MEASURING IMPLEMENTATION OF EARLY CHILDHOOD INTERVENTIONS AT MULTIPLE SYSTEM LEVELS

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Diane Paulsell, M.P.A., is a senior researcher and associate director of human services research at Mathematica Policy Research. Ann M. Berghout Austin, Ph.D., is a professor at Utah State University. Maegan Lokteff is a doctoral student at Utah State University.

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Submitted to:
Ivelisse Martinez-Beck, Ph.D., Project Officer
Office of Planning, Research and Evaluation
Administration for Children and Families
U.S. Department of Health and Human Services

Submitted by:
Diane Paulsell, Mathematica Policy Research
Ann M. Berghout Austin, Utah State University
Maegan Lokteff, Utah State University

Contract Number: GS10F0030R
CONTRACTOR
Project Director: Tamara Halle
Child Trends
7315 Wisconsin Avenue
Suite 1200 West
Bethesda, MD 20814

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Overview for OPRE Research Brief series on Applying Implementation Science to Early Care and Education Research and Evaluation

The "science of implementation" is the study of the process of implementing programs and practices that have some evidence from the research field to suggest they are worth replicating. Implementation science is the study of how a practice that is evidence-based or evidence-informed gets translated to different, more diverse contexts in the "real world." In this way, effective implementation bridges the gap between science and practice.

There is a growing body of research looking at the processes and core components of implementing evidence-based practices to different settings and, especially, at what it takes to move an evidence-based practice from the laboratory to the field (Berkel, Mauricio, Schoenfelder, & Sandler, 2010; Durlak & Dupre, 2008; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Meyers, Durlak & Wandersman, 2012). However, historically much of this research has focused primarily on adult services (Simpson, 2002) rather than on services for young children and evidence-based practices that support young children's growth and development.

The salience of implementation has come to the fore within the early childhood field in recent years because, increasingly, early childhood program developers are being asked not only to prove their program's efficacy before being brought "to scale" or transported to other locations, but also asked to articulate what components of their model, or the contexts in which the model is deployed, are essential for making the intervention a success. This is true of individual programs, such as discrete language and literacy interventions, as well as for larger, systems-level interventions, such as statewide initiatives to improve early childhood educators' professional development, children's school readiness, or child care quality. However, up until now, the early childhood field has lacked a common framework and language with which to examine important implementation supports for successful initiatives.

This research brief series seeks to provide early childhood researchers, program developers, and funders with an introduction to implementation frameworks and promising practices in implementation science with the aim of facilitating their use in early care and education research and program evaluation.

- The first two briefs in this series 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 research brief series. Specifically, a brief by Allison Metz, Sandra Naoom, and Tamara Halle introduces key elements of effective implementation within an integrated, stage-based framework; and a brief by Eboni Howard, Lindsey Allard Agnamba, Julia Wessel and Victoria Rankin provides a review of the terminology used in implementation research in the early care and education literature.
- The third brief (by Jason Downer and Noreen Yazejian) defines two cross-cutting themes: the quality and quantity of implementation. A review of recent empirical work provides examples of how these constructs are assessed and examined in relation to early care and education program outcomes. The authors highlight implications for researchers, purveyors, and funders of early childhood programs.
- The fourth brief (by Barbara Wasik, Shira Kolnik Mattera, Chrishana Lloyd, and Kimberly Boller) uses an implementation science lens to help readers understand the effects that dosage of interventions can have on outcomes, as well as on general implementation factors such as training and program administration.

- The fifth brief (by Diane Paulsell, Anne M. Berghout Austin, and Maegan Lokteff) introduces the importance of measuring implementation at multiple system levels and proposes tools for doing so. The benefits for practitioners, researchers, and policymakers of measuring implementation at multiple system levels are conveyed and suggestions and practical considerations are offered.
- The sixth brief (by Amy Susman-Stillman, Shannon B. Wanless, and Christina Weiland) reviews three theoretical frameworks of fidelity from the fields of prevention science, clinical psychology, and elementary education; highlights useful aspects of each framework; and offers early care and education researchers considerations for choosing a framework to use in their studies.

Implementation science offers a means by which to create a shared understanding of what it takes to have effective, replicable, and sustainable early childhood programs and systems in community-based settings. This research brief series aims to provide a useful overview of the current state of the field of implementation science research and its applications to the early care and education field. We hope that researchers, program developers, funders and other stakeholders will find this series helpful in facilitating the use of implementation science frameworks, methodologies, and analysis in early care and education research and program evaluation.

This research brief series may be found at http://www.acf.hhs.gov/programs/opre/research/project/child-care-and-early-education-policy-and-research-analysis-and-technical.

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MEASURING IMPLEMENTATION OF EARLY CHILDHOOD INTERVENTIONS AT MULTIPLE SYSTEM LEVELS

Overview

Early childhood interventions are increasingly imbedded in larger, multi-level service delivery systems, such as Quality Rating and Improvement Systems (QRIS) and home visiting initiatives. Within these systems, implementation of program-level interventions occurs and is supported at multiple levels—national, regional, state, community, implementation agency, classroom and home—and involves multiple partners and stakeholders. To ensure implementation of early childhood interventions with fidelity, implementation strategies must be aligned and coordinated across system levels. This brief discusses the importance of assessing implementation at multiple levels and suggests tools for facilitating multi-level assessment of implementation. Specifically, the brief provides two illustrative examples of early childhood interventions with cascading logic models (Metz & Bartley, 2012) that identify implementation strategies and desired outcomes at each system level to facilitate alignment and sequencing of implementation activities. In addition, the brief suggests implementation constructs to be measured at each system level, along with illustrative examples of measures. Implementation teams are discussed as a key strategy for improving and aligning implementation quality across levels, along with examples of how these teams use implementation information collected across levels. Finally, the brief describes the benefits for practitioners, researchers, and policymakers of measuring implementation at multiple system levels.

Introduction

Early childhood interventions are increasingly embedded in larger service delivery systems, such as Quality Rating and Improvement Systems (QRIS), professional development systems, home visiting initiatives, and other systems of care. Within these systems, implementation of early childhood interventions occurs and is supported at multiple levels—national, regional, state, community, implementing agency, classroom or home—and involves multiple public and private agencies and stakeholders. For example, within a QRIS, implementation of a quality improvement intervention for child care providers may involve federal agencies that provide funds to states and establish program requirements; state agencies that fund local programs, establish additional requirements, and monitor performance; state or regional training and technical assistance providers; community agencies that deliver the intervention; and early care and education professionals who receive the quality improvement services. The intervention may also involve community colleges and other institutions of higher education that offer degree programs in early childhood education and Child Development Associate (CDA) credentialing programs. Implementation of home visiting services for at-risk families with young children may involve federal agencies that provide funds to states and establish program requirements; state agencies that fund local programs, establish additional requirements, and monitor performance; national model developers that provide training, certification, and technical assistance; state and regional technical assistance providers; community agencies that deliver home visiting services; and other community organizations that exchange referrals with the program.

Identifying core components of an intervention and what it takes to implement those components with fidelity to program models is critical for successful replication of effective programs and practices. While research is limited, there is growing recognition in the early childhood field of the importance of effective implementation and the need for implementation research that can guide selection, initial implementation, and ongoing improvement of early childhood interventions (Avellar & Paulsell, 2010; Kaderavek & Justice, 2010; Paulsell et al., 2010). Most implementation research, however, focuses on measuring the extent to which the intervention is carried out as planned or intended by program developers. This focus on delivery of services specified by the intervention does not take into account other essential implementation activities that support

service delivery and influence how the services are carried out, nor does it provide sufficient information for replication or program improvement efforts (Durlak & DuPre, 2008; Wandersman et al., 2008). For example, it does not take into account implementation of training for program staff, ongoing technical assistance, or the use of data systems. Moreover, this approach is insufficient for many early childhood interventions, which are implemented and supported at multiple levels, and operate in the context of larger service delivery systems such as QRIS and professional development systems (Britto et al., 2011; Hargreaves, 2010; Paulsell et al., in press; Halle et al., in press; Wandersman et al., 2008; Zellman et al., 2011).

To begin filling this gap, this brief introduces the importance of measuring implementation at multiple system levels and proposes tools for doing so. Specifically, the brief:

- Provides two examples of early childhood interventions with cascading logic models (Metz & Bartley, 2012) to illustrate the system levels at which implementation occurs;
- Identifies implementation constructs to be measured at each level within the respective systems in which the exemplar interventions operate, along with illustrative measures;
- Describes the benefits for practitioners, researchers, and policymakers of measuring implementation at multiple system levels; and
- Offers suggestions and practical considerations for measuring implementation across system levels.

Overview of Relevant Literature

As the need for implementation research to support the translation, replication, and scale up of effective programs and practices has grown in recent years, researchers in a range of fields have developed conceptual frameworks to guide both implementation research and practice (Berkel et al., 2010; Carroll et al., 2007; Daro, 2010; Durlak & DuPre, 2008; Fixsen et al., 2005; Wandersman et al., 2008). In addition, researchers in multiple disciplines have conducted systematic literature reviews to identify factors affecting implementation of programs and practices (Durlak & DuPre, 2008; Fixsen et al., 2005; Greenhalgh et al., 2005; Stith et al., 2006). While these frameworks and systematic reviews vary in focus and purpose, most recognize that interacting factors affecting program delivery occur at multiple system levels. Wandersman et al. (2008) propose an Interactive Systems Framework for Dissemination and Implementation (ISF) with three interacting systems that support implementation: (1) a synthesis and translation system to translate research on effective interventions into practice guidance; (2) a support system for the provision of training, technical assistance, and other supports; and (3) a delivery system for implementing the intervention. Durlak and DuPre (2008) build on the ISF framework by emphasizing that implementation occurs in an ecological context, influenced by characteristics of the program model, the service providers, the community, the organizational capacity of the implementing agency, and training and technical assistance supports. Fixsen et al. (2005) include system interventions—interventions with systems external to the implementing agency that provide resources required to support implementation—as a core implementation component, and researchers have created implementation assessment tools that include items on system interventions (State Implementation and Scaling-Up of Evidence-Based Practice, 2010). Moreover, Durlak and DuPre find that across multiple systematic literature reviews, 11 factors are found to affect how interventions are implemented: funding, a positive work climate, shared decision making, coordination with other agencies, formulation of tasks, leadership, program champions, administrative support, providers' skill proficiency, training, and technical assistance. Greenhalgh et al. and Fixsen et al. also note the importance of having a monitoring and feedback system in place to assess and improve implementation. Thus, consensus is growing across a range of disciplines about the importance of understanding factors at multiple system levels that influence program delivery.

Within the field of early childhood care and education, the body of research on implementation is limited but growing (Avellar & Paulsell, 2010; Kaderavek & Justice, 2010; Paulsell et al., 2010). For example, in the field of early childhood home visiting, most rigorous evaluations of home visiting program models do not include assessments of fidelity to the program model (Avellar & Paulsell, 2010). However, two national home visiting studies currently underway include plans for careful examination of program fidelity and other dimensions of implementation (Daro, 2010; Michalopoulos et al., 2011). In the area of center-based child care and early education, several recent studies of literacy and language interventions include assessments of program fidelity and dosage (Breit-Smith et al., 2009; Mashburn et al., 2010; McGinty et al., 2011). In addition, a recent literature review examined research on program dosage and quality in center-based child care (Zaslow et al., 2010).

While implementation research in the field of early childhood care and education is growing, few studies have measured aspects of implementation at multiple system levels. A recent evaluation guide for QRIS, a complex system intervention, includes guidance on measuring implementation in future studies (Lugo-Gil et al., 2011), and a national cross-site evaluation of evidence-based home visiting initiatives incorporates a system component into the evaluation design, but it does not measure implementation at multiple levels (Hargreaves & Paulsell, 2009). This brief contributes to the existing literature on measuring implementation in the field of early childhood care and education by proposing strategies for measuring implementation across multiple system levels and describing the benefits for practitioners, researchers, and policymakers.

Measuring Implementation Across System Levels: Two Illustrative Examples[1]

Two illustrative examples of early childhood interventions demonstrate the importance of measuring implementation across multiple system levels. Both examples—a child care quality improvement initiative and a home visiting intervention—have the ultimate goal of promoting positive child outcomes. Both are embedded in larger service delivery systems and both require activities at multiple system levels to implement the intervention. Typically, stakeholders involved in specifying or implementing the requirements of an early childhood intervention span five system levels—national, state or regional, community, implementing agency, and direct service provider (Table 1).[2] Each example includes a "cascading logic model" that links the early childhood intervention with implementation strategies at each system level (Metz & Bartley, 2012). The cascading logic model displays the specific activities that need to take place at each system level to support service delivery and relationships between system levels, implementation strategies, and desired outcomes. Accompanying tables display the implementation strategies at each system level and provide examples of constructs to be measured and specific measures and data collection strategies for doing so.

Child Care. The first example is a state's effort to improve the quality of infant-toddler care in child care centers (Figure 1). Implementation of this quality improvement (QI) initiative occurs at five system levels: direct service provider (infant-toddler teacher), implementing agency (child care center), community (infant-toddler consultant working for a community-based nonprofit), state (state Office of Child Care), and national (federal Office of Child Care). The top level of the model depicts the intervention strategy, implementation of a QI initiative for center-based infant-toddler care, and the desired outcomes, improved quality of infant-toddler child care and child outcomes. The rest of the cascading logic model identifies implementation strategies to be used with a specific target population at each system level, and the desired outcomes at each level. In this model, infant-toddler teachers interact directly with children in the classroom and implement the quality-improvement intervention with the goal of improving children's outcomes. Therefore, the next level of the cascading model shows the implementation strategy for supporting infant-toddler teachers to provide the intervention.

[1] These examples provide descriptions of two common types of early childhood interventions, but they are generic examples and do not represent actual programs implemented in specific states or communities.
[2] All tables and figures appear at the end of the brief.

At the direct service provider level, center directors obtain grants to improve the caregiving environment and pay for training on infant-toddler care; they also facilitate teachers' access to on-site coaching and mentoring. At the implementing agency level of the cascading model, center directors are supported by infant-toddler consultants, who assess the center's caregiving environment, provide coaching and mentoring, and provide specialized training on infant-toddler development.

At the community level of the cascading model, infant-toddler consultants employed by a community-based organization receive funds from the state Office of Child Care to implement consultation and a training curriculum, as well as guidance, monitoring, and support. For example, the state provides guidelines about the required qualifications of consultants, training curricula to be used, and intensity and content of consultation activities. The state also defines reporting requirements for consultants and monitors consultant performance. In addition, the state provides consultants with training, technical assistance, and other resources. The state, in turn, receives funds from the federal Office of Child Care to improve the quality of infant-toddler care and support for meeting funding requirements such as access to national meetings for state child care administrators and technical assistance networks and resources. Finally, federal policymakers identify quality improvement in infant-toddler care as a policy priority and authorize funds for relevant activities. Each step in the implementation process must be aligned to improve the quality of infant-toddler center-based care.

For each implementation strategy, Table 2 provides examples of constructs that should be measured, as well as specific measures and data collection strategies that could be used. For example, at the direct service provider level, periodic observations of classroom quality can be used to document baseline quality, develop individualized QI plans, and assess progress. At the community level, the QI coach logs and periodic observations of coaching sessions could be used to measure dosage of coaching provided and fidelity to the coaching model.

Home Visiting. The Maternal, Infant and Early Childhood Home Visiting (MIECHV) program, established by the Affordable Care Act, provides grants to states to fund evidence-based home visiting programs for families with pregnant women and children ages birth to five. As shown in the top level of the cascading logic model (Figure 2), the program aims to improve child and family outcomes by delivering home visiting services to families with fidelity to an evidence-based program model. The rest of the model displays the implementation strategies needed at each system level to carry out the intervention. Home visitors deliver services directly to families. At the direct service provider level of the cascading model, supervisors support home visitors in their work with families by arranging for training and providing individual and group supervision. To support supervisors, in the next level of the cascading model, the implementing agency adopts an evidence-based model, creates an organizational climate and administrative supports to facilitate implementation with fidelity, and facilitates access to training and other needed resources. At the community level, a community-based organization operates a central intake system that conducts eligibility screenings of interested families seeking home visiting services and refers them to appropriate programs (not shown in Figure 2).

At the next level, the state provides implementing agencies with funding and supports for meeting funding requirements. Supports include data systems to facilitate collection and reporting of required benchmark data and use of these data for continuous quality improvement activities, enhanced training for home visitors on topics such as identifying and making referrals to address substance abuse problems, and technical assistance on how to establish central intake and referral systems in communities with multiple home visiting programs. Federal agencies, in turn, provide states with funds to support home visiting and supports for meeting federal funding requirements. At the national level, these supports include technical assistance to states to help them establish benchmarks for their programs, develop data systems, plan state-level evaluation activities,

and engage in continuous program improvement. Technical assistance at the federal level is provided through federal staff, technical assistance contractor staff, webinars, and written materials. National home visiting program model developers also provide training, certification, and ongoing technical assistance and monitoring to home visiting programs (not shown in Figure 2). In the final level of the model, federal policymakers provide direction and authorize funds to implement evidence-based home visiting nationally. At each level, the implementation strategies must be carried out to achieve the desired child and family outcomes.

For each implementation strategy, Table 3 provides examples of constructs that could be measured at each system level, along with specific measures and data collection strategies. For example, at the direct service provider level, dosage and content of home visits can be measured through review of administrative records, home visit observations, and home visitor reports. At the implementing agency level, frequency and type of supervision and training activities can be measured through staff reports or a review of administrative records to examine the support home visitors are receiving to deliver home visit to families. Depending on the purpose of data collection—internal program monitoring, performance measurement and reporting, program evaluation and research—the data could be collected by initiative staff at each system level or by outside researchers.

Implications for Stakeholders: Practitioners, Policymakers, and Researchers

As illustrated in the previous section, optimal execution of complex early childhood interventions requires implementation of specific strategies at multiple system levels. These strategies must be aligned and implemented in coordination with one another to best support activities across system levels. From the federal to the local level, all systems and activities that support implementation should provide clear and consistent guidance to support understanding of the intervention's core components and related implementation strategies. Achievement of desired outcomes at one system level is necessary for successful implementation at the next level. Direct service providers require support from supervisors and implementing agencies to deliver new service delivery approaches. Implementing agencies must be supported through community- and state-level technical assistance and support, and so on. Creating a cascading logic model that identifies the implementation strategies and desired outcomes for actors at each system level can help stakeholders to assess alignment across levels, map relationships between actors at each level, and think about how activities should be sequenced across levels.

Moreover, research shows that simply relying on program administrators to implement initiatives with fidelity by using research findings on their own or practice guidance contained in manuals or websites is not sufficient for ensuring high-quality implementation of innovations (Balas & Boron, 2000; Clancy, 2006; Metz, Halle, Bartley, & Blasberg, 2013). A more promising strategy involves forming implementation teams, supported by experts outside the organization or system, to increase buy-in and readiness to implement; putting into place the infrastructure (staff, data systems, and other supports) necessary to implement; assessing fidelity and outcomes; building linkages to external systems; and engaging in problem solving (Fixsen, Blase, Timbers, & Wolf, 2001; Greenhalgh, 2004; Metz, Halle, Bartley, & Blasberg, 2013; Metz & Bartley, 2012).

Early childhood interventions implemented in the context of a complex service delivery system could benefit from implementation teams established at each system level. Such teams could facilitate forming linkages, sharing information, and establishing feedback loops across system levels to improve alignment and ensure that implementation at each level facilitates and supports implementation at the other levels. During initial implementation, implementation teams can provide crucial support by actively assessing implementation activities at each level, helping to develop the staff competencies needed to implement and support the intervention, and helping to build buy-in for the new intervention at all levels. Once an intervention has become well established, an implementation team can help to ensure continuity as turnover occurs among practitioners, administrators, and leaders at various system levels (Metz, Halle, Bartley, & Blasberg, 2013).

Implementation information collected at each system level can be an invaluable resource to support these teams. Information shared across levels can be used for needs assessment, planning, performance measurement and reporting, and building the knowledge base to support further replication and scale up. For example, information about the extent to which services are delivered to children and families as intended by the program model (program fidelity) can be used at the program level by administrators and supervisors to provide feedback, support, and technical assistance to program staff, and at the state level to identify training and resource needs. Similarly, information about the dosage of training received can be used by program administrators and funders to monitor whether program staff has received the required number of annual training hours. Documentation of the volume and content of technical assistance requests received by technical assistance providers can be used at the state level to identify needs for additional technical assistance and support on specific topics, as well as to plan for level of funding and staff expertise required to meet those needs. Results of training observations and assessments can be used by training providers to assess whether adaptation of training curricula is needed to better meet the needs of participants—such as delivery of training at appropriate reading levels, through appropriate hands-on or role play activities for non-traditional learners, or in languages other than English. At all system levels, consideration must be given to how to collect and aggregate the data efficiently and make it available in a user-friendly manner for ongoing self-assessment and planning purposes. In complex early childhood systems, implementation data are likely collected in multiple data systems at different system levels.

The research literature also indicates that implementation of a new intervention is a two-to-four year process that typically occurs in four stages: exploration, installation, initial implementation, and full implementation (Metz & Bartley, 2012) [see box with definitions]. While these stages typically do not occur in a linear fashion or in isolation of each other, it is useful to think about each one separately along with the implementation questions that should be asked at each level. The stages of implementation framework is another resource that implementation teams at all system levels can use to assess progress, set priorities, and identify tasks that must be completed to move implementation to the next stage. Table 4 provides an illustrative set of questions for stakeholders at each system level to consider at each implementation stage.[3]

Definitions of Stages of Implementation

Exploration: Assessment of the potential match between an intervention and identified needs and decision-making about whether to move forward with adopting an intervention

Installation: All tasks that must be accomplished before implementation can begin, such as hiring qualified staff, conducting pre-service training, setting up data systems, establishing supervisory and fidelity-monitoring systems, and establishing relevant partnerships

Initial implementation: The initial phase of implementing a new intervention for the first time
Full implementation: Implementation at a steady state—program services are being implemented with fidelity, implementation supports (such as technical assistance and data systems) are in place, and continuous improvement activities are ongoing

[3] See Evaluating Implementation of Quality Rating and Improvement Systems in *Applying Implementation Science to Early Care and Education Program and* Systems, edited by Tamara Halle, Ivelisse Martinez-Beck, and Allison Metz, for an example of how to apply implementation questions at different stages of implementation for a particular multi-level initiative—a QRIS.

Understanding implementation at each system level is also critical for researchers and program evaluators. First, a thorough understanding of implementation can aid in interpreting child and family outcomes. Is a program not producing the desired outcomes because it is not effective, because it has not been implemented as intended by the program developer, or because sufficient resources have not been invested in one or several implementation supports (such as supervision, training, fidelity assessment, or data systems)? Answers to these questions should take activities required at all system levels into account. For example, is the intervention not being implemented as intended by direct service providers because implementing agencies are not providing required supervision, or because training provided at the community level does not adhere to training protocols? How are activities at the federal, state, or community level facilitating or impeding implementation at the implementing agency level?

Second, measuring implementation at all system levels can help researchers assess the feasibility of implementation. How complicated is implementation at each system level? Do some steps take too long or require more resources than is feasible? Is it realistic for staff with the qualifications envisioned by the developer to implement the activities? More basically, is it realistic to find staff with the desired qualifications in some geographic or low-population, high-poverty areas? Are additional supports needed?

Third, measuring implementation at each system level enables researchers and policymakers to gain a comprehensive and detailed picture of how all implementation strategies fit together, and to identify potential gaps and problems. For example, if staff has difficulty implementing particular content or activities, is the training on those parts of the program adequate? Are the activities well specified? Do service providers receive enough support and feedback from supervisors to implement the activities?

Finally, implementation research at multiple system levels provides rich information to support replication and scale up of effective interventions by documenting the implementation strategies at each level, along with resource requirements and organizational factors that facilitate implementation.

Examining implementation at multiple system levels can help researchers, practitioners, and policymakers to:

1. Interpret outcomes: What role did implementation at each level play?
2. Assess the feasibility of implementation: How complicated is implementation at each level?
3. Provide a more comprehensive picture of the initiative under investigation: How do the implementation strategies at each level fit together?
4. Provide important information for successful replication of an effective intervention: What has to happen and what resources are needed to implement in another location?

Next Steps for Researchers

As early childhood practitioners and stakeholders seek to replicate and scale up effective interventions embedded in complex systems, research evidence about implementation at multiple system levels is needed to inform implementation strategies, develop measurement tools and data collection strategies, and support ongoing continuous improvement at all levels.

Inform implementation strategies. Careful research on implementation can be used to further specify program delivery procedures and requirements at each level—such as curricula and fidelity standards for direct service delivery, and for supervision and training at the implementing agency level. Similarly, implementation research can inform specification of community- or state-level systems for providing and assessing technical assistance as well as planning for professional development systems.

Development measurement tools and data collection strategies. More research is needed to develop tools for measuring fidelity of service delivery, supervision, and training to established standards, as well as for assessing the implementation quality at all levels. Such tools can be used in research to learn about the factors that support fidelity and quality at each level. They can also be used by practitioners to support replication.

Support ongoing continuous improvement. Research is also needed to learn about the organizational factors and leadership qualities at each level that support the use of data for program improvement. For example, what supports do direct service staff and supervisors need to use service delivery and child outcome data for program improvement? How can technical assistance providers use data to assess program needs in a region or state? At the state and federal levels, what requirements and incentives encourage continuous assessment of implementation processes for program improvement?

Conclusion

Early childhood interventions are increasingly embedded in larger, multi-level service delivery systems, such as QRIS and home visiting initiatives. To ensure implementation with fidelity, implementation strategies must be aligned and coordinated across system levels. This brief discussed the importance of assessing implementation at multiple systems levels, proposed tools for facilitating multi-level assessment, and reviewed implications for stakeholders.

Implications for program developers and practitioners:

- Creating cascading logic models that identify implementation strategies and desired outcomes for actors at each system level can facilitate assessment of alignment, mapping of relationships, and sequencing of activities at each system level.
- Establishing implementation teams at each level can facilitate forming linkages, sharing information, and establishing feedback loops to improve alignment of implementation across system levels.
- Collecting implementation information at each level provides important information for teams to use in needs assessment, planning performance measurement and reporting, and continuous improvement activities.

Implications for policymakers:

- Coherence of funding requirements, supports, and core intervention components across levels is essential for achieving implementation with fidelity.
- Research indicates that implementation is typically a two- to four-year process that occurs in stages. Implementers at each system level must have sufficient time to progress through these stages before high levels of fidelity and desired outcomes can be achieved.

Implications for researchers:

- A thorough understanding of each system level can aid in interpreting child and family outcomes.
- Measuring implementation at all system levels can help researchers assess the feasibility of implementation.
- Measuring implementation at all system levels can help enable researchers to gain a comprehensive understanding of how all implementation strategies fit together, and to identify potential gaps and problems.
- Implementation research at multiple system levels provides rich information to support replication and scale-up of effective interventions.

TABLE 1

SYSTEM LEVELS AND STAKEHOLDERS

System Level	Stakeholders Who Specify or Implement the Intervention
Direct Service Provider	Early care and education professional who works directly with children and families
Implementing Agency	Agency delivering program services, including supervisors and administrators
Community	Local government agency, community service providing agency, local training and technical assistance provider, local foundation, institution of higher education
State or Regional	State agency, state office of national model developer or purveyor, state or regional training and technical assistance provider, state nonprofit or network, state or regional foundation, institution of higher education
National	Federal agency, national model developer or purveyor, training and technical assistance provider, foundation or other funder

FIGURE 1

CASCADING LOGIC MODEL FOR A QUALITY IMPROVEMENT INITIATIVE IN INFANT-TODDLER CENTER-BASED PROGRAMS

System Level	Target Population	Intervention Strategy	Desired Intervention Outcomes
Program recipients	Families and children ages 0 to 3	Teachers implement an intervention to improve the quality of center-based infant-toddler care	Improved quality of infant-toddler care and child outcomes
System Level	**Target Population**	**Implementation Strategy**	**Desired Implementation Outcomes**
Direct service provider	Infant-toddler teacher	Center directors obtain grants for improving caregiving environments and purchasing training for teachers on infant-toddler care and facilitate access to on-site coaching and mentoring for infant-toddler teachers	High-quality infant-toddler center-based environment and caregiving
Implementing Agency	Center director	Infant-toddler consultants assess caregiving environmental using the ITERS-R, provide on-site coaching and mentoring for infant-toddler teachers and directors, and provide specialized training in infant-toddler development using a scripted curriculum	Access to effective supports for infant-toddler teachers
Community	Infant-toddler consultant	The state Office of Child Care provides funds for grants to provide coaching and mentoring; selects training curriculum; and monitors implementation of consultation and training activities	Individualized coaching and mentoring based on assessments of each classroom and skillful training on infant-toddler development
State	State Office of Child Care	The federal Office of Child Care provides state with funds to improve the quality of infant-toddler care and support for meeting federal reporting and implementation requirements	State funding, programmatic direction, and monitoring to ensure effective implementation of quality-improvement initiative
National	Federal Office of Child Care	Federal policy makers provide policy direction and authorize funds to support quality improvement in infant-toddler child care	Federal funds and support for quality improvement in infant-toddler child care

TABLE 2

DIMENSIONS OF IMPLEMENTATION TO BE MEASURED BY SYSTEM LEVEL: QUALITY IMPROVEMENT INITIATIVE IN INFANT-TODDLER CENTER-BASED PROGRAMS

Strategy	Constructs	Illustrative Measures	Data Collection Methods
System Level: Program Recipients			
Teachers implement an intervention to improve the quality of center-based infant-toddler care	Selecting teachers for implementation	Practitioner Assessment (SISEP Center, 2011)	Staff survey
	Implementation of new strategies by teachers	Performance Assessment (SISEP Center , 2011)	Staff survey
	Classroom quality	ITERS –R (Harms, Cryer, & Clifford, 2005)	Observation
		CLASS-Toddler (Pianta, La Paro, Hamre, 2008)	Observation
		CIS (Arnett, 1989)	Observation
System Level: Direct Service Provider			
Center directors obtain grants for improving caregiving environments and purchasing training for teachers on infant-toddler care and facilitate access to on-site coaching and mentoring for infant-toddler teachers	Delivery of training program	Competency Driver: Training (Blase, Van Dyke, Duda, Fixsen, 2010)	Staff survey/ interview
		Adherence to QI program	Document review/ training log
	Supervision/Coaching	Satisfaction with training procedures and topics	Staff survey/ interview
		Supervision/Coaching (SISEP Center, 2011)	Staff survey/ interview
		Frequency of in-class coaching	Staff survey/ training log
		Competency Driver: Supervision & Coaching (Blase, Van Dyke, Duda, Fixsen, 2010)	Staff survey
		Satisfaction with coaching; self-assessment of learning and behavior /classroom changes	Staff survey/ interview
System Level: Implementing Agency			
Infant-toddler consultants assess caregiving environmental using the ITERS-R, provide on-site coaching and mentoring for infant-toddler teachers and directors, and provide specialized training in infant-toddler development using a scripted curriculum	Selection of QI trainers	Trainer qualifications are commensurate with those specified in the QI program	Trainer survey/ vitae/ application materials
	Fidelity of program delivery	Content and dosage delivered as specified in the QI program	Observation/ training logs

TABLE 2 continued

Strategy	Constructs	Illustrative Measures	Data Collection Methods
System Level: Community			
The state Office of Child Care provides funds for grants to provide coaching and mentoring; selects training curriculum; and monitors implementation of consultation and training activities	Adequacy of funding to fulfill program requirements	Funding sources and adequacy to implement model as specified	Document reviews/ administrator interviews
	Alignment of training curriculum and characteristics of the service population	Documentation of model content, research base, psychometric data, and populations previously served	Document review
	Frequency and content of TA	Frequency and content of TA, qualifications of TA providers	Staff pre-post training assessments/ periodic TA needs assessments
System Level: State			
The federal Office of Child Care provides state with funds to improve the quality of infant-toddler care and support for meeting federal reporting and implementation requirements	Specification of funding procedures and data required in reports	Description of program and reporting requirements communicated to applicants, sample reporting documents and extended explanations where necessary	Document reviews

FIGURE 2
CASCADING LOGIC MODEL FOR AN EVIDENCE-BASED HOME VISITING PROGRAM

System Level	Target Population	Intervention Strategy	Desired Intervention Outcomes
Program recipients	Families with children ages prenatal to 5	Qualified home visitors deliver home visiting services to families with fidelity to an evidence-based program model	Positive child and family outcomes
System Level	**Target Population**	**Implementation Strategy**	**Desired Implementation Outcomes**
Direct service provider	Home visitors	Supervisors support home visitors in their work with families by arranging for pre- and in-service training and providing individual and group supervision required by the program model	Effective home visiting services for families
Implementing agency	Supervisors	Implementing agency leaders provide supervisors with resources to implement high-quality home visiting programs by: • adopting an evidence-based program model • creating an organizational climate and administrative supports that facilitate implementation with fidelity • facilitating access to training, technical assistance, and other resources needed to implement the evidence-based program model	Effective and supportive training and supervision for home visitors
Implementing agency	Implementing agency leaders	State agencies with responsibility for implementing a state home visiting strategy provide implementing agencies with: • funds to implement evidence-based home visiting programs • support for complying with state reporting and implementation requirements	A supportive organizational climate, administrative support, and access to resources needed to implement an evidence-based program model
State	State agencies	Federal agencies with responsibility for implementing a federal home visiting strategy provide states with: • funds to support home visiting and technical assistance • support for meeting reporting federal reporting and implementation requirements	State funds to support home visiting and skillful technical assistance and support to meet funding requirements
National	Federal agencies	Federal policy makers provide policy direction and authorize funds to implementing evidence-based home visiting programs nationally	Federal funds to support home visiting and skillful technical assistance and support to meet funding requirements

TABLE 3
DIMENSIONS OF IMPLEMENTATION TO BE MEASURED BY SYSTEM LEVEL: STATE HOME VISITING INTERVENTION

Strategy	Constructs	Illustrative Measures	Data Collection Methods
System Level: Program Recipients			
Qualified home visitors deliver home visiting services to families with fidelity to an evidence-based program model	Dosage of home visiting services	Percent of required visits completed	Administrative records
		Percent of scheduled visits completed	Administrative records
		Number of completed visits	Administrative records
		Duration of home visits, in minutes	Administrative records or observation
	Content of home visits	Home Visit Encounter Form (Barrett et al., 2010)	Home visitor report
		Characteristics and Content Form (Boller et al., 2009; Hallgren et al., 2010)	Observation
	Participant-home visitor relationships	Home Visit Observation Form-Revised (McBride & Peterson, 1996)	Observation
		Home Visit Rating Scales-Adapted (Roggman et al., 2010)	Observation
		Working Alliance Inventory (Santos, 2005)	HV /parent report
		Helping Relationships Inventory (Poulin & Young, 1997)	HV/parent report
	Referrals	Number and type of referrals provided	Administrative records
		Other community services received by families	Parent report
System Level: Direct Service Provider			
Supervisors support home visitors in their work with families by arranging for pre- and in-service training and providing individual and group supervision required by the program model	Receipt of pre-service training	Percentage of home visitors who have completed in-service training	Administrative records
		Hours of pre-service training received by home visitors	Administrative records or HV report
		Content of pre-service training received by home visitors	Observation/ HV report
	Receipt of in-service training	Percentage of home visitors who are up to date on required in-service training	Administrative records
		Hours of in-service training received by home visitors	Administrative records or HV report
		Content of in-service training received by home visitors	Observation/ HV report
	Frequency and types of supervision	Frequency and content of individual supervision sessions	HV/supervisor report
		Frequency and content of group supervision sessions	HV/supervisor report
		Frequency of home visit observation by supervisor	HV/supervisor report

TABLE 3 continued

Strategy	Constructs	Illustrative Measures	Data Collection Methods
System Level: Implementing Agency			
Implementing agency leaders provide supervisors with resources to implement high-quality home visiting programs by: adopting an evidence-based program model; creating an organizational climate and administrative supports that facilitate implementation with fidelity; and facilitating access to training, technical assistance, and other resources needed to implement the evidence-based program model	Attitudes toward adoption of the home visiting model	Evidence-Based Practice Attitudes Scale (Aarons, 2004)	Staff survey
	Organizational culture and climate	Organizational Social Context (Glisson et al., 2008)	Staff survey
		Survey of Organizational Functioning (TCU Institute of Behavioral Research, 2008)	Staff survey
	Leadership	Multi-Factor Leadership Scale (Corrigan & Garman, 1999)	Staff survey
		Survey of Transformational Leadership (TCU Institute of Behavioral Research, 2009)	Staff survey
	Frequency and content of TA	Hours of TA received by topic, source, and mode (phone consult, site visit, provision of materials, observation)	Administrative records or staff report
State agencies with responsibility for implementing a state home visiting strategy provide implementing agencies with funds to implement evidence-based home visiting programs and support for complying with state reporting and implementation requirements	Specification of funding procedures and data required in reports	Description of program and reporting requirements communicated to applicants, sample reporting documents and extended explanations where necessary	Document reviews
System Level: State			
Federal agencies with responsibility for implementing a federal home visiting strategy provide states with funds to support home visiting and technical assistance support for meeting reporting federal reporting and implementation requirements	Specification of program requirements	Description of federal program requirements	Review of federal funding announcement
	Specification of performance measurement and reporting requirements	Description of performance measurement and reporting requirements	Review of program data collection and reporting requirements

TABLE 4

ILLUSTRATIVE QUESTIONS FOR EACH STAGE OF IMPLEMENTATION, BY SYSTEM LEVEL

Stage of Implementation	System Level				
	Service Provider	Implementing Agency	Community	State	National
Exploration	-How would the proposed intervention address the needs of children and families? -Are front line staff receptive to receiving training and changing practice to implement the intervention? -Do existing staff have required qualifications?	-How to state and national priorities align with agency needs? -Is implementation of effective practices feasible? -How supportive is agency leadership? -What gaps in readiness must be addressed prior to implementation?	-How well do state and national priorities align with community needs? -What resources are available in the community to support implementation of effective practices? -What resource gaps need to be filled?	-How well do state and national priorities align? -What resources are needed to implement effective practices prioritized at the national level? -Does the state have experience implementing the practices? -What resource gaps need to be filled?	-What are national priorities for improving early childhood care and education? -What is the evidence of effectiveness about strategies for addressing priorities? -What resources are needed to implement effective practices?
Installation	-Would new staff need to be hired? -What are pre- and in-service training requirements? -How would fidelity be monitored? -What supervision and supports would front line staff receive?? -What documentation and data collection would be required?	-What strategies should be used to generate staff buy in for the intervention? -What changes in program operations need to be made? -What changes to existing data systems are required? -Would any agencies policies need to be changed?	-What strategies should be used to generate community buy in? -How will the target population be identified? -What are the potential referral sources? -What community services and resources are needed to support implementation? -What strategies should be used to coordinate with other service providers?	-Which communities should be targeted for initial implementation? -What criteria should be used for selecting implementing agencies? -How much funding is needed to implement? -What monitoring and reporting requirements should be put in place? -How will data be aggregated and used? -What kinds of state-level supports are needed? -What data must be reported to the national level?	-What criteria should be used for selecting sates/ grantees to implement the intervention? -How much funding will be provided over what period of time? -What monitoring and reporting requirements should be put in place? -What kinds of national-level supports are needed? -How will the quality implementation and outcomes be assessed?

TABLE 4 continued

Stage of Implementation	System Level				
	Service Provider	Implementing Agency	Community	State	National
Initial Implementation	-Are applications with required qualifications for staff positions available? -Have required staff be hired or transferred to new positions? -Has initial training occurred, and how well has it met staff needs? -What training gaps exist? What supports do staff need? -Are supervision systems in place? -How are staff reacting to initial implementation experience?	-Are staff delivering the intervention with fidelity? -What additional supports are needed? -Are data systems adequate to support the new intervention? -How are children and families responding to the intervention? -What are the early outcomes of the intervention? -What lessons from initial implementation can be used for fine-tuning operations?	-How are community stakeholders reacting to initial implementation? -Have referral sources generated sufficient referrals? -Are community resources adequate to support implementation? What gaps have been identified? -What coordination issues have arisen and how should they be addressed?	-Have implementing agencies been selected, and is initial implementation underway? -Are state level support systems in place to support implementing agencies? -What training and technical assistance needs have been identified? -Are reporting and monitoring systems functioning as intended? -Have data systems been developed? -What lessons from initial implementation of state monitoring and support systems have been identified?	-Have states/ grantees been selected, and is initial implementation underway? -Are national level support systems in place to support grantees? -What training and technical assistance needs have been identified? -Are reporting and monitoring systems functioning as intended? -Have data systems been developed? -What lessons from initial implementation of national monitoring and support systems have been identified?

TABLE 4 continued

Stage of Implementation	System Level				
	Service Provider	Implementing Agency	Community	State	National
Full Operation	-What refinements in training and support should be made to improve service delivery? -What systems are in place for using implementation data to improve practice? -What ongoing training needs have been identified? -Has staff turnover been an issue? If so, how can it be addressed?	-What levels of fidelity have been achieved? -Has the new intervention been integrated into program operations? -Do agency leaders support the intervention? -Are systems in place to facilitate the collection and use of implementation data for continuous program improvement? -What steps are needed to sustain the intervention for the long term?	-Do community stakeholders support the intervention? -Are referral systems functioning smoothly? -Are community resources needed to support the intervention in place? -Are community coordination systems function smoothly? -Do community stakeholders provide input for continuous program improvement?	-Are funding, monitoring, and reporting systems in place to assess the performance of implementing agencies? -Are state level training and support systems fully operational? -What ongoing training and support needs have been identified? -Are data systems fully operational? -How is the state using implementation data for continuous improvement? -What steps are needed to sustain the intervention at the state level?	Are national funding, monitoring, and reporting systems in place to assess state /grantee performance? -Are national level support systems fully operational? -At the national level, what ongoing support needs have been identified? -Are adaptations needed to address the needs to special populations? -Are national data systems fully operational, and how are the data used for continuous improvement? For supporting scale up? -What steps are needed to support sustainability?

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