INTRODUCTION
Dissemination and implementation (D&I) research can be dynamic and complex. Studies lacking adequate underpinning from a model may miss key information related to system-wide processes, organizational factors, and measures required for D&I. Evidence from other fields, such as public health, have found that interventions using health behavior theories are more effective than those lacking a basis in theory, as the model can provide a way to focus the intervention on the process of behavior change.2,3 Similarly, as D&I science advances, evidence is building to show that the interpretability of study findings is improved by use of models because the study can be better organized and strategies can more successfully intervene on and measure the components essential to a successful D&I outcome.3–5

There are a number of ways in which a model can improve a D&I study. Models provide a systematic structure for the development, management, and evaluation of D&I efforts, linking study aims, design, measures, and analytic strategies.6 D&I models can help narrow the scope of a study, by assisting with the focus of the research question and guiding the selection of constructs to measure. Framing a study within a D&I model can also help explain why an evidence-based intervention (EBI) or D&I strategy works or does not work. Empirical findings from model-based studies provide evidence to support understanding the mechanisms for D&I strategies and moves D&I science forward. In this way, models can help on the front end to organize and understand phenomenon and on the back end to understand why/how D&I strategies succeed or fail. This is particularly true if the field is to progress to precision implementation, which recognizes that models in D&I need to account for a different combination of factors affecting local implementation, and in this way, precision implementation can help to better specify/tailor implementation strategies to an individual setting. This is especially important as there are a number of pathways through which a D&I strategy can succeed or fail.

The purposes of this chapter are to introduce models to inform D&I research and to provide advice and examples on model selection, adaptation, and application.

TERMINOLOGY
In explaining the conceptual underpinnings of a field, we recognize the use of various terms, including theories, frameworks, and models. Theories and frameworks are distinct concepts, as defined in the following text and in chapter 2. A theory is generally considered to provide a systematic way of understanding events or behaviors by indicating relationships between constructs and concepts. Frameworks guide researchers to consider constructs in systematic efforts to develop and evaluate interventions.

- Theory: a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables, in order to explain and predict events or situations.7(20)
Dissemination and Implementation Research in Health

- Conceptual Framework: A type of intermediate theory that attempts to connect to all aspects of inquiry; can act like maps that give coherence to empirical inquiry.6

To avoid further complicating the already complex language of D&I science, and for simplicity and consistency, this chapter collectively describes theories and frameworks as models.

- Model: A description of analogy used to help visualize something that cannot be directly observed.9

Outside of the health field, there has been an evolution of models for D&I of innovations. For example, in the field of business/management, this thinking incorporated a number of different ways to think about change, including change as rational action;6,10,11 change as adaptation to environment, which included theories such as Contingency Theory,12–14 Ecology theory,15 and Institutional Theory.16 A theory familiar to many D&I in health researchers, Rogers Diffusion of Innovation,17 became part of this literature as change was conceptualized as innovation; a further conceptualization was cultural change.18,19 The science of D&I in health has learned a great deal from fields beyond health about the value of models, and can continue to look to these fields (e.g., business, engineering, political science) to develop and adapt new model applications and build new theories.20

SELECTING AND ADAPTING A MODEL

Given the importance of models in guiding research and their availability in the literature, researchers embarking on D&I research may wonder: how do I select an appropriate model to guide my work? Several efforts to collect, organize, and synthesize the many models available to guide D&I science are available, and can be used in combination. In one review, models were organized based on three continua: construct flexibility, dissemination and/or implementation (D/I), and the levels of the socioecological framework (SEF).5 At one end of the construct flexibility spectrum are broad models, those with more loosely defined or outlined constructs; at the other end, operational models offer more detailed step-by-step actions for organizing a D&I study. Because of the greater flexibility afforded by broad models, more responsibility is placed on the researchers to operationalize, implement, and use the model; however, operational models, because of their specificity, tend to be more clearly defined for a particular context and activity. D/I refers to whether the model is focused on using active approaches to spread EBIs to the target audience via determined channels using planned strategies (dissemination) or has more of a focus on integrating an EBI within a setting (implementation); definitions for D&I have been provided in chapter 2. The SEF includes the levels: individual, organization, community, system, and describes that a model can operate at one or more of these; models can also include a policy component. In a review of 61 models, at least four fell into each of the five categories for the construct flexibility and D/I scales. Models were spread across the socioecological framework levels, and every model operated at more than one level. The majority of models included community and/or organizational levels. Only eight models touched on policy. Additional information about these models is also provided, including the field in which the model was developed as well as citations with examples where the model was used (where available).

A sample of the most highly cited, representative models from this review are displayed in Table 5.1, to demonstrate how these pieces of information about each model might be used. Within this sample are models representing all categories in terms of dissemination to implementation and construct flexibility, as well as all levels of the SEF. From the table it is possible to narrow down the list of available models to those that might best fit the intended study. To provide an additional tool to identify models and narrow the search, the models collected and organized in this review, as well as 25 models from another review with a greater focus on practitioners and clinicians,3 have been included in a searchable website (http://dissemination-implementation.org/index.aspx).

Nilsen developed a strategy to categorize models and assist researchers in model selection based on study aim;48 this, and the resource just mentioned, can be used in combination to help narrow the list of models and find the best fit. Nilsen’s review identified five categories of models and associated each with one of three common aims for implementation science research. The first category, process models, includes models that focus on describing and/or guiding the process of translating research into practice. Process models incorporate the temporal sequence of implementation as well as the importance of
<table>
<thead>
<tr>
<th>Model</th>
<th>Dissemination and / or Implementation</th>
<th>Construct Flexibility: Broad to Operational</th>
<th>SEF Level</th>
<th>Community</th>
<th>Organization</th>
<th>Individual</th>
<th>Policy</th>
<th>Field of Origin</th>
<th>Studies that Use the Model</th>
<th>Number of Times the Model Has Been Cited</th>
<th>Citation(s)</th>
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<tr>
<td>Diffusion of Innovation</td>
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<td></td>
<td>1</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Agriculture</td>
<td>21-28, 29-31</td>
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<td>Streams of Policy Process</td>
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<td>2</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Political Science</td>
<td>34-35, 36</td>
<td>16,204'</td>
<td>32, 33</td>
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<td>A Conceptual Model for the Diffusion of Innovations in Service Organizations</td>
<td>D &gt; I</td>
<td></td>
<td>4</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Health Services</td>
<td>37</td>
<td>283, 881*</td>
<td>38-41</td>
</tr>
<tr>
<td>Research Knowledge Infrastructure</td>
<td>D &gt; I</td>
<td></td>
<td>4</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Knowledge Transfer in Health and Economic/ Social Research Organizations</td>
<td>42</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>Framework for Dissemination of Evidence-Based Policy</td>
<td>D &gt; I</td>
<td></td>
<td>5</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Public Health</td>
<td>42</td>
<td>10</td>
<td>43</td>
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<tr>
<td>Real-World Dissemination</td>
<td>D = I</td>
<td></td>
<td>1</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Health Care</td>
<td>42</td>
<td>1234</td>
<td>44-45</td>
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<tr>
<td>Interactive Systems Framework</td>
<td>D = I</td>
<td></td>
<td>2</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Violence Prevention</td>
<td>42</td>
<td>599</td>
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<tr>
<td>The RE-AIM Framework</td>
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<td></td>
<td>4</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Public Health</td>
<td>42</td>
<td>1088</td>
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<tr>
<td>The Precede-Procede Model</td>
<td>D = I</td>
<td></td>
<td>5</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Health</td>
<td>42</td>
<td>2020</td>
<td>56</td>
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<td>CDC DHAP's Research-to-Practice Framework</td>
<td>I &gt; D</td>
<td></td>
<td>4</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>HIV/AIDS Prevention</td>
<td>42</td>
<td>1088</td>
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<td>x</td>
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<td>Any Domain</td>
<td>42</td>
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<td>70, 71</td>
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<td>x</td>
<td>x</td>
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<td>Construct Flexibility: Broad to Operational</td>
<td>SEF Level</td>
<td>Field of Origin</td>
<td>Studies that Use the Model</td>
<td>Number of Times the Model Has Been Cited</td>
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<td>Sticky Knowledge</td>
<td>I only</td>
<td></td>
<td>3</td>
<td>x</td>
<td>Strategic Management</td>
<td>80</td>
<td>61, 8696††</td>
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<td></td>
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<td>x</td>
<td>and Medicine</td>
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<td>81, 82</td>
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<td>Consolidated Framework</td>
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<td>4</td>
<td>x</td>
<td>Health Services</td>
<td>83–86</td>
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<td>for Implementation Research</td>
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<td>87</td>
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*As of January 12, 2017
†For 2010 edition, as this is the first edition that appears in google scholar.
‡This citation number is provided for the 2003 edition (the 2nd edition).
*These are the citation numbers for the 2006 Collins† (176 citations) and 2000 Neumann‡ (63 citations) articles. These were selected because the authors felt these articles best explained the model.
**Citation numbers for both the Elwyn† (61 citations) and Szulanski‡ (8,696 citations) references are provided. Both were included because the authors felt the references were sufficiently different that the citation numbers for both would be useful.
barriers and facilitators to D&I efforts, but do not aim to identify or systematically structure what makes D&I effort successful. Models in the categories of determinant frameworks, classic theories, and implementation theories are used to guide research aimed at understanding and/or explaining the factors that influence the outcomes of D&I efforts. Determinant frameworks describe five common determinants including the implementation object, the users/adopters, the context, the implementation strategy, and the outcome(s). Framework determinants may be based on theory, but limited in scope. Theory from implementation science or other fields is needed for research aimed at enhancing the understanding of relationships, change mechanisms, or to predict outcomes. The last category, evaluation frameworks, can guide D&I research by identifying specific aspects of the D&I effort to evaluate in order to determine success.

It is important to consider this variety of models available for use in D&I research, and to recognize the benefits of selecting an existing model from those already available, which include an opportunity to advance the field by providing empirical evidence for a model. Applying an existing model can be a source of innovation for a study, especially if it is a model not previously used in the field. However, there is no comprehensive model that will perfectly fit every study. It will likely be necessary to adapt a model and/or to combine multiple models in order to inform a study. Case study 1 outlines an example of adapting a model. While there are a number of models available, not all are well operationalized, and it may therefore require more effort to apply them in a study. The decision to attempt to develop a new model should be taken with extreme caution, as this is a large undertaking, and there are many models with similar and overlapping constructs that currently exist in the literature. Chambers has laid out a set of questions that can be asked about a D&I research by identifying specific aspects of the D&I effort to evaluate in order to determine success.

Context
This case study describes the selection and adaptation of a theory-based framework used to guide research evaluating the impact of an evidence-based policy innovation within the context of a health care organization. The innovation was designed to support nurses to know and use best practices in caring for patients during hospitalization. A theory-based approach was needed to ensure that essential concepts and processes were captured in the study design and used to support the interpretation of the findings.

Methods: The Selection and Adaptation of the Framework
The selection and adaption of the framework was guided by the process described by Tabak et al. The research team reviewed the inventory of commonly cited models (N = 61) to select one best suited for the proposed study. The Dissemination of Evidence-Based Policy (DEBP) framework (see Figure 26-1 in chapter 26) was selected because it described the process for using a policy-based innovation to achieve desired outcomes using both passive and active dissemination strategies, utilized an operational (step-by-step) construct, and incorporated a multi-socioecological level evaluation. The DEBP describes the policy process and illustrates how passive and active dissemination activities can be targeted to key audiences and carried out in phases to achieve policy outcomes. The framework was adapted to accommodate the aims, setting, and outcomes for the proposed study with a detailed description of the adaptation process.

First, the DEBP framework was designed for health policy research conducted at the “big P” level, referring to the formal laws, rules, and regulations enacted by elected officials. To adapt the framework for organization-level (“little p”) policy research the researchers had to address several key issues. Health care organizations create and maintain written policy to guide decisions...
<table>
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<tr>
<th>Question</th>
<th>Considerations</th>
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</table>
| What is/are the research question(s) I’m seeking to answer?             | 1. Reviewing D&I literature to identify and utilize essential concepts and established definitions\(^9\) will enhance the overall generalizability of the effort.  
2. Articulating a research question and aims can narrow the scope of which models might fit the study well.  
3. Beginning with a research question allows the researcher to determine what evidence is needed to answer that question.                                                                                                                                                                                                                                                                                                                                                          |
| What is the scope of the study?                                         | 1. Explanatory investigations certainly benefit from models.  
2. Earlier stage research such as measurement development or pilot work may not need to fully flesh the study out in terms of a model and might instead frame the study under the idea of a model.                                                                                                                                                                                                                                                                                                                                                   |
| What is the purpose of the model in the context of the study?            | Nilsen proposed\(^88\) five categories within three aims a model can have in guiding a study to help guide selection:  
1. Process models “describe and/or guide the process of translating research into practice.”  
2. Determinant frameworks help explain/understand influences on implementation outcomes by specifying determinants (barriers and facilitators).  
3. Classic theories, which emerge from fields such as organizational theory, psychology, and sociology, can be applied to explain/understand implementation efforts.  
4. Implementation theories, developed by implementation researchers, help understand/explain implementation.  
5. Evaluation frameworks “specify aspects of implementation that could be evaluated to determine implementation success.”                                                                                                                                                                                                                           |
| What socioecological level(s) of change am I seeking to explain?         | 1. Specifying the socioecological level in which the change will occur allows for selection of a model that corresponds to the types of change under investigation (e.g., individual, organizational, community, system).  
2. When thinking about policy, it is important to consider that policy exists at two levels: “big P” policy (formal laws, rules, regulations enacted by elected officials) and “small p” policy (organizational guidelines, internal agency decisions/memoranda, social norms).\(^43\)                                                                                                                                                                                                                     |
| What characteristics of context are relevant to the research questions?  | 1. Identifying aspects of the context that may be important to the D&I outcome are important steps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| What is the timeframe?                                                  | 1. There is variability between models in terms of how many phases of the D&I process are included (e.g., exploration of an EBI to be adopted, EBI implementation, and sustainment of the practice).  
2. A study may focus on some or all phases of the D&I process depending on the research question and the scope of the study.  
3. For studies covering multiple phases, multistage stage models Reach Effectiveness Adoption Implementation Maintenance (RE-AIM)\(^93\) and Exploration, Preparation, Implementation, and Sustainment (EPIS) framework\(^92\) can help organize these in addition to providing context specific for those stages.  
4. Other models may focus on a specific phase of the D&I process.  
5. Measures are one of the important ways in which a model and its constructs are operationalized and are a way to tie the model to the research question.  
6. Resources to help researchers identify measures for the constructs in their selected models, including the availability/absence of psychometric properties for the measures, are available,\(^93\) but considerable work is still needed.                                                                                                                     |
The Conceptual Basis for Dissemination and Implementation Research

and activities related to governance, management, care, treatment, and services. In this setting, policy decision-making often takes place at the level of the organization where “policy content” is produced based on three key inputs: “big P” policy requirements, published evidence, and practice-based evidence. To accurately reflect the differences associated with organizational use, the “policy process” concept was relocated to the upper left corner to represent that policy creation occurs at the level of the organization with the addition of the key inputs (Figure 5.1). The active dissemination process is focused solely on disseminating policy with accepted benefits, complexity, and costs to organizational audiences (e.g., departments/units) who are responsible for implementing and maintaining it over time.

Second, the DEBP framework illustrates how passive and active strategies could be used to disseminate health policy. The framework featured a full range of strategies including passive (e.g., innovation development and awareness) and active strategies commonly used to support implementation within a setting (e.g., adoption, implementation, and maintenance). To enhance conceptual clarity, the two D&I concepts were adjusted from “passive dissemination” and “active dissemination” to “dissemination” (passive

![Figure 5.1 Framework for disseminating and implementing evidence-based policy.](image-url)
and active) and “implementation.” The framework title was adapted to the “Dissemination and Implementation of Evidence-based Policy” (DIEBP) framework to recognize the inclusion of the full range of interventions on a dissemination-to-implementation spectrum.

Beyond the policy process, the DEBP framework describes two factors that influence the outcomes associated with active dissemination—specifically the audience and the conditions that support the implementation of the approved policy. These attributes are commonly referred to as “context”—the “conditions or surroundings in which something exists or occurs, typically referring to an analytical unit higher than the phenomena directly under investigation.” The context includes characteristics of the adopters (e.g., individuals/unit) and the factors that influence EBP implementation (e.g., leadership, culture, interactions, staffing, skill mix, turnover, etc.).

Last, the outcome component of the framework was refined with the addition of two intermediate outcomes with a feedback loop to depict the mechanisms used to provide practice and outcome-based evidence to update policies. The intermediate outcomes, clinician knowledge and use of best practices behaviors, are not commonly measured but are seemingly important for achieving the identified outcomes and for interpreting the findings of the study.

Lessons Learned

The policy dissemination process is one avenue for “hardwiring” best practices to promote the consistent use of EBP for patient care, but writing and disseminating policy does not ensure a practice change. The DIEBP framework was adapted to support the study aims, population, and setting. The adaptations made the process explicit and supported the research team to evaluate the strategies and measure the factors that may be impacting EBP policy implementation and outcomes.

The adapted framework draws attention to the policy process, the potential impact of health system (big P) and organizational (little p) policy, and the options leaders have for deploying EBP policy to impact outcomes. Passive dissemination may be efficient and cost-effective but it may not be sufficient to change practice. Implementation may cost more, but may result in better uptake with fewer resources used for quality improvement and service recovery. The use of implementation requires that the consistent use of best practice is a priority and that unit leaders have the knowledge, skills, and overall capacity for overseeing and maintaining practice changes. Further use and testing is needed to promote growth in this important area of D&I science.

APPLYING THE SELECTED MODEL

The next two case studies demonstrate the application of a model to a research question. Case Study 2 applies the Consolidated Framework for Implementation Research (CFIR) to retrospectively explore and implementation effort related to healthy weight promotion. Case Study 3 applies the Interactive Systems Framework (ISF) prospectively to an effort to increase the capacity for community organizations to address teen pregnancy prevention using science-based approaches.

Case Study 2: Consolidated Framework for Implementation Research

Background

Obesity has increased dramatically in the United States and many other countries over the past few decades, and this has led to an increase in associated chronic diseases and substantial health care costs. While randomized controlled trials have demonstrated the benefit of these interventions for increasing physical activity, less attention has been paid to deploying Internet-based interventions into a broad population.

Context

A large US insurance company began offering a wellness program, delivered via the Internet, to all employees with obesity in 2010. This program offered employees who did not meet certain health metrics the opportunity to join the wellness program, in order to be eligible for enhanced benefits. The multicomponent, automated, web-based lifestyle change intervention included the Walkingspree program (including an uploading pedometer, guided step-count goal setting, and web-based feedback), an online community, motivational and informational messaging, and diet tracking.
The Conceptual Basis for Dissemination and Implementation Research

The CFIR was developed based on multiple implementation theories and reviews of constructs important to effective implementation.57 The CFIR is composed of five major domains: Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process. Each domain contains several constructs, providing a “menu” for implementation scientists. For example, the Inner Setting domain includes constructs such as: Structural Characteristics, Networks & Communications, Culture, Implementation Climate, and Readiness for Implementation.

The research team conducted semistructured interviews with those critical to implementation of the program, in order to understand factors influencing implementation. The interview guide was developed based on the CFIR. As an example, the interview guide addressed the Outer Setting, including prompts related to the impact of relevant local, state, or national policies, regulations, or guidelines; the importance of member needs; and the influence of competitors implementing similar programs on program implementation efforts. The program evaluation also included assessments of program acceptance, adherence, and impact. The CFIR-based analysis identified factors in a number of domains, which were related to program implementation. In the Outer Setting, factors included federal policies (e.g., US Department of Labor Health Insurance Portability and Accountability Act guidelines) and rising costs associated with obesity. In the Inner Setting, organizational culture and support from leadership were influential as were Intervention Characteristics such as program design and the flexibility of the vendor that provided Walkginspree. The wellness program was implemented with a formal implementation Process, though in a short time frame.

Lessons Learned
The impact of interventions to modify health behaviors will be limited if they cannot be implemented on a large scale. The program evaluation was able to explore implementation through the CFIR. An appendix in the original publication provides a mapping of quotes from interview respondents on to relevant constructs,111 which helps to deconstruct aspects of the intervention and its implementation that are critical to inform future efforts. This detailed evaluation, as well as the assessment of acceptance, adherence, and impact, was able to demonstrate the promise of a wellness program delivered through the Internet to promote physical activity among workers with obesity as well as important information regarding implementation. The implementation effort evaluated in this study engaged a large number of employees, many of whom adhered to the intervention and demonstrated sustained levels of physical activity above the program’s initial goal despite modifications to the program, which were necessary to allow for large scale implementation.

Case Study 3: Interactive Systems Framework

Background
The Promoting Science-based Approaches to Teen Pregnancy Prevention project (PSBA) program is a multisite, capacity-building effort whose goal is to assist local prevention partners in the use of science-based approaches to prevent teen pregnancy.48 While previous work had shown that coalitions were important partners in prevention, the model of building and strengthening teen pregnancy prevention coalitions to improve community level capacity to plan and implement effective and sustainable teen pregnancy prevention programming had limited success.112 However, this work suggested the need for a focus on building the capacity of existing local coalitions or other types of community organizations that provide prevention programming directly to youth (i.e., focus more on capacity building of existing, youth-serving organizations than on building new community level infrastructures such as coalitions) to improve local prevention practice.

Context
The ISF51 was adopted to allow for more specific and strategic planning about what capacities were needed at the local level and to develop a framework for systematically building these capacities. The ISF was originally developed to be used by different types of stakeholders (e.g., funders, practitioners, researchers).51 The ISF aims to help these diverse stakeholders see prevention through the lens of their own needs and perspectives as well as helping these stakeholders to better understand the needs of other stakeholders and systems. This framework identifies three systems: (1) the Prevention Synthesis and Translation System (which distills information about innovations and translates it into user-friendly formats); (2) the Prevention Support System (which provides training, technical assistance or other support to users in the field in order to build their
capacity); and (3) the Prevention Delivery System (which implements innovations in the world of practice), each of which are necessary for the movement of innovations into widespread prevention practice at the community level.51

ISF informed the measures and evaluation for this PSBA project, including development of questions to document and evaluate the process and outcomes. This evaluation included a focus on how well the ISF-inspired capacity-building model was able to improve prevention practice among selected local partners. The ISF also guided how barriers identified in previous prevention efforts were addressed in the current project.

Lessons Learned
PSBA uses all three systems of the ISF to facilitate practice improvements and offers valuable research opportunities to investigate factors related to D&I processes across these systems. (I) In an effort to synthesize the elements needed to promote science-based approaches and increase the capacity of local providers, the PSBA project created an accessible and comprehensive manual called Promoting Science-based Approaches to Teen Pregnancy Prevention using Getting To Outcomes (PSBA-GTO).48 (II) CDC’s national, regional, and state partners have worked to: (1) strengthen their own general organizational capacity, (2) build science-based approaches-specific capacity to provide training and technical assistance using the PSBA-GTO process, and (3) through training and technical assistance, assist local partners in applying PSBA-GTO in their work. (III) In the PSBA project, the Prevention Delivery System includes all those local prevention partners who were invited to and have agreed to receive intensive technical assistance from state and regional grantees. Over the life of the project, each state and regional grantee was expected to have selected a convenience sample of 5 to 10 local partners and worked intensively with these partners to build their capacity to use science-based approaches to prevent teen pregnancy.

FUTURE DIRECTIONS
Given the plethora of models to guide D&I efforts and the importance of a theory-based approach to support these efforts, it is essential to consider how to make this available to D&I scientists and how to facilitate the selection process. While several options for categorization of existing models have been described,5,88 further categorizing models by (1) type of intervention, (2) type of provider, (3) type of setting, and (4) study aim, as well as utility for implementing multiple interventions simultaneously, could be beneficial to those selecting a model. There is much to be gained from employing models, including contributions to empirical testing and mechanistic D&I, which can be facilitated by enabling more researchers to select from existing models. As described, there are many models that have never been tested,6,88 so empirical use of models has great potential to advance the field. Aside from models existing within D&I science and health, models for D&I may be adapted from fields outside of health such as education, business, and engineering. There is room for additional efforts in specialty topics of D&I science (e.g., adaptation, sustainment, and de-implementation) to describe how the models are used. While efforts to sort models have been described, further synthesis of existing models, including exploring the many common constructs across models could help extend the existing models to address key questions in D&I. A better connection between models and the measures to assess the model constructs is required for continuing to advance D&I science.59 This highlights the importance of using a model in all stages of research, from designing the study to interpreting the findings.

SUMMARY
There are tangible benefits to the use of models to inform D&I research. However D&I scientists may find it difficult to select, adapt, and apply a model to their work. Guidance is provided on how to select a model, as answering several questions (e.g., the research question, scope of the study) can aid a research team in selecting a model. A case study example of adapting a model is also included, as for nearly all studies the selected model will need adaptation. Given the large number of models available and the amount of work required to develop a new model, a D&I researcher likely does not need to create a new model. There is a need to look outside the field of health research to identify other models that might inform D&I research, as reviews have identified gaps in availability models for certain types of D&I research (e.g., policy research). The use and ongoing testing of theory-based approaches will increase our ability to ensure that essential concepts are considered, enhance interpretability, support the evaluation of outcome variations, and move the science forward.
The Conceptual Basis for Dissemination and Implementation Research

SUGGESTED READINGS AND WEBSITES

Readings

This resource includes a literature search in which the 47 models identified are categorized into four thematic areas, which emerged from the review: (1) evidence-based practice and knowledge transformation processes, (2) strategic change to promote adoption of new knowledge, (3) knowledge exchange and synthesis for application and inquiry, and (4) designing and interpreting dissemination research to help aid model selection to guide D&E-I.


This narrative review identified 61 models used in D&E-I research and organized them according to several continua (construct flexibility, dissemination and/or implementation (D/I), and the levels of the socio-ecological framework) in order to assist with model selection. Additional information about each model including the field in which it originated, examples of studies (where available) that use the model, and the number of times the model was cited. Case studies demonstrating model use are also included.


This paper describes how efforts to implement evidence-based practices in clinical settings can be improved by using a theoretical foundation for the design and planning of intervention strategies and tool selection. The resource argues that a failure to truly link the theory, models, strategy, and tools in intervention design, when planning a change effort can result in suboptimal outcomes. The theories discussed in this resource are those most appropriate to clinical settings, often complex organizations.


In this paper, Nilsen presents a strategy to categorize models to assist in model selection based on study aim. This review identified five categories of models and associated each with one of three common aims for implementation science research (describing and/or guiding the process of translating research into practice, understanding and/or explaining what influences implementation outcomes, and evaluating implementation): process models, determinant frameworks, classic theories, implementation theories, and evaluation frameworks.


This chapter offers guidance to researchers on using theories, models, and conceptual framework in support of D&E-I research. This includes examples of several prominent models in D&E-I research as well as guidance for application of models to practice and policy in addition to research. Also included in this chapter is information on model selection.


This scoping review aimed to identify and describe conceptual/organizing frameworks, which could be of use to guide dissemination efforts by researchers. The review identified 33 frameworks, and among these, 20 were designed to help researchers in dissemination. Of the 33 frameworks identified, 28 were underpinned in some way by persuasive communication, diffusion of innovations theory, and social marketing. The frameworks are described in terms of their dissemination elements, theoretical foundations, and framework description.


This book aims to assist researchers in selecting and applying an appropriate model by providing considerable information and analysis about the included models. Model chapters are written by the model developer and include background, suitable applications, underlying theory, examples of use, strengths and weaknesses, and barriers and facilitators for use. Models included in this book were selected if they have wide recognition, evaluation and testing, transfer across different settings, and apply across disciplines.

Selected Websites and Tools
http://dissemination-implementation.org/index.aspx
This website provides a searchable database of models included in the review papers published by Mitchell et al. and Tabak et al. Search categories include dissemination to implementation, levels of the SEF, and included constructs. The database includes
information about each model’s categorization as well as citations for the model, and where possible, examples of its use. Resources on adapting and integrating the model are also provided.

CFIR Technical Assistance Website: http://www.cfir-guide.org/

This website has considerable information for those interested in the Consolidated Framework for Implementation Research (CFIR). This includes an overview of the framework, its domains and constructs, and library of citations using CFIR. Other features of the site are tools and templates for data collection and analysis, including an interview guide tool, which is designed to help researchers build interview guides based on CFIR.

http://re-aim.org/

The RE-AIM website provides a number of resources related to the RE-AIM framework and external validity. Information on the overall framework and its application is provided, as well as information on RE-AIM’s components: Reach, Effectiveness, Adoption, Implementation, and Maintenance with examples of use. The website also includes many resources and tools including guides on how to calculate the components of RE-AIM as well as checklists and tools for intervention planning and assessing RE-AIM application.

REFERENCES


42. Hook ML. Using Implementation Theory to Evaluate the Impact of Technology on Nurses’ Knowledge and Use of Best Practices in Acute Care. Presentation at the 9th Annual Conference of the Science of Dissemination and Implementation, co-hosted by the National Institutes of Health and AcademyHealth; December 2016; Washington, DC.


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