Applying Implementation Science in Early Childhood Programs and Systems

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SECTION **I**

Implementation Science

Defining the New Frontier

Allison Metz

There is a growing body of research that demonstrates the importance of implementation in improving outcomes for children and families. As such, a field dedicated to the science of implementation has emerged in recent years. The four chapters in the first part of this volume lay the groundwork for understanding the principles and frameworks of implementation science and provide a common language for key terms and constructs used throughout the entire book. Each chapter contributes to providing a foundation for the application of implementation science in early childhood research, practice, and policy.

In Chapter 1, Robert P. Franks and Jennifer Schroeder define implementation science and common terms associated with this new discipline, discuss shared themes across implementation frameworks, and explore the application of implementation science in an early childhood context. They begin by describing implementation as the pathway by which evidence is translated to practice. They note that the study of factors that contribute to effective implementation at the program, organization, and systems levels is central to building the science of implementation. The chapter includes definitions of commonly used terms such as *diffusion*, *replication*, *knowledge translation*, and *dissemination* and identifies how these processes are different from one another and how they relate to implementation. Other terms defined by the authors include *readiness, capacity, scalability, sustainability, fidelity,* and *quality improvement.* Creating a shared understanding of terminology will facilitate dialogue among researchers, practitioners, and policy makers regarding how to promote effective implementation.

The authors also synthesize common themes in implementation frameworks and identify elements that are present across various science-based implementation frameworks such as assessing readiness and capacity, engagement and buy-in, program installation, evaluation and fidelity, feedback loops, and innovation and adaptation. Lastly, the authors provide several examples of how implementation science has been applied in real-world early childhood settings.

In the next chapter, Allison Metz, Tamara Halle, Leah Bartley, and Amy Blasberg provide an overview of "active implementation frameworks" by describing the stages and core components of implementation. As a precursor to this description,

they note that a prerequisite for engaging in active implementation strategies is a well-operationalized practice or program model, and they provide a multitiered description of what must be included in a fully defined practice model in order for implementation to commence.

The authors observe that there is substantial agreement in the implementation field regarding the idea that, while implementation is not always a linear process, there are discernible stages to implementation. They describe the structural components and activities that represent each stage—exploration, installation, initial implementation, and full implementation—and how completing each stage contributes to successful practice, organization, and system change.

The chapter continues by describing the implementation core components or "building blocks" of the infrastructure needed for effective change at multiple levels of the early childhood system. The authors define 1) core components that build the competency and capacity of practitioners to implement new innovations effectively, 2) core components that create the hospitable organization and systems environments needed for innovations to thrive, and 3) core components that build leaders' capacity to use appropriate leadership strategies for different challenges. The authors discuss how core implementation components are applied at different stages of implementation and provide key questions to ask at each stage. The chapter also provides a framework for "making implementation happen" through the development and use of implementation teams. The role of implementation teams at different stages is discussed. Finally, the authors note the implications that using active implementation frameworks in early childhood settings will have on practice and on research and evaluation.

Shira M. Peterson in Chapter 3 provides an in-depth look at the concept of readiness. She defines readiness to change in the context of promoting successful implementation, identifies common barriers to promoting readiness, and describes frameworks such as the Transtheoretical Model of change for assessing and facilitating readiness at staff and organizational levels. Key concepts such as collaboration, empathy, and reflective listening are explored in the context of increasing readiness.

Peterson goes on to describe how the core implementation components introduced in Chapter 2 can contribute to increasing readiness. In particular, she notes how staff selection, training, and coaching processes can be used during different stages of implementation to improve readiness of early childhood educators. The role of administrative supports and the importance of aligning policies and procedures with a new way of work also are explored. Finally, the author discusses implications for future research and practice application in an early childhood context.

Chapter 4, by Chris S. Hulleman, Sara E. Rimm-Kaufman, and Tashia Abry, presents a model of intervention fidelity assessment and discusses the implications this model could have on measurement, design, and analysis of early care and education programs. The authors define fidelity and provide distinctions between intervention fidelity (assessment of the core components of the practice model or intervention) and implementation fidelity (assessment of the supports that are needed to implement the intervention such as staff selection, training, and coaching).

Chapter 4 provides a detailed description of the five steps of an intervention fidelity assessment model: 1) developing an operational logic model that "represents program elements in practical terms" and describes the specific resources and activities that support implementation of the intervention, 2) identifying appropriate fidelity indicators for program elements, 3) establishing the reliability and validity of the fidelity measures, 4) combining fidelity indices where measures are found to be interrelated, and 5) conducting statistical analyses to link fidelity scores to outcomes. The authors then apply this five-step fidelity assessment process to Responsive Classroom, a model that focuses on integrating children's social and academic learning, to illustrate how these steps could be applied in an efficacy study.

Finally, Hulleman and colleagues examine how fidelity indices can address key questions in intervention fidelity assessments, including the extent to which a program model can be adapted before outcomes disappear, how best to weight fidelity indicators when creating composite scores for fidelity, whether and how the sequencing of program elements contributes to outcomes, how to match fidelity measures with different program elements, and how to align fidelity assessments with implementation trajectories (e.g., allowing practitioners enough time to achieve skillful implementation of new practices before assessing fidelity).

These four chapters provide a deep foundation for the full volume. This creates the basis to explore how the implementation science concepts and principles addressed in these chapters are applied in early childhood research and practice throughout the rest of the book.

Implementation Science

What Do We Know and Where Do We Go from Here?

Robert P. Franks and Jennifer Schroeder

What is implementation science and why does it matter? In recent years, increasing attention has been given to the process of implementing programs and practices across a wide range of fields. It seems that it is no longer enough just to fund an innovation, but we also must devote resources to ensure that programs are successfully installed with fidelity to an identified model (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Odom et al., 2010). As the importance of evidence-based practice (EBP) has grown, the science of implementation has also gained attention in health, mental health, education, and related fields. Research has demonstrated that fidelity to evidence-based models is related to outcomes and, further, that the process of implementation is related to fidelity (Fixsen, Blase, Timbers, & Wolf, 2001; Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004; Odom et al., 2010). In a major review of the literature, Durlak and DuPre (2008) showed that successful implementation can result in programs being 3 to 12 times more effective and concluded that "there is credible and extensive empirical evidence that the level of implementation affects program outcomes" (p. 334). Thus, implementation matters.

There is now a growing body of research that examines the implementation process in community-based settings; however, few studies have focused on the implementation of model programs in the field of early care and education (ECE). In this chapter, we will begin by introducing the concept of implementation science, define common terms, and identify shared themes across implementation models and theories. We will also explore the implications of implementation science for practice and research, in particular as it relates to the developing field of ECE. Subsequent chapters will explore these concepts in greater depth and identify applications of implementation science as a mechanism for successful installation of ECE programs and as a framework for sustainable child and family outcomes.

Implementation Science Defined

Implementation can be defined as a specified set of activities designed to put into practice an activity or program of known dimensions (Fixsen et al., 2005), such

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as an evidence-based program or practice. When considering the implementation process, we typically, but not always, examine the replication and dissemination of EBPs.

An EBP is commonly defined as a program or practice that, when implemented effectively, produces a statistically significant and positive outcome for the EBP recipient. Debate remains over the level of evidence required for an EBP to be considered evidence based. Often this involves the use of randomized control trials (research comparing the outcomes of program recipients with a randomly selected sample of individuals who did not participate in the program) in community-based settings that demonstrate that a program is ready to disseminate to participants in the community. Program developers typically strive to utilize consistent implementation procedures when establishing the evidence base for an EBP; however, the implementation activities required to reproduce an EBP in the community may or may not be explicitly described in the model.

Implementation can also include activities designed to put into practice an activity or program that may not be evidence based. In this case, program developers or researchers may be interested in investigating the utility of a pilot or model program, establishing evidence for a program that is thought to contribute to positive outcomes, or identifying implementation factors that may contribute to establishing an EBP that ensures positive outcomes. These programs are often considered "promising practices" or "recommended practices" rather than EBPs, depending on whether or not rigorous investigation of the program is already under way that is expected to establish the evidence base for the program.

One of the challenges of implementing EBPs and model programs is that when such practices are brought to community-based settings, the activities put into practice to implement the programs may not always be consistent or aligned with the original procedures used to establish the practice as evidence based and therefore may not produce the positive outcomes demonstrated in the research trial (Durlak & DuPre, 2008; Fixsen et al., 2001; Schorr, 1993). In these situations, it is possible that the program has not actually been implemented as intended and therefore is not likely to produce the expected results. This is referred to as a Type III error, an error that occurs when outcomes are evaluated from a program that was not implemented as intended (Dobson & Cook, 1980). Any outcomes that result are produced by factors other than the program of interest. The outcome of a Type III error is that children, families, and individuals will not benefit from a program they do not experience (Fixsen et al., 2005).

In some instances, when implementing model practices, adaptations are necessary to ensure successful implementation and help the practice fit the ecology and culture of the community; however, it is sometimes unclear what adaptations are acceptable and which can overly compromise fidelity to program models, resulting in compromised or negative outcomes. Despite these challenges, when implementing ECE programs in real-world settings, adaptation almost invariably becomes a consideration (Durlak & DuPre, 2008).

Implementation has been described as the "science, practice, and policy of getting science into practice and policy" (Fixsen, 2011). Factors associated with effective implementation are therefore crucial to ensuring that evidence-based programs—or for that matter any intervention, activity, or program—are implemented as intended in order to sustain changes in practice and policy. Attention

should be given to factors that contribute to effective implementation, whether at the program, organization, or systems level. Under this premise, implementation science can be defined as *the scientific investigation of factors associated with effective implementation*. As will be described in this and subsequent chapters, there seem to be many factors that contribute to effective implementation. In addition, these factors seem to interact in a nonlinear and iterative manner and may affect multiple systems, including practice, policy, and research (Sung et al., 2003).

Due to the complexity of the implementation process, it can be argued that implementation science must capture the iterative and nonlinear nature of the various implementation components. This approach to empirical investigation differs from the more traditional method of research establishing the evidence base of EBPs, which typically involves the use of randomized control trials and research designs that measure participant outcomes from preprogram to postprogram implementation. As the major themes of implementation frameworks described in the next section will show, the implementation process involves multiple direct service activities, including training on the program model and monitoring fidelity to the program model (implementing the program model as intended), as well as service support activities such as data-driven decision making, ongoing coaching for practice improvement, and organizational or system policies that support quality implementation sustainability. The science of implementation must therefore not only focus on the components of fidelity to the program model but also address the organizational and system-level components that contribute to the quality implementation (including model fidelity) of the program, the continuous quality improvement at the individual and organizational level, and the quality implementation sustainability of the program over the long term. The benefit of a science that can account for a variety of components operating within a systemic framework is a more dynamic and individualized approach to service delivery and increases the likelihood of sustainability and high-quality outcomes.

Definitions of Commonly Used Terms

There is a range of terms often associated with implementation science and commonly used in the scientific, practice, and policy areas. Key terms include *diffusion*, *replication*, *dissemination*, *readiness*, *capacity*, *scalability*, *fidelity*, *coaching*, *training*, *technical assistance*, *quality improvement*, *sustainability*, and *purveyor and intermediary organizations*.

Diffusion, replication, dissemination, knowledge translation, and *implementation* are commonly used terms that refer to the process of bringing an established model from research to practice. These terms differ slightly in their meanings, particularly in how passive or active the process is. Diffusion usually tends to be a more passive process and can include the diffusion of knowledge. *Replication* usually refers specifically to re-creating a model program ("replicating" it) in another setting. *Dissemination* can refer to the spreading of knowledge, ideas, or practices. Similar to dissemination and diffusion, but focused more on the usability of research knowledge by users of an innovation, is *knowledge translation* (Grimshaw, Eccles, Lavis, Hill, & Squires, 2012; Lane, 2012). Implementation is the most active and intentional of these processes and is often differentiated from more passive approaches as "making it happen" (Fixsen et al., 2005; Greenhalgh, Robert, Bate, MacFarlane, &

Kyriakidou, 2005). The chapter by Metz, Halle, Bartley, and Blasberg (Chapter 2) provides an in-depth overview of what constitutes *active* implementation.

Readiness and capacity are often seen as critical elements in the early stages of the implementation process. *Capacity* can be defined as the host agency's available resources that can be dedicated to the implementation process, such as a well-trained workforce, knowledge and skills, physical space, ability to collect and use data, supporting policies, or other factors that can contribute to the successful implementation of new practices. *Readiness* refers to the ability of the host agency or organization to learn and assimilate new ideas, to engage in a change process, and to change practice that is critical to the host organization's ability to implement with quality and sustainability (Damschroder et al., 2009; Gulbrandsson, 2008; Weiner, 2009). The chapter by Peterson (Chapter 3) further explores the linkages between readiness to change and effective implementation.

Scalability is a term used to describe the potential for taking an individual model or pilot program and expanding it to fit some larger system. Fixsen, Blase, Metz, and Van Dyke (2013) define *scale* as "60% of the service units in a system… using the program with fidelity and good outcomes," meaning not only that the program has been adopted by most service providers in a large system but also that it is being implemented with quality.

For example, at some point in their early development, commonly recognized evidence-based treatment models such as Multisystemic Therapy (MST) were once localized, individual, structured programs developed to meet the needs of an identified population. As the model was researched and evidence was established, it was replicated in many settings. In this example, the scalability of MST—the potential for replicating it—was great, as it has been successfully replicated in settings around the world.

It is important to note that the process of bringing a program to scale in a larger system can encounter multiple challenges in terms of systems change and quality assurance; these challenges should be considered before initiating a scaling-up process (Chamberlain et al., 2011). The chapters in Part III of this volume highlight the replication and scale-up of several ECE practices and interventions, noting where applicable some of these challenges with regard to systems change and quality assurance.

Fidelity is a critical element to successful implementation, especially when replicating evidence-based models. *Fidelity* typically refers to how well the program is being implemented compared to the original program model or design. What we refer to here as fidelity to a program model is called by Hulleman, Rimm-Kaufman, and Abry in Chapter 4 "intervention fidelity," which they distinguish from "implementation fidelity," the latter denoting adherence to the core implementation components of an active implementation framework. Model drift can occur if sufficient attention is not paid to monitoring and supporting fidelity and can result in poor or even negative outcomes. Achieving fidelity also takes into account the complex organizational factors that may require minor adaptations while still replicating the core program components (Aarons et al., 2012; Mowbray, Holter, Teague, & Bybee, 2003). One of the challenges associated with implementing EBPs and other recommended-practice models is finding the adequate resources to support fidelity adherence in an ongoing manner once the program is installed.

Coaching, training, and *technical assistance* all refer to activities that support the implementation process. Coaching can be conducted by either trained internal staff or an outside "expert" who provides consultation and support to supervisory and frontline staff to ensure the model is being implemented correctly and any deficits in knowledge or skills are addressed. Research on the link between implementation activities and program outcomes has shown that the intended outcomes may not be achieved with training alone and that coaching and technical assistance are critical to successful program replication (Joyce & Showers, 2002; Rodriguez, Loman, & Horner, 2009). Coaching often has the goal of building the capacity of the providers so that they can ultimately do the work themselves without significant external support.

Training and technical assistance are typically provided or brokered by the treatment developer—an external expert entity, purveyor, or intermediary organization who brings knowledge and resources to address needs identified by the organization or through an external monitoring or evaluation process. Training and technical assistance can address very concrete issues, such as questions about billing or third-party reimbursement, or more complex issues such as organizational development, systems change, or sustainability planning. Coaching and training may or may not be explicit components of a program or intervention model, but they are understood as essential components of an intentional and active implementation model (see Chapter 2).

Quality assurance and *quality improvement* refer to processes that support the implementation, fidelity, and sustainability of model programs. These processes often play a critical role in ensuring that programs are being delivered with fidelity to an identified model and are resulting in expected outcomes. These processes work by collecting and using data to track and analyze performance, measure performance against established benchmarks, and create incentives and provide support for program improvement. Quality assurance and improvement activities can be seen as critical to the successful implementation of EBPs and model programs (Aarons et al., 2012).

Sustainability refers to the ongoing maintenance and successful implementation of a model program with good effect. In many cases, following initial stages of implementation that may include intensive financial, consultative, and technical support, model programs and practices have difficulty being sustained in the "real world." Sustainability planning has been identified as a critical component of the implementation process that should be considered from the outset of implementation activities (Johnson, Hays, Center, & Daley, 2004). The goals of sustainability planning are 1) establishing adequate policies and procedures to institutionalize the desired changes and 2) putting into place the necessary mechanisms to ensure the short- and long-term survival of the program following the intensive implementation process.

The intercession of purveyor and intermediary organizations—typically defined as external entities that facilitate the implementation process—may be necessary to ensure successful implementation (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2005). Fixsen et al. (2005) defined a purveyor organization as "an individual or group of individuals representing a program or practice who actively work with implementation sites to implement that program or practice with fidelity and good effect" (p. 14). They defined an intermediary organization

more broadly, as "the specific agency that houses, supports, and funds the implementation of a program or practice…that will in turn help to develop, support and sustain one or more replication programs" (p. 82). The definition of an intermediary organization has been expanded to include the following functions: 1) consultation activities; 2) recommended-practice model development; 3) evidence-based practices purveyance; 4) quality assurance and improvement; 5) outcome evaluation and research; 6) training, public awareness, and education; and 7) policy and systems development (Franks, 2011). Purveyors and intermediary organizations could serve many functions, including a translational role between research and practice or a technical assistance provider to program implementers to ensure quality implementation and sustainability of programs (Fixsen, 2011).

Major Themes in Implementation Literature

Over the past decade, an increasing number of research studies and publications have focused on the topic of implementation; however, the field of implementation is still relatively new and comparatively small in relation to other research topics. Because implementation science is still an emerging field, few frameworks have accounted for the complex and dynamic nature of implementation.

Of note is the Fixsen et al. (2005) framework, which was developed through a comprehensive literature review of existing implementation studies published in the fields of health, mental health, education, and business and identified variables contributing to quality implementation, positive programmatic outcomes, and sustainability. The authors categorized six stages of implementation and core implementation components common to all fields: 1) exploration, 2) installation, 3) initial implementation, 4) full implementation, 5) innovation, and 6) sustainability. Core implementation components are addressed within the framework at the individual provider, organization, and systems levels. As a result, the authors point out that these stages may not progress in a linear fashion, but are often iterative and nonlinear, allowing for a program improvement feedback loop that includes strategic learning at the individual, organizational, and systems levels of program implementation in order to encourage policy changes that better support effective implementation over time. This framework is described in greater detail in Chapter 2.

From 2004 through 2012, several systematic reviews looked at features related to dissemination, diffusion of innovation, and implementation of model programs (e.g., Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2004; Meyers, Durlak, & Wandersman, 2012; Stith et al., 2006). These reviews examined multiple factors related to implementation and evaluated hundreds of research studies to look for common themes and trends that emerge as common characteristics of implementation research. This research was not necessarily focused explicitly on implementation, but observations about issues related to implementation nevertheless often resulted from studies that examined efficacy, outcomes, program development, or innovations in practice (e.g., Durlak & DuPre, 2008; Meyers et al., 2012). In many instances, the common themes that emerged from these reviews were more numerous than their differences. Durlak and DuPre (2008) noted that of the 23 factors described in their review, a range of 13–21 common factors was observed by other authors. These factors included the importance of funding, a positive

work climate, shared decision making, coordination with other agencies, formulation of tasks, leadership, program champions, administrative support, providers' skill proficiency, and training and technical assistance (Durlak & DuPre, 2008, p. 340). From this analysis, it seems that a common language for implementation science is emerging and converging factors are being explored that relate to the implementation process.

As we consider the range of potential themes and topics emerging in the growing field of implementation science, several key areas come to light as crosscutting themes in much of the literature. Many of these topics will be discussed in greater detail in subsequent chapters of this volume and have specific relevance for the early care and education field. Seven key areas that provide a foundational understanding of implementation science have been identified and are described in the following list:

1. *Assessing readiness and capacity.* Many researchers who have examined the developing field of implementation cite the importance of assessing the capacity for change and goodness of fit for implementing evidence-based and model programs in community-based settings (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2004; Meyers et al., 2012; Stith et al., 2006). Therefore, an important initial step in the implementation process is conducting a structured assessment, often one that assesses readiness to implement specific components and aspects of the identified model, before further investment is made in initiating a potentially costly implementation process.

2. *Structure of the implementation process.* Many of the articulated implementation processes are stage based and linear, with the ultimate goal of program installation and sustainability (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2004; Meyers et al., 2012; Wandersman et al., 2008). Although implementation methodologies vary, it is important to have a well-articulated methodology that is described up front so that the entities participating in the implementation process have a clear sense of the process and what is expected of them.

3. *Engagement and buy-in.* Buy-in is often considered to be important at every level (Durlak & DuPre, 2008; Greenhalgh et al., 2004; Meyers et al., 2012; Simpson, 2002). Agency or community leadership must provide sufficient support and assistance to create a climate for successful implementation. To achieve practice change, workers and line staff must be sufficiently engaged in the process to benefit from training and knowledge transfer. Ideally, participants in the implementation process should have a clear sense of what is expected of them and be willing to actively partake in the implementation process.

4. *Program installation.* What many people may consider the most active phase of the implementation process is what in the field is referred to as "installation" or "adoption" (Fixsen et al., 2005). During this process, knowledge is transferred and new skills are acquired through a structured process of training, coaching, and technical assistance (Durlak & DuPre, 2008; Greenhalgh et al., 2004; Meyers et al., 2012; Simpson, 2002; Wandersman et al., 2008). Most implementation models suggest that this process takes a considerable amount of preservice delivery time and effort.

5. *Outcome evaluation and fidelity monitoring.* Agencies learning a new model often need to build capacity not only to change practices and learn new skills but also to develop comprehensive data systems that allow the collection, analysis, and interpretation of various forms of data (Durlak & DuPre, 2008; Meyers et al., 2012; Stith et al., 2006). Model programs must also be monitored to ensure that they are being delivered with fidelity and resulting in expected outcomes.

6. *Feedback and quality improvement.* Ideally, data are not collected in isolation or for research purposes only but are used in a systematic way for quality improvement and skill development. Quality improvement can help increase the likelihood that model programs produce and sustain the outcomes as intended (Arthur & Blitz, 2000; Chinman et al., 2008; Schorr, 1993).

7. *Innovation and adaptation.* Many authors and researchers who study the implementation process address the issue of innovation and model adaptation (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2004; Meyers et al., 2012). When implementing a model practice, most agree that it is necessary to ensure that the model is compatible with the local culture, and context and accommodations must often be made to ensure buy-in and successful implementation. However, especially in the case of evidence-based models where fidelity is a consideration, care must be taken to ensure that innovations or adaptations do not compromise essential aspects of the model.

From these metareviews and syntheses of literature, it is evident that a shared language for the science of implementation is emerging. As a unified model continues to develop, the need to explicate the features through case examples and to further test components of the model through research and evaluation is needed. However, even at this early stage of development, treatment developers, purveyors and intermediary organizations, and agencies and funders can begin to use implementation frameworks as a road map for implementation of services and programs. A more in-depth consideration of the stages of implementation is presented in Chapter 2.

Challenges and Limitations

Although the availability of implementation frameworks provides a useful guide to quality implementation, there are also some challenges to using implementation frameworks to structure future implementation activities and related research. The following considerations highlight the potential challenges in using implementation frameworks:

• *The theoretical base for implementation is relatively new and needs to be tested and operationalized in real-world settings.* Many of the frameworks described above, as well as those that were not included in this chapter, were developed through a review of existing literature (see Meyers, Durlak, & Wandersman, 2012, for a more extensive description of existing implementation frameworks). Given the recent emergence of the field of implementation science, it is possible that the existing literature does not yet represent implementation practices in general, particularly since most if not all of the available frameworks have yet to be empirically tested in real-world settings.

- *Implementation frameworks may not neatly fit real-world ecology.* Given the iterative and nonlinear process of implementation, an emphasis on an organizing framework may risk overlooking the emergent qualities of practice improvement and the possible need to revisit earlier phases of implementation to improve program outcomes and sustainability.

- *Implementation frameworks may be better used as guides for organizing results than for driving research.* Implementation science may help to further inform implementation frameworks, but not necessarily the other way around. It would be informative to empirically test implementation frameworks, but implementation science may also be served by considering alternative hypotheses for empirical investigation.

- *Implementation frameworks may not be sufficiently articulated to identify and measure change.* Further refinement of processes, phases, and stages may be necessary to clearly define the empirical hypotheses needed to test implementation frameworks and related activities.

Despite these challenges, the field of early care and education can benefit from the integration of key implementation components into ECE practices by increasing the sustainability of quality practices and services and thereby enhancing the likelihood of positive outcomes for children and families. The implementation frameworks described above can be used as guideposts in the adoption and dissemination of evidence-based practices and even promising practices with the goal of establishing evidence of successful programmatic outcomes. As the field of ECE expands to incorporate implementation of EBPs, the dividends produced by an investment in offering quality programs and services will be greater if there exists an equal investment in quality implementation.

Case Examples: Applying Implementation Science in Real-World Settings

Although implementation science is a relatively new field, several examples illustrate how large-scale systems apply comprehensive implementation strategies to successfully disseminate model and recommended-practice programs. Although these strategies do not specifically operationalize previously described implementation frameworks, many of the features highlighted by these frameworks are evident in the following case examples. Several of these examples reflect the major themes in Meyers, Durlak, and Wandersman's (2012) synthesized model. In particular, the importance of assessing the capacity for change by utilizing a structured approach, identifying and engaging organizational and community leadership, developing implementation teams and a plan, collecting data, and providing ongoing training and technical assistance and quality assurance through the process of implementation can be seen in the following case examples.

The Learning Collaborative Approach:
Trauma-Focused Cognitive Behavior Therapy and Child FIRST

The importance of utilizing a structured implementation approach and relying on an external purveyor, intermediary, or technical assistance provider to facilitate

the process of implementation has been often cited in the literature (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2004). The state of Connecticut has recently applied implementation strategies to bring two EBPs to scale across the state: 1) Trauma-Focused Cognitive-Behavior Therapy (TF-CBT) and 2) Child FIRST, an early childhood home visiting intervention. In both instances, through support from the Center for Effective Practice at the Child Health and Development Institute, the Learning Collaborative methodology was successfully utilized as the implementation strategy, with the Center for Effective Practice acting as an intermediary organization to facilitate the implementation (Franks, 2011).

The Learning Collaborative methodology was first developed by the Institute for Healthcare Improvement (IHI) as an approach to implementing practice improvements in community settings (Lang & Franks, 2011). IHI originally developed the methodology to provide a framework for creating improvements in health care (Institute for Healthcare Improvement, 2004), and the model was later adapted to the dissemination of trauma-focused mental health interventions by the National Center for Child Traumatic Stress and more recently to an early childhood intervention program in Connecticut. A learning collaborative differs from typical training and implementation strategies in that it typically involves a 6- to 15-month-long process that includes multiple phases of implementation and multimodal training for participants. Learning collaboratives involve multiple groups learning together from different communities or agencies. Through an interactive, collaborative process, participants learn from one another and overcome barriers to successful implementation.

Learning collaboratives include staff with diverse roles in a team-based approach, employ several in-person trainings and individual consultation throughout the year, emphasize the use of data for quality improvement, utilize active-learning techniques, and focus on organizational change and sustainability (Lang & Franks, 2011). An initial assessment of the site's capacity for change is assessed, and a "model for change" that targets areas in need of capacity building, training, and technical assistance is developed. Between in-person "learning sessions," participants engage in a variety of other implementation activities, including "action periods" in which they practice skills, apply small tests of change, and overcome obstacles to implementation. In addition, web-based learning, group consultation conference calls, site-based consultation, and affinity group meetings are utilized to help accelerate the process of implementation. The implementation process is closely monitored by the ongoing collection of metric and outcome data, which are continuously fed back to participants. Senior leaders at each agency actively participate in the training (along with supervisors, line staff, and others) to ensure that there is organizational buy-in and that any organizational barriers can be addressed and overcome.

Promising results have been found for the IHI Learning Collaborative model in health care fields, and learning collaboratives have also been used to improve health promotion practices in afterschool programs and to improve the quality improvement infrastructure of county mental health agencies (Lang & Franks, 2011). This methodical implementation process is particularly useful when attempting to bring model programs or EBPs to scale. Outcomes from the application of this model in Connecticut have yielded strong results indicating that the programs are being implemented with high fidelity and resulting in

positive outcomes for children and youth participating in the program (Lang & Franks, 2011).

Child FIRST (Lowell, Paulicin, Carter, Godoy, & Briggs-Gowan, 2011) adapted this basic learning collaborative model to an early childhood home-visiting intervention for at-risk mothers and their young children, but several important adaptations were introduced. As Durlak and DuPre (2008) suggest, it was important to find the right balance between fidelity to the learning collaborative model and the adaptations necessary for this model to be used for a community-based home-visiting model. Further, minor adaptations to the original treatment model had to be considered by the model developer when disseminating across a state system of care.

Due to the intensive nature of the intervention, the "standard" learning collaborative timeline, which typically involved three or four in-person learning sessions punctuated by site-based action periods, had to be adapted to include both increased frequency and duration of learning sessions coupled with intensive site-based coaching and supervision. When working with the treatment developer, it became evident that the scope of the model, which includes a community-based care coordination component as well as an intensive home-based intervention, required a comprehensive implementation strategy that addressed the multiple needs of the participants. Ensuring buy-in and participation from communities, engaging senior leadership at participating agencies, and creating a sustainable learning community were all challenges faced by the implementation team. In addition, the use of metric and outcome data and continuous quality improvement continue to be ongoing critical components of the implementation process. This real-world example brings many of the previously described elements of implementation to life and highlights the importance of being flexible even when utilizing a highly structured approach to implementation.

Scaling of Evidence-Based Practice: The Incredible Years

The Incredible Years is a well-researched evidence-based behavioral improvement program for young children that is currently implemented by teachers in classroom settings in more than 400 classrooms in Colorado. The program was brought to the state by an intermediary purveyor, Invest in Kids, which served the role of bridging research and practice through the recognition of the need for a school-based behavioral health intervention that was evidence based, the identification of the EBP that matched this need, the engagement of local systems and schools interested in adopting the program, and the installation of the systems and processes necessary to implement the program with high quality.

Over the 7 years that The Incredible Years has been implemented in Colorado, the purveyor Invest in Kids has steadily monitored fidelity of program implementation, provided technical assistance when needed, addressed at the state and local levels policy issues that support quality implementation, and helped guide the scaling-up efforts to bring the program to an increasing number of classrooms each year. There are many factors that have supported the successful installation and initial implementation of the program, including the cultivation of new and ongoing funding sources, the establishment of data collection and fidelity monitoring processes, and an emphasis on local sustainability and community buy-in. Evaluation efforts are now aimed at investigating the implementation drivers that support

sustainable and quality implementation of The Incredible Years in Colorado as well as related child outcomes.

Systems Change: Early Childhood Council Health Integration Initiative (Colorado)

In 2009, the Colorado Trust funded 20 Early Childhood Councils (ECCs) in the state to implement programs that integrate health with other systems relevant to the well-being of young children. This unique funding approach allowed for ECCs to focus not only on quality program implementation but also on systems-building activities that support program implementation sustainability. The evaluation of this initiative focuses on the process of systems building in ensuring quality implementation of programs. The implementation of programs, engagement of health system representatives in the implementation process, and related developmental evaluation are highly participatory in nature and focus on quality improvement practices to improve child and family outcomes. Section IV of this book discusses systems issues in more depth as they relate to the process of implementation.

Implications for Early Care and Education Program Evaluaton and Research

Based on the literature reviewed in this chapter, common themes are evident in areas for future evaluation and research. Greenhalgh et al. (2008) made multiple methodological recommendations for how research on diffusion and implementation of innovations should be conducted in the future. Based on their recommendations, future research should be 1) theory driven; 2) process oriented; 3) ecological (including a focus on the setting and context for implementation); 4) able to use common definitions, measures, and tools; 5) collaborative and coordinated; 6) multidisciplinary and multimethod; 7) meticulously detailed; and 8) participatory. Further, authors reviewed in this chapter have recommended a range of content areas to be considered in future implementation research, including:

1. Development of further consensus on the elements of implementation and shared definitions and frameworks in order to better operationalize, define, and describe factors associated with implementation (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2008; Schoenwald & Hoagwood, 2001)

2. Research to explore how contextual factors such as setting and capacity may affect successful implementation (Fixsen et al., 2005; Meyers et al., 2012; Schoenwald & Hoagwood, 2001; Wandersman et al., 2008)

3. Comparative research to determine how implementation factors influence outcomes (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2008; Meyers et al., 2012)

4. Research to explore the relative weight of implementation factors as they relate to outcomes and variability across similar implementation settings (Fixsen et al., 2005; Greenhalgh et al., 2008; Meyers et al., 2012)

5. Research to determine the relative influence of implementation structure and the impact of training and technical assistance (Durlak & DuPre, 2008; Durlak & Wandersman, 2012; Greenhalgh et al., 2008)

6. Research to explore the effects of adaptation and model fidelity on successful implementation and program outcomes (Durlak & DuPre, 2008; Durlak & Wandersman, 2012; Greenhalgh et al., 2008)

When considering early childhood and education implementation research, it is important to note that little research specific to the ECE field has been conducted. The recommendations above would certainly be applicable to the ECE field, with special consideration given to issues relevant to working with this population. Implementation frameworks highlight the need for organizational, community, and cross-system improvements in supporting quality program implementation. Unique factors associated with implementing ECE programs may be discovered in the future. Because traditional research tends to explore changes in time and causality between two points, examining ECE research through an implementation lens may yield new multidimensional and multidetermined approaches to better understand how implementation factors impact model fidelity and program outcomes.

Further, implementation factors should be examined continuously and repeatedly over time. ECE researchers can better explore what works for whom and under what conditions. In some cases, good measures of the implementation process do not yet exist or have not been sufficiently validated. Self-report measures can be unreliable, and objective measures are lacking and often difficult to operationalize (requiring intensive external observation by an objective party). In addition, many researchers may not be adequately trained or prepared to conduct implementation research. In sum, implementation research can be challenging and may not easily fit within our existing research paradigms.

Despite these challenges, it is imperative that ECE researchers continue to explore implementation as it relates to successful and sustainable program outcomes for young children and their families. Otherwise, we may continue to invest resources in ECE programs that lead to poor outcomes and erroneously conclude that it is a result of a flawed intervention. Instead, we should invest in developing and utilizing rigorous yet flexible implementation frameworks that can ensure that programs are implemented successfully with sufficient fidelity to program models. Only then can we accurately assess the impact of ECE programs in community settings and make informed decisions about program outcomes and investment of limited resources.

Summary

This chapter introduced the concept of implementation, defined key terms, reviewed implementation literature and frameworks, and set the stage for further description of the implementation process, models for change, and areas of future research. Although implementation science is an emerging field, it is evident that a great deal of attention and focus on implementation is under way. We may be on the threshold of a paradigmatic shift in how we understand program effectiveness and outcomes. No longer can we separate the intervention from the implementation process. This realization has significant implications for the early care and education field, especially during times of diminished resources. To make sound investments and ensure that resources are being utilized to their utmost potential, we must focus on how programs and services are implemented in community-based

settings. Recognizing the value of implementation has implications for how programs are funded and replicated. This volume provides further in-depth analysis of implementation science as it relates to ECE initiatives and begins to provide a blueprint for policy makers, researchers, practitioners, and purveyors and intermediary organizations as they embark on developing and disseminating promising and model ECE programs in the hopes of yielding improved long-term outcomes for vulnerable young children.

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