicating the RE-AIM framework for evaluating public health interventions, Glasgow, Vogt, and Boles (1999) defined implementation as “the extent to which a program is delivered as intended. It can be thought of as interacting with efficacy to determine effectiveness” (p. 1323). Green, Ottoson, Garcia, and Hiatt (2009) defined it as the “translation and application of innovations, recommended practices, or policies” (p. 152). The strong form of this argument endorses the occasional use of mandates as a means to ensure evidence-based practice implementation (Dodson, Baker, & Brownson, 2010; Rieckmann et al., 2011).
Point #3 of the evidence-based practice thesis in public health rests on an important sub-point, namely that the research-practice gap exists because evidence-based innovations have been weakly or incompletely implemented. A number of authors have observed that implementation of evidence-based interventions is low in many public health settings (Brownson, et al., 2007; Scutchfield & Lamberth, 2010). Moreover, several authors have commented on the average length of time required for public health innovations to be adopted in practice (Scutchfield & Lamberth, 2010; Waters, 2011). Although, as noted by Rogers (2003), “prevented events, by definition, do not occur, and thus they cannot be observed or counted…For these reasons, preventive innovations…generally have a relatively slow rate of adoption” (p. 70).

While a host of implementation barriers have been proposed (e.g., Green, Glasgow, et al., 2009; McKay, et al., 2009; Rieckmann, et al., 2011), once implemented, failure to replicate initial positive findings discovered elsewhere is usually interpreted to mean that an error was made in terms of implementation (e.g., Glasgow & Emmons, 2007; Green, Ottoson, et al., 2009; Kessler & Glasgow, 2011). In the preventive medicine context, fidelity has been defined as “the degree to which an intervention maintains its original form” (Cohen et al., 2008, p. S381). This definition is similar to that proposed by Rabin et al. (2008) in their glossary of dissemination and implementation research. Adherents to the strong form of the evidence-based practice thesis can be seen as belonging to the pro-fidelity camp—i.e., “those who would argue for close adherence to program methods and intent” (Dusenbury, Brannigan, Falco, & Hansen, 2003, p. 239). This strong viewpoint about the proper way to manage treatment fidelity in effectiveness research has been identified by other authors as well (e.g., D. J. Cohen, et al., 2008; Dumas, Lynch, Laughlin, Phillips Smith, & Prinz, 2001).
However, this strong stance on implementation is not without its critics. Although dissimilar from public health in terms of primary focus (i.e., treatment vs. prevention) and unit of intervention (i.e., individuals vs. populations), clinicians who use behavioral interventions (e.g., substance abuse counselors) face many of the same complexities as public health practitioners in bringing about desired change. One of the criticisms of evidence-based practice voiced by such practitioners is phrased as follows: “If clinical practices are prescribed, or in some cases even scripted…What place is there for clinical judgment and the personal idiosyncrasies that all clients present?” (Rieckmann et al., 2011, p. 28). As noted above, many evidence-based medicine proponents would argue that there is—and has always been—a role for clinical judgment in evidence-based decision making.

When examined from the other end of the stethoscope, the interests of patients can sometimes conflict with the principles of evidence-based practice. Rothman (2011) describes a number of examples where the interests of health advocacy organizations to promote patient choice were not in synch with evidence-based recommendations. Rather than arguing for more facts and figures to fill in the knowledge gaps of the uninformed, Meisel and Karlawish (2011) suggest that experts should consider deploying evidence-based counter-narratives.

Another criticism of the evidence-based practice movement that has been voiced by clinicians is the inherent problems in making treatment decisions for individual patients on the basis of population-based data (Rieckmann et al., 2011). Some policy makers would argue, however, that to not implement evidence-based practices does a disservice to individual patients and the populations who fund said care.

The discrepancy between actual levels of translation of research into practice and desired levels may create a negative feedback loop intended to bring the order of things in line with a
particular goal or desired state (Figure 2). Green et al. (2009) have noted that “governmental and other program funding agencies and insurance companies have insisted that practitioners and program planners adhere to protocols or guidelines defined by efficacy studies in highly controlled research” (Green, Ottoson et al., 2009, p. 167). In the clinical realm, this insistence sometimes comes by way of policies and/or mandates to accelerate the use of evidence-based practices (Fairbrother, Hanson, Friedman, & Butts, 1999; Rieckmann, et al., 2011). However, Bernhardt, Mays, and Kreuter (2011) have warned that “encouraging or requiring the use of evidence-based programs that are not readily available may have the unintended effect of increasing frustration rather than implementation” (pp. 40-41). Moreover, even when public health organizations successfully implement evidence-based solutions, the sustainability of those solutions is another matter (Tibbits, Bumbarger, Kyler, & Perkins, 2010).

**Summary.** Brownson, Fielding, and Maylahn (2009) have characterized disease prevention and health promotion as a tradition where “intervention decisions are often based on perceived short-term opportunities, lacking systematic planning and review of the best evidence regarding effective approaches” (p. 176). The thesis of the evidence-based practice movement in public health is rooted in the belief that public health practitioners should always use scientific evidence to guide their decision making (Baker, Brownson, Dreisinger, McIntosh, & Karamedic-Muratovic, 2009; Brownson, et al., 2011; Brownson, et al., 2009). It is an idea based on the reduction of uncertainty in judgment and decision making regarding disease prevention and health promotion. As stated by Rogers (2003) in his final edition of *Diffusion of Innovations*: “Uncertainty is the degree to which a number of alternatives are perceived with respect to the
occurrence of an event and the relative probabilities of these alternatives. Uncertainty motivates individuals to seek information, as it is an uncomfortable state” (p. xx).

According to evidence-based practice proponents, that information should derive from evidence that was developed in a systematic manner. As noted above, a widely held assumption is that practice based on scientific evidence has a greater chance of success than practice that is not evidence-based. Ironically, though, there is no direct evidence of comparative effectiveness for evidence-based vs. non-evidence based practice.

The “practice-based” movement. Despite the intuitive appeal of the evidence-based movement’s thesis, the discrepancy between what has been shown to work through intervention testing and what is actually done in everyday practice (i.e., the research-practice gap) endures. As pointed out above, advocates of evidence-based practice within public health have an affinity for a research-to-practice model as a way to close (or at least narrow) the research-practice gap. This model is patterned after the approach to problem solving seen to dominate biomedical interventions (e.g., linear translation of findings from research to practice). However, the transposition of the evidence-based framework to non-clinical domains such as population-based disease prevention and health promotion has exposed a number of difficulties (Behague, Tawiah, Rosato, Some, & Morrison, 2009).

Consequently, others within public health have called for an approach to intervention research that is more sensitive to the complexity of practice settings—e.g., “…applied health sciences research would have a much enhanced probability of influencing policy, professional practice, and public responses if it turned the question around from how can we make practice more science based to how can we make science more practice-based?” (Green, Ottoson et al.,
2009, p. 166). The author interprets this question more broadly than just the research and development of interventions to also include practice-based dissemination and implementation. While overtures have been made for breaking down the silos between evidence generation, dissemination, and implementation (Waters, 2011) and fostering partnerships with practitioners (Gielen et al., 2011), the silos remain. Writing within the context of health disparities research, Koh et al. (2010) articulated the charge as follows:

…the extensive evidence amassed and the many recommendations for disease prevention and treatment have been largely concentrated in public health and academic medicine and could be more strongly linked to other critically related disciplines as well as to practice and advocacy settings. Without such linkage, the compelling evidence and recommendations will fail to stimulate change. (p. S72)

**Thesis.** The thesis of the practice-based movement can be stated as follows: In public health, disease prevention and health promotion practitioners should implement innovations with discretion—i.e., innovations that have been systematically researched and developed but disseminated with primary consideration for intended end users. This too is a prescriptive thesis with three basic parts. The first point that undergirds the practice-based evidence thesis is that innovations should be researched and developed in a systematic manner but with end users (e.g., public health practitioners) always in mind. Second, the spread of evidence-based solutions should be managed but oriented primarily to the needs and wants of end users. Lastly, this thesis argues that evidence-based interventions should be implemented by practitioners in a structured manner but with some freedom for adaptation.
Point #1: Public health solutions should be researched and developed in a systematic manner but with prospective end users in mind. The strong form of this argument—i.e., really strong—can be found in Kessler and Glasgow (2011), where the authors propose a “moratorium” on efficacy trials in health and health services research that use narrowly defined interventions and participants of questionable representativeness. In the interim, the authors call for “pragmatic, transparent, contextual, and multilevel designs that include replication, rapid learning systems and networks, mixed methods, and simulation and economic analyses to produce actionable, generalizable findings that can be implemented in real-world settings” (Kessler & Glasgow, 2011, p. 637). Green et al. (2009) have similarly warned: “Delivering a highly purified review or guideline that emphasizes carefully conducted trials with high internal validity runs the risk of ignoring those elements that make applied research useful, appealing, and relevant to those who would apply it” (p. S187).

Point #1 of the practice-based thesis in public health rests on an important sub-point, namely that the research-practice gap persists because public health researchers have not designed interventions for prospective end users. Green (2006) described what he saw as “the paradoxical challenge of evidence-based practice. The challenge is that most of the evidence is not very practice-based” (p. 406). However, despite the stark differences implied by the contrasting terms, evidence-based practice and practice-based evidence are more similar than some readers may realize. For example, the author most commonly associated with evidence-based practice in public health (Brownson) has called for an improved understanding of practice-based evidence: “More evidence needs to come from settings and organizations that reflect public health practice and policy” (Brownson & Jones, 2009, p. 314). In fact, the definition of
evidence-based public health has evolved to include a focus on community needs and wants (Baker, Brownson, Dreisinger, McIntosh, & Karamet-Muratovic, 2009; Brownson, et al., 2009; Kohatsu, Robinson, & Torner, 2004). However, the evidence-based and practice-based theses both argue for a systematic approach to research and development.

Some authors who eschew the strong form of the evidence-based practice thesis nonetheless call for research methods that “focus on interventions that can be practically applied to entire populations” (Kansagra & Farley, 2011, p. 2204). For others, better evidence means “evidence that explores the effects of interventions within different sections of society, and that can be used to tackle inequalities in health” (Petticrew et al., 2009, p. 453). It is perhaps not surprising then that a priority issue for authors whose writings reflect the practice-based evidence viewpoint concerns the external validity of public health interventions (e.g., Green, Glasgow, et al., 2009; Kessler & Glasgow, 2011). For example: “Implicated barriers to evidence-based practice are numerous…The one most cited by practitioners themselves is the lack of relevance or fit of much research to practice” (Green, Glasgow et al., 2009, p. S187).

Bowen et al. (2009) have defined the term feasibility study broadly to encompass “any sort of study that can help investigators prepare for full-scale research leading to intervention” (p. 453). In fact, Kessler and Glasgow (2011) have proposed that “feasibility of translation into typical practice settings” be a scored criterion for NIH review of grant proposals. As noted by Thorpe et al. (2009): “When planning their trial, trialists should consider whether a trial’s design matches the needs of those who will use the results (p. E49)… However, how useful a trial is depends not only on design but on the similarity between the user’s context and that of the trial” (p. E57). One potential strategy that might increase an innovation’s chances of successful dissemination and implementation is the use of participatory approaches to intervention design.
such as community-based participatory research (CBPR) (Green, Glasgow, et al., 2009; Koh, et al., 2010; Silka, 2010; Wallerstein & Duran, 2010).

Beyond primary studies of public health interventions, point #1 of the practice-based evidence thesis also relates to the importance of a systematic approach to evidence synthesis. While there are conditions in which a review might not need to be a systematic review (Petticrew, 2009), most writings that adhere to a practice-based viewpoint are supportive of systematic evidence syntheses. The key differences tend to reside in the nature of evidence considered and the resultant recommendations for end users. Regarding the former, unlike in clinical medicine where systematic reviews based solely on RCTs are much more feasible, evidence for decision-making in disease prevention and health promotion tends to be much more complex (Green, 2008; Green, Glasgow, et al., 2009; Kessler & Glasgow, 2011; Livingood, et al., 2011; Orton, Lloyd-Williams, Taylor-Robinson, O'Flaherty, & Capewell, 2011). According to Humphreys et al. (2009): “Traditional systematic reviews may not be sufficient or the most appropriate means for knowledge generation in complex settings…Syntheses must be attuned to the context of the review” (p. 592). (A relatively recent innovation is the realist review (Pawson, Greenhalgh, Harvey, & Walshe, 2005).) Therefore, practice-based proponents argue that the synthesis of findings regarding public health interventions needs to make certain allowances for evidence that is derived from non-randomized studies (Kelly et al., 2010) and that possibly originates from outside of the health sector (R. Armstrong, Doyle, & Waters, 2009). This is complicated, of course, by the difficulties of appraising the implementation details of primary studies that make up evidence syntheses (Egan, Bambra, Petticrew, & Whitehead, 2009).

A number of authors have begun to comment on the applicability of GRADE (Grading of Recommendations Assessment, Development and Evaluation) for judging the quality of
evidence about public health interventions and strength of recommendations for practice
(Durrheim & Reingold, 2010; Rehfuess, Bruce, & Pruss-Ustun, 2011). In the clinical realm,
GRADE is advertised as an approach for creating practice guidelines based on a transparent
assessment of the evidence base. The GRADE approach has enjoyed particular popularity for
summarizing the clinical evidence extracted from systematic reviews and grading the quality of
said evidence along with grading the strength of practice recommendations. However, a number
of authors have expressed concern over the applicability of the GRADE framework for public
health interventions unless modifications are made. In particular, Durrheim and Reingold (2010)
propose Bradford-Hill’s (1965) causality criteria as a useful addition, to which members of the
GRADE working group have responded (Schunemann, Hill, Guyatt, Akl, & Ahmed, 2010).
Guyatt and colleagues (2011) provide GRADE guidelines for rating up the quality of evidence
generated from non-randomized studies, and Guyatt and colleagues (2011) provide guidelines for
rating the quality of evidence in terms of its application to different groups—both of which have
particular relevance for those conducting systematic reviews of public health interventions
(Shepperd & Straus, 2011).

Point #2: The spread of evidence-based solutions should be strategically managed but
oriented to prospective end users. The practice-based viewpoint concerning the use of a managed
approach to dissemination does not differ tremendously from its corollary within the evidence-
based thesis; however, the practice-based thesis endorses more of an active, consumer-oriented
approach to the management of dissemination. As noted herein, most evidence-based
recommendations have had little impact on the behavior of public health practitioners, which has
been attributed at least in part to the relatively passive dissemination strategies used by
researchers, systematic reviewers, and recommendation bodies (Bero, et al., 1998; Lomas, 1991). Moreover, a consumer orientation has been largely neglected in the dissemination of disease prevention and health promotion innovations to practitioners. Although in the present context the consumers are public health practitioners, such an orientation has been described as “a prerequisite to successful health-promotion efforts…The very best health-promotion campaigns arise out of clear recognition of consumers’ health needs, problems, beliefs and behaviors so that campaigns are developed to reflect target audiences’ specific concerns and cultural perspectives” (Kreps, 1996, p. 46).

Point #2 of the evidence-based practice thesis in public health rests on an important sub-point, namely that the research-practice gap persists because current modes of dissemination are inattentive to the needs and wants of end users. As noted above, a number of authors have commented on the sparseness of knowledge regarding effective approaches for dissemination of evidence-based interventions in public health (Jacobs, Dodson, Baker, Deshpande, & Brownson, 2010). Responsibility for the persistence of the research-practice gap has been pinned on a number of stakeholders, including researchers for their overconfidence that the fruits of their labor will be happily consumed by practitioners (Green, Glasgow et al., 2009). Several authors have reviewed the literature on knowledge-to-practice research traditions (Dearing & Kreuter, 2010; Green, Ottoson, et al., 2009), which includes such viewpoints as diffusion of innovations, knowledge transfer, and knowledge utilization. Kreuter and Bernhardt (2009) identified four strategies around which attempts to bridge the gaps between evidence and practice have centered: (1) increasing researchers’ dissemination efforts; (2) assembling inventories of effective programs; (3) building partnerships for dissemination; and (4) increasing demand for evidence-based approaches.
Kreuter and Bernhardt (2009) characterized the aforementioned strategies as making important contributions but noted that “even if they were highly coordinated—and they are not—there would remain significant gaps to fill” (p. 2124). Bernhardt, Mays, and Kreuter (2011) argue for a transition from what they term “dissemination 1.0” to “dissemination 2.0.” The former can be viewed as the dissemination model aligned with much of the evidence-based practice movement in public health—e.g., dissemination of intervention findings via journal articles, conference presentations, and the like. In advocating for a transition to dissemination 2.0, the authors write that “the interactivity, deep user engagement and multidirectional information exchange of Web 2.0 information tools can enhance the dissemination of research evidence among intended users and thus facilitate the translation of scientific evidence for effective programs and services into everyday practice” (p. 34).

This is not to say that there is no place for the tools associated with what Bernhardt, Mays, and Kreuter (2011) termed “dissemination 1.0.” For example, health-evidence.ca is a knowledge management tool which might fit with dissemination 1.0 in principle but is still based on heavy input from users (Dobbins et al., 2010). The key distinction between point #2 of the practice-based evidence viewpoint and its corresponding item within the evidence-based practice perspective is that, whereas the latter emphasizes control of the dissemination process, the former gives up some control by basing dissemination decisions on the needs and wants of end users. The same could be said for the distinction between the two viewpoints regarding the implementation process.

Point #3: Evidence-based solutions should be implemented in a structured manner but allow for discretion on the part of end users. The third and final point of the practice-based
evidence thesis prescribes that practitioners should implement evidence-based interventions as appropriate for their situation. As noted by Green et al. (2009), “even when information, ideas, or policies do reach practitioners or other intended users, and even if they profess that they accept and intend to use them, the effective application tends to wane, deviate from intended use, or take on new forms” (p. 152). However, deviating from intended use or allowing innovations to take on new forms is not necessarily a bad thing according to proponents of the practice-based movement. In contrast to the pro-fidelity camp referenced above, a second camp embraces adaptation—to an extent (D. J. Cohen, et al., 2008; Dusenbury, et al., 2003).

Point #3 of the practice-based evidence thesis in public health rests on an important sub-point, namely that the research-practice gap persists because many evidence-based innovations and recommendations are unfeasible for real-world application. The barriers to implementation typically proposed from an evidence-based viewpoint can be seen as originating from a diffusion and dissemination lens (Green, Ottoson et al., 2009). Failure to use or act on evidence has been reported to be the consequence of many different factors, such as limitations in the way in which evidence is usually generated (point #1) as well as the perceived threat of evidence for existing power structures and vested interests (Hunter, 2009). However, Green et al. (2009) used an alternative theoretical lens, “knowledge utilization,” to examine the research-practice gap. They identified multiple influences on knowledge use—grouped according to the source, content, medium, user, and context (pp. 164-165).

Once the decision has been made to utilize knowledge of a public health intervention, however, practitioners may perceive the need to adapt the innovation. For instance, the author most frequently linked with evidence-based public health has stated that “Often, constraints require some modification of the original intervention. In these situation there is an inherent
tension between fidelity (maintaining the original program design) and reinvention” (Brownson et al., 2009, pp. 186-187). This tension between treatment fidelity and flexibility in disease prevention and health promotion research has been pointed out by other authors as well (e.g., Cohen et al., 2008).

This tension is very much related to what Rogers (2003) termed the pro-innovation bias, which he characterized as “One of the most serious shortcomings of diffusion research” (p. 106). This bias is defined as “the implication in diffusion research that an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented nor rejected” (Rogers, 2003, p. 106). One preventative measure that researchers can take to avoid this bias, which is very much in tune with the practice-based evidence viewpoint, is to adopt a consumer orientation. As phrased by Rogers himself: “Taking into account the people’s perceptions of an innovation, rather than the technologists’, is essential in overcoming the pro-innovation bias” (p. 109).

Summary. In addition to the aforementioned tension between fidelity and flexibility with respect to implementation of interventions, more generally, there is a tension between evidence-based and innovation-based decision making in public health (Dolan, Hallsworth, Halpern, King, & Vlaev, 2010; Wayman, 2010). According to Brownson, Fielding, and Maylahn (2009), evidence-based decision making in public health has numerous direct and indirect benefits, including “a higher likelihood of successful programs and policies being implemented” (p. 176). Again, though, this statement says nothing about either the effectiveness of evidence-based practice in terms of securing social and behavioral change or its comparative effectiveness. The
same could be said, however, about what has been characterized here as the practice-based evidence viewpoint.

Despite the differences highlighted here, proponents of the two theses still could go much further to differentiate themselves. In Figure A2, the author has situated the two viewpoints according to where they fall along the three dimensions of research and development, dissemination, and implementation. The figure is intentionally designed using continua rather than discrete categories. The placement of objects within the figure admittedly involves some subjectivity. Thus, there may be some approaches to evidence-based practice and practice-based evidence that do not fit perfectly with the location of their overall thesis. For example, concerning the implementation of evidence-based interventions, Brownson et al.’s (2011) form of evidence-based practice in public health (EBPH) is more accepting of innovation adaptations. For the most part, however, it is believed that Figure 21 faithfully represents the positions of the two theses.

Regarding research and development, this author sees a lack of attention in the public health literature for the great potential of what have been called happy accidents (Meyers, 2007). In his book by the same title, Meyers writes: “A large number of significant discoveries in medicine arose, and entirely new domains of knowledge and practice were opened up, not as a result of painstaking experimentation but rather from chance and even outright error” (p. 2). Such happenings have been positioned away from the extreme, random end of the systematic-unsystematic continuum in Figure 21 because “accidents” is not really the best descriptor as this implies chance; and according to Meyers, “Chance alone does not bring about discoveries. Chance with judgment can” (p. 7).
In regard to dissemination, although Kreuter and Bernhardt’s (2009) call for a ‘distribution’ perspective on the dissemination challenge was wrapped within the language of marketing, it still reflects more of a product orientation rather than a consumer orientation. Later, Dearing and Kreuter (2010) used the term designing for diffusion, defined as “taking additional steps early in the process of creating an innovation to increase its chances of being noticed, positively perceived, accessed and tried, adopted and implemented and, thus,
successfully crossing the research-to-practice chasm” (p. S100). The authors take a different tack to the typical characterization of the dissemination process by also incorporating diffusion, characterizing the latter as “a very active change process, not on the part of proponents and intermediaries as with dissemination, but on the part of potential and actual adopters of innovations” (p. S101). Dearing and Kreuter call for public health innovations with “built-in process multiplier effects” (p. S103). Or as marketing guru Seth Godin advises: “Build virality and connection and remarkability into your product or service from the start and then the end gets a lot easier” (Godin, 2012).

Lastly, concerning implementation, the practice-based evidence movement is more tolerant of adaptation than is the evidence-based practice movement. According to Rogers (2003): “Re-invention can be beneficial to adopters of an innovation…As a result of re-invention, an innovation may be more appropriate in matching an adopter’s preexisting problems and more responsive to new problems that arise” (p. 185). Moreover, purposeful re-invention in the context of the implementation process may lead to the serendipitous discoveries mentioned above.

Assumptions common to both viewpoints. Having reviewed the theses and assumptions of the evidence-based and practice-based viewpoints separately, the author now highlights some assumptions common to both perspectives. First, the language used by proponents on each side and across the continua of research and development, dissemination, and implementation reflects the assumption that the problems we face are indeed solvable—i.e., in the traditional sense of the term. Merriam-Webster (2012b) defines a solution as “a bringing or coming to an end or into a state of discontinuity.” Second, the viewpoints represented above assume that we should always
act rather than step back when it comes to public health problems. As framed by Meadows (2008): “Despite efforts to invent technological or policy ‘fixes,’ the system seems to be intractably stuck, producing the same behavior every year. This is the systematic trap of ‘fixes that fail’ or ‘policy resistance’” (p. 112). Meadows used the term “policy” in a more general sense than most social and behavioral scientists in public health to include public policy and other courses of action (e.g., campaigns, programs, etc.), but her statement is very much related to the third major assumption of both evidence-based and practice-based proponents. That is, social and behavioral scientists in public health are trained to develop, implement, and evaluate interventions in the form of campaigns, curricula, and multi-component programs. This is our “hammer”; thus, most all public health problems resemble “nails.”

**Different types of problems.** The disease prevention and health promotion literature is filled with diagnoses as well as suggested remedies for the research-practice gap. As noted above, much of the history of dissemination and implementation research is characterized by trying to do *more*. For example, Brownson, Fielding, and Maylahn (2009) have called for more research on effective means for translating evidence-based interventions to public health settings. However, what if we are trying to do *more* of the wrong thing? Is it reasonable to assume that a research-to-practice model can work in public health, regardless of whether that model is based in an evidence- or practice-based viewpoint? Multiple authors have offered up principles for making applied health research more practice-based (e.g., Green, Ottoson, et al., 2009; Kottke, et al., 2008). But do we even understand the nature of the problems our research is intended to inform?
As noted in the main text of this document, the dissertation described herein reflects the possibility that public health funders, researchers, and practitioners might not understand the true form of many of the problems they are trying to ‘solve.’ In the next section of this literature review, the author explains what is meant by concepts such as “tame,” “messy,” and “wicked problems,” which render moot many of the traditional approaches to disease prevention and health promotion research.

**Typologies.** This section represents an attempt to briefly introduce the public health reader to issues and concerns related to problem typologies. While it may be incorrect to assume that the reader is largely unaware of problem typologies, the author believes it is accurate to state that little effort has been expended in the disease prevention and health promotion literature for articulating such typologies. The purpose here is to introduce these issues as a primer for the discussion of “ecological” vs. “systems” perspectives for understanding and managing complex problems in public health (see “Theoretical Framework” above).

The primer begins by specifying what is meant by the terms “problem” and “typology.” According to Jonassen (2000), there are just two critical attributes of a *problem*: “First, a problem is an unknown entity in some situation (the difference between a goal state and a current state)…Second, finding or solving for the unknown must have some social, cultural, or intellectual value” (p. 65). Heretofore, public health researchers writing within the realm of disease prevention and health promotion interventions have paid little to no attention to distinguishing between different types of problems.

According to Ritchey (2006), a *typology* is defined as follows:
A typology (the Greek word *typos* originally meant a hollow mould or matrix) is a very simple morphological model based on the possible combinations obtained between a few (often two) variables, each containing a range of discrete values or states. Each of the possible combinations of variable-values in the typological field is called a *constructed type*. (p. 793)

Wa¨scher, Haußner, and Schumann (2007) differentiate between *typologies* and *classifications* by noting that the former “may not be complete (i.e. not all properties of a criterion may be considered explicitly), and it may be ‘fuzzy’ (i.e. the categories may not always be defined precisely and properly distinguished from each other)” (p. 1109).

Jonassen (2000) has argued that the ability to solve problems is a function of several factors, including the nature of the problem, the way that the problem is represented to the would-be solver, and a variety of intra-individual differences that mediate the problem solving process. As Jonassen was writing within the context of instructional design, the focus here is restricted to his interpretation of the nature of problems. In particular, Jonassen (2000, 2003) has proposed that problems vary in at least four ways: (1) structuredness, (2) complexity, (3) dynamicity, and (4) domain specificity or abstractness.

First, “well-structured” and “ill-structured” can be seen as adjectives anchoring a continuum of *structuredness*. Well-structured problems have been characterized as presenting all elements of the problem to the would-be solver; requiring the application of a limited set of well thought-out rules and principles that are organized in prescriptive ways; and having knowable, comprehensible solutions (Jonassen, 2000, 2003). According to Hisschemöller and Gupta (1999), a well-defined or structured problem “is to be solved by standardized (quantitative) techniques
and procedures…The disciplines and specialisms invoked are clearly defined…These problems can be referred to as mainly technical” (p. 156). In referring to different types of problems faced by organizations, Heifetz, Grashow, and Linsky (2009) have similarly characterized technical problems as having known solutions that can be implemented through the organization’s current structures and processes. Conversely, ill-structured problems have been portrayed as possessing problem elements that are not well known; holding either multiple solutions or no solutions at all; owning multiple evaluative criteria; and often requiring would-be solvers to reveal personal opinions or beliefs about the problem (Jonassen, 2000, 2003). The boundaries of this type of problem are diffuse (Hisschemöller & Gupta, 1999). As noted by Taleb (2005) in the context of randomness and uncertainty, “in the real world one has to guess the problem more than the solution” (p. x).

Problem complexity has been characterized as largely concerned with “how many, how clearly, and how reliably components are represented implicitly or explicitly in the problem. The most complex problems are dynamic, that is, those in which the task environment and its factors change over time” (Jonassen, 2000, p. 68). Dynamicity with respect to complex problems has been characterized as a consequence of the fact that “the task environment and its factors change over time. When the conditions of a problem change, the solver must continuously adapt his or her understanding of the problem” (Jonassen, 2003, p. 5). Lastly, whereas problems have been reported to vary in terms of their structuredness, complexity, and dynamicity, Jonassen (2000, 2003) has argued that all problems also vary in terms of domain and context along an abstract-situated continuum. Specifically, “problem-solving activities are situated, embedded, and therefore dependent on the nature of the context or domain” (Jonassen, 2000, p. 68).
A number of authors representing an assortment of disciplines have proposed various typologies of problems. For example, writing within the knowledge management discipline, Breuker (1994) proposed a typology of eight major types of problems nested within three groups: synthesis (modeling, design, planning/reconstruction), modification (assignment), and analysis problems (prediction, monitoring, diagnosis, assessment). Also writing from a knowledge management perspective, Nickerson and Zenger (2004) provided a typology of problems arrayed according to the level of interaction among knowledge sets, specifically: decomposable or low-interaction problems, nearly decomposable problems with moderate levels of knowledge interaction, and nondecomposable problems of high-interaction. Hisschemöller and Gupta (1999) have presented a typology of policy problems identified in policy analysis. Grint (2005) has proposed a typology of problems that incorporates dimensions regarding power and authority in decision making. The concept of power was also built-in by Voß, Newig, Kastens, Monstadt, and Nölting (2007) in their typology of steering problems, which also included ambivalence of goals and uncertainty of knowledge.

There is a particular type of problem that has been cited by several creators of the aforementioned typologies. It has been referred to using various labels. For example, Ackoff (1979) wrote: “Managers are not confronted with problems that are independent of each other, but with dynamic situations that consist of complex systems of changing problems that interact with each other. I call such situations messes” (p. 99). Another label that has been used interchangeably with “messy problems” and “ill-structured problems”—though not always used synonymously (e.g., Raisio, 2009)—is wicked problems. As characterized by Ritchey (2011):
You may not call them by this name, but you know what they are. They are those complex, ever changing societal and organizational planning problems that are difficult to define and structure properly because they won’t keep still. They’re messy, ambiguous and reactive, i.e. they fight back when you try to do something with them. (p. 1)

Wicked problems. Horst Rittel is the author generally credited with coining the term “wicked problems” (H. Rittel, 1972; H. W. J. Rittel & Webber, 1973). It was in a seminar series at the University of California at Berkeley in the late 1960s where Rittel first presented the term as applicable to design and planning problems (Protzen & Harris, 2010). Both components of the term—“wicked” and “problems”—should be qualified here. As explained by Ritchey (2011):

Problems are ‘wicked’ not in the sense of being ‘evil’, but in that they are seriously devious and are notoriously susceptible to the so-called ‘law of unintended consequences’…Also, wicked problems are not actually ‘problems’ in the sense of having well defined and stable problem statements: they haven’t come that far yet. (p. 1)

Rittel and Webber (1973) proposed that there were at least 10 distinguishing properties of wicked problems. As noted above regarding the structuredness of problems, wickedness should be thought of on a continuum (anchored on the other end by tameness) (Ritchey, 2011). The reader should note that the author is not the first to cite “wicked problems” within the disease prevention and health promotion realm (e.g., Humphreys, et al., 2009; Norman, 2009; Petticrew, et al., 2009; van Beurden & Kia, 2011). Therefore, rather than simply relist the properties of
wicked problems, it seems more valuable to annotate each proposition regarding its applicability to efforts to close the research-practice gap in public health.

1. There is no definitive formulation of a wicked problem (H. W. J. Rittel & Webber, 1973, pp. 161-162). According to Rittel and Webber, problem understanding and problem resolution operate in parallel rather than in succession as typically represented in many approaches to problem solving within public health. Consider what would be necessary in identifying the nature of the research-practice gap: What are the determinants of the gap? Is it deficiency of the implementation of evidence-based public health interventions, or is it deficiencies of the way said evidence is generated in the first place? If the former, the problem statement and the problem “solution” must encompass the implementation process. But, then, where within the implementation process does the real problem reside? What then might it mean to “improve the implementation process”? Alternatively, if one adopts the viewpoint of this author, the question becomes one of whether the research-practice gap is (at least partly) a byproduct of our fundamental misunderstanding of the nature of most public health problems—i.e., that they are wicked and cannot be “solved” with a research-to-practice model, regardless of whether that model is rooted in an evidence-based or practice-based thesis. To quote Rittel and Webber: “The formulation of a wicked problem is the problem! The process of formulating the problem and of conceiving a solution (or re-solution) are identical, since every specification of the problem is a specification of the direction in which a treatment is considered” (p. 161).
2. **Wicked problems have no stopping rule (p. 162).** As a corollary of Proposition 1, those who intervene to address a wicked problem can always try to do better: “The planner terminates work on a wicked problem, not for reasons inherent in the ‘logic’ of the problem. He stops for considerations that are external to the problem” (p. 162). For example, public health stakeholders in a particular time and place working to reduce bullying might stop because they run out of time, money, or political will—not because the problem is “solved.” Consequently, Caron and Serrell (2009) have suggested: “Because wicked problems often possess no definitive resolutions, we suggest that remediation must focus on how to best manage them” (p. 195). Or as Meadows (2008) so eloquently put it: “We can’t control systems or figure them out. But we can dance with them!” (p. 170).

3. **Solutions to wicked problems are not true-or-false, but good-or-bad (pp. 162-163).** The term “satisficing” comes to mind. According to Simon (1956), “it appears probable that, however adaptive the behavior of organisms in learning and choice situations, this adaptiveness falls far short of the ideal of ‘maximizing’ postulated in economic theory. Evidently, organisms adapt well enough to ‘satisfice’; they do not, in general, ‘optimize’” (p. 129). In terms of wicked planning problems, stakeholders’ assessment of proposed solutions are expressed as “satisfying” or “good enough” rather than “correct” or “incorrect.”

4. **There is no immediate and no ultimate test of a solution to a wicked problem (p. 163).** With wicked problems, any solution, post-implementation, will lead to many consequences distributed over time and space. For example, Sterman (2000) has described the consequences of the Romanian government’s past attempts to manage the
birth rate in its country with disastrous results. In some cases, one is better off letting go rather than leaping into action (Meadows, 2008).

5. *Every solution to a wicked problem is a ‘one-shot operation’; because there is no opportunity to learn by trial-and-error, every attempt counts significantly* (p. 163). As phrased by Rittel and Webber, “every implemented solution is consequential. It leaves ‘traces’ that cannot be undone” (p. 163). Regarding design theory and methodology, Protzen and Harris (2010) have observed: “Designers do not have any direct feedback from the real world until after their plans are implemented; they do not have the luxury of trial and error in the real world” (p. 1). Therefore, although public health researchers can conduct pilot programs to increase, for example, the dissemination of evidence-based innovations, those efforts—regardless of whether they are eventually brought to scale—may have effects on the research funding agency (e.g., by diverting money from other issues), pilot participants (e.g., redirecting health department professionals’ time), and stakeholders (e.g., influencing the attitudes and beliefs of the public). In the health policy arena, Hannigan and Coffey (2011) have observed with respect to acting on wicked problems: “These actions, once initiated, will also trigger ‘waves of consequences’ throughout an interconnected system, some of which may be unintended, far-reaching and irreversible” (p. 221).

6. *Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan* (p. 164). The ambiguity that belies wicked problems is described by Ritchey (2006): “the uncertainties inherent in such problem complexes are in principle non-reducible, and often cannot be fully described or delineated” (p. 792).
Ritchey (2011) later elaborated regarding what is called “genuine uncertainty – i.e. there is no way to calculate the probability of something happening, and for the most part we are not even sure what might happen” (p. 1). For example, the strategies that are possible for dealing with intimate partner homicide are not exhaustively describable. Should we disarm anyone ever charged with intimate partner violence? Try restructuring the way custody arrangements are handled in cases of divorce? Although methods have been proposed for investigating the possible set of relationships between scenarios and strategies contained in wicked problems (e.g., Ritchey, 2006; Ritchey, 2011), Rittel and Webber have argued that “the set of feasible plans of action relies on realistic judgment, the capability to appraise ‘exotic’ ideas and on the amount of trust and credibility between planner and clientele that will lead to the conclusion, ‘OK let's try that’” (p. 164).

7. Every wicked problem is essentially unique (pp. 164-165). In this author’s opinion, Proposition #7 cuts to the heart of the debate regarding the research-practice gap in public health. As framed by Rittel and Webber: “Despite seeming similarities among wicked problems, one can never be certain that the particulars of a problem do not override its commonalities with other problems already dealt with” (p. 165). If the reader accepts Proposition #7, much of the enterprise of research and development, dissemination, and implementation of public health interventions may be seen in a whole new light. Suddenly the assumption that a public health program or service developed elsewhere will also work for others requires even greater scrutiny. Hannigan and Coffey (2011) have observed: “Whilst responses to problems identified elsewhere and findings from
empirical investigation can provide valuable intelligence, technocratic, reductionist, solutions are limited as each wicked problem is essentially a unique case” (p. 221).

8. *Every wicked problem can be considered to be a symptom of another problem (p. 165).*

For example, various types of childhood poisonings might be considered a symptom of uninformed adolescents regarding the dangers of prescription drugs; or inattentive parents who fail to supervise their children; or script-happy physicians; or whatever level of causal explanation one settles upon. Proposition #8 is very much related to the wave of ecological thinking that has washed over the public health literature during the past two decades (see “Theoretical Framework” above). According to Rittel and Webber: “There is nothing like a natural level of a wicked problem. Of course, the higher the level of a problem's formulation, the broader and more general it becomes: and the more difficult it becomes to do something about it” (p. 165).

9. *The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem’s resolution (p. 166).* As a consequence of Propositions 5 and 7, Rittel and Webber have argued that it is not possible to put a particular hypothesis regarding a wicked problem to a crucial test in the normative sense of conjecture and refutation: “In dealing with wicked problems, the modes of reasoning used in the argument are much richer than those permissible in the scientific discourse” (p. 166). While the choice of explanation for the existence (or persistence) of such a problem is arbitrary in the logical sense, in actuality, much less-scientific criteria (e.g., the analyst’s worldview) are believed to influence the choice of explanation and subsequent course of action. As phrased by Brown, Harris, and Russell (2010): “The many inter-related causes interact with multiple interests in the
outcome, so the issue cannot be reduced to a single causal factor or a simple solution” (p. 6).

10. The planner has no right to be wrong (pp. 166-167). Speaking of conjecture and refutation, Rittel and Webber suggested in this final proposition that whereas basic scientists are held harmless for postulating hypotheses later found to be false, no such immunity is tolerated in the world of planning and wicked problems: “Planners are liable for the consequences of the actions they generate; the effects can matter a great deal to those people that are touched by those actions” (p. 167).

As referenced by the above typologies, not all public health problems are of the same ilk. In particular, the type of problem that has been labeled “messy,” “ill-structured,” and “wicked” needs to be understood by those who intervene in public health matters. The aforementioned propositions are particularly consequential for those who subscribe to a strong form of the evidence-based practice thesis involving (potentially) the “uncritical use of ‘best practice’ examples” (Hannigan & Coffey, 2011, p. 221) and “off-the-shelf responses to wicked problems” (p. 221). According to Brown, Harris, and Russell (2010):

...resolution of wicked problems requires a new approach to the conduct of research and to the decision-making based on that research. Rather than following the fixed trajectories of pre-existing research pathways, addressing wicked problems involves the inquirer and decision-maker in exploring the full range of investigative avenues. (p. 4)