Building a Real-World Evidence Base for Improving Child and Family Outcomes

Susan M. Sheridan
University of Nebraska at Lincoln, ssheridan2@unl.edu

Veronica A. Fernandez
University of Miami, vfernandez17@gmail.com

Lisa Knoche
University of Nebraska-Lincoln, lknoche2@unl.edu

Ann M. Stacks
Wayne State University, amstacks@wayne.edu

Bethanie S. Van Horne
Baylor College of Medicine, bethanie.vanhorne@bcm.edu

See next page for additional authors

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Acknowledgements

Authors

Susan M. Sheridan, Veronica A. Fernandez, Lisa Knoche, Ann M. Stacks, Bethanie S. Van Horne, Johayra Bouza, Silvia Niño, Daryl B. Greenfield, Janelle J. Montroy, Kathleen Dwyer, and The EHS Parent-Teacher Intervention Consortium

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INTRODUCTION

Early childhood is a critical period of development. Significant and compelling evidence establishes the role of positive relationships in the lives of infants and toddlers, including those from low-income families.[1,2] Warm, responsive, and supportive parent-child[3,4] and teacher-child interactions[5-7] yield lasting benefits for children. Thus, integrated intervention approaches that promote positive relationships to benefit children, enhance developmentally appropriate practices, and support coordinated experiences across home and early education programs are needed to support, reinforce, and maintain children's early development.

Integrated (home-school) interventions are intended to align practices and experiences supporting children's learning and development across home and educational contexts. Some integrated approaches have documented efficacy based on rigorous randomized controlled trials (eg, ParentCorps[8]); however, programs designed and tested in highly controlled studies require significant adaptations for broad use in the field,[9] which can diminish impact.[10] There is a sizeable gap between typical family engagement practices used in centers and early childcare settings, and programs with documented efficacy. To address the gap between evidence-based programs and practices in early childcare, we offer an approach to research that builds "real-world" evidence in center-based programming for infants and toddlers. *Building evidence* allows researchers and early childcare partners to focus on the unique structural, contextual, cultural, and interpersonal realities of early childcare programs in their intervention work.[11] This approach is in contrast to one focusing on *translating evidence* by implementing and evaluating interventions proven efficacious in settings external to program sites that may not necessarily "fit" due to program and policy goals, structures, and capacities.

We illustrate our approach in the context of Early Head Start (EHS), a federally funded program that provides intensive comprehensive child development and family support services to low-income pregnant women, infants, and toddlers under the age of 3.[12] Like other early care and education programs, EHS is charged with delivering practices that promote and improve children's early development. Most EHS programs organize services in ways intended to support quality adult-child interactions and relationships in home and center-based contexts. EHS's comprehensive approach recognizes that the most potent outcomes for children are

achieved when positive, stimulating experiences are provided in both the childcare and home environments. Despite the focus of many center-based programs on aligned supports across home and childcare settings, evidence of effective interventions that integrate home and center-based practices to promote and improve young children's development is still needed.[13] Such integrated interventions are critical given research that shows EHS programs with a mixed-approach service delivery model in homes and centers have the greatest positive effects on child development and parenting outcomes as compared to center-based programs alone.[14]

Demonstrating the efficacy of practices delivered in the context of EHS is challenging. Research intended to examine the experimental control of interventions requires a number of conditions (eg, randomization, specification of intervention, and fidelity in the implementation of intervention strategies) that often conflict with the structure of EHS programs. Even when research-based interventions are identified, they often do not generalize easily to other populations (they lack external validity[15]) or translate to practice in naturalistic settings (they fail to achieve ecological validity[16]). This dilemma is not unique to the early childcare field; typical efforts to realize the benefits of scientific findings in public settings require an estimated 17 years or more.[17] When programs are introduced and practiced in real-world settings, challenges with implementation fidelity are common and may compromise treatment outcomes.[10]

The disconnect between best-practice interventions and their implementation results in a persistent *lack of real-world evidence* for improving child and family outcomes. The availability, implementation, and documentation of research-based practices are key to establishing real-world evidence of positive intervention effects on young children and their families. Together, efficacy (evidence of desired effects) and implementation (factors that influence intervention uptake) "set a ceiling for real-world impact."[18] Simultaneous documentation of efficacy and attention to implementation is critical in our understanding of "what works" for children. Specifically, a greater understanding is needed of how implementation, feasibility, and efficacy intersect. An understanding of the structures by which effective interventions can be infused into ongoing program models is also needed. This infusion is often complicated by a host of interrelated problems associated with fit to the new environment and its needs, as well as by the necessary skills, knowledge, and organizational resources related to implementation.[19]

The purpose of this paper is to offer a conceptualization for blending science and practice. Our perspective is grounded in both research that attests to the inherent challenges of efficiently and effectively diffusing

evidence-based programs into widespread use with notable public impact[20] and field-based experiences where the "chasm"[21] between controlled and applied settings truncates practitioners' abilities to benefit from scientific findings. Specifically, our approach is characterized by *building* as opposed to just *translating* real-world evidence. We define real-world evidence as scientifically grounded information that is largely created, then tested, analyzed, and understood in applied, relevant practice settings. This definition is based on ecologically oriented intervention research models that focus on relationships between researchers and practitioners who, by design, work together to address implementation realities that contribute to understandings of efficacy and feasibility.[22]

A research-practice partnership (RPP) approach is intended to promote efficacious and relevant interventions given that both researchers' perspectives and practitioners' experiences shape implementation.[23] These partnerships emphasize research with communities, agencies, and systems, rather than research "on" these systems, as a way to make interventions relevant and build capacity.[24] Many examples of effective RPPs demonstrate the utility of the approach at addressing problems experienced in practice settings, and achieving goals shared by both researchers and practitioners. For example, Wethington et al[25] created an RPP to influence policy and disseminate evidence-based practices for supporting service recipients within the context of existing service networks in New York City. In the early childhood field, Ispa[26] described partnership work with EHS programs that shed light on local factors influencing program implementation and program effects, and methods to produce findings that are accessible and interesting to stakeholders. Often research on RPPs focuses on challenges of implementation; more information on solutions to support effective RPPs in building an evidence base is needed.[27]

Below, we describe challenges, experiences, potential solutions, and next steps when building evidence within RPPs based on 4 ongoing research programs. First, we introduce readers to the research programs that are testing promising models, curricula, or interventions that target both parents and center-based teachers as part of a federally funded Early Head Start University Partnership initiative. Second, we posit the importance of RPPs as foundational to building real-world evidence. Third, we describe various contextual, practical, and empirical realities and challenges encountered by the research teams at the intersection of program implementation and research/evaluation efforts. Finally, we provide important next steps for partnership-based research that we believe will result in programs with sustained positive effects on infant and toddler development.

CONTEXT: EARLY HEAD START UNIVERSITY PARTNERSHIP PROGRAM

In 2015, the Office of Planning, Research and Evaluation (OPRE), part of the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services (HHS), awarded 4 cooperative agreements through the "Early Head Start University Partnerships (EHSUP): Building the Evidence Base for Infant/Toddler Center-based Programs." The overarching goal of this grant program was to contribute to the knowledge base regarding how EHS and other early programs can promote early child development by supporting both parenting and center-based early care. Partnerships between researchers and one or more EHS center-based programs and/or EHS-Child Care Partnership (EHS-CCP) programs provided the context for addressing specific objectives associated with implementing and evaluating promising models, curricula, or interventions that target both parents and center-based teachers as a means of promoting child development. Each grantee conducted an implementation study to evaluate the effectiveness of their intervention.

Within these partnerships, the grantees use rigorous methods to address research questions related to the effectiveness of their models; examine the impacts on teacher and parent practices, as well as child outcomes; identify which families and children benefit most from the interventions; and determine program and community factors that lead to variations in the impact of the interventions. Of particular importance to this grant program, the grantees are also carefully addressing questions related to the supports required to successfully implement and sustain the interventions within the context of EHS/EHS-CCP programs. Balancing these emphases requires strong partnerships and consideration of a range of issues facing researchers and programs. Below, we briefly introduce each of the projects. Full program descriptions are in the Appendix, where we describe the interventions, the settings in which they are being tested, and the nature of the partnerships with EHS and/or EHS-CCP programs.

Hearts and Minds on Babies (Wayne State University, Michigan State University, and University of Michigan)

Hearts and Minds on Babies (HMB) is an attachment-based intervention that incorporates mindfulness-based stress reduction techniques for EHS teachers and parents. Teachers participate in 30 hours of professional development and coaching over the course of 26 weeks. During the first 13 weeks, teachers focus on using HMB concepts in the

classroom, and in the last 13 weeks, on sharing the concepts with parents during daily communication and 3 parent meetings. Both the parent and teacher interventions were adapted from an evidence-based parenting intervention, Mom Power.[28,29]

Getting Ready 0 – 3 (University of Nebraska-Lincoln)

Getting Ready 0-3 (GR03) focuses on strengthening relationships in children's lives. Infant/toddler teachers participate in formal training for blending important developmental objectives with effective parent-child and teacher-child interactions. Over their 2-year period of involvement, teachers receive ongoing coaching to support their use of strategies that promote adult-child (parent-child; teacher-child) interactions and parent-teacher partnerships, including collaborative goal setting with parents to support children's development.

Supporting Sprouts (University of Texas Health Science Center at Houston)

Supporting Sprouts is a responsive caregiving parenting and teacher training program that seeks to improve infants' and toddlers' language, cognitive, social-emotional, and self-regulation skills. The interventions are designed to specifically target parent use of a responsive, stimulating caregiving style in the home in combination with teacher instructional practices that also include a responsive interactive style in the classroom. Parents and teachers complete online courses and are supported via remote coaches using videoconferencing.

Coaching UP (University of Miami)

The Coaching UP team uses inquiry to collaborate with teachers and families to set intentional goals focused on infants' and toddlers' social-emotional and cognitive development. Coaches ask teachers intentional questions to plan high-quality interactions, embedded in daily routines, that promote children's engagement and higher-order thinking skills. They integrate brief learning modules within iterative coaching cycles to build on teachers' knowledge and ask questions to prompt reflective understanding. Coaches also foster bidirectional home-classroom connection, capitalizing on convenient opportunities for communication.

BUILDING A REAL-WORLD EVIDENCE BASE: RESEARCH-PRACTICE PARTNERSHIPS

Given ACF's goal for the EHSUP grant program to build a real-world evidence base for infant/toddler center-based programs, the 4 projects described above formed RPPs with EHS agencies to ensure that the integrated interventions were both feasible and effective. Close coordination between practitioners steeped in the realities of day-to-day implementation and researchers who bring new perspectives and support new approaches to benefit young children and families was necessary. RPPs, characterized by coordination and collaboration, provided opportunities to navigate the contextual, practical, and empirical realities associated with implementing and testing interventions in the field.[30-32] In this section, we describe RPPs as the approach for building real-world evidence and share examples of teams' experiences with partnerships.

We adopt the definition offered by Coburn and colleagues,[23] who characterize RPPs as "long-term, mutualistic collaborations between practitioners and researchers that are intentionally organized to investigate problems of practice and solutions for improving… outcomes" (p. 2) and posit that such collaborations are necessary to build real-world evidence to address problems of practice[33] and encourage the use of research to guide educational decisions.[34] There are a number of features of RPPs that characterize the significant work of practitioners and researchers coming together to identify, implement, and assess programming to support children's optimal development,[23] as summarized in Table 1 and reviewed below.

First, partnerships should have the intention of being *long-term in duration.* All four of the EHSUP research teams relied initially on partnerships with community agencies and programs established well before the initiation of the EHSUP funding opportunity; some of these partnerships had been in place for more than a decade. With existing

Table 1. Characteristics of Research-Practice Partnerships*

Characteristic	Description
Long-term associations	RPPs are intended to sustain beyond a single project or activity; long-term associations support innovation and trust.

Address problems relevant to practice	Issues relevant to the practitioners are the focus of the work rather than gaps in theory or research.
Engage in mutualistic collaborations	Researchers and practitioners share perspectives and desires to understand the feasibility, acceptability, and practicality of interventions.
Use intentional strategies to create partnership	Multiple strategies (communications, meetings, data use agreements) used with various levels within organization (administrators, teachers, families) support partnership.
Produce relevant data reports	Reports are generated that address different needs including academic products as well as products that highlight needs of practice partners.

*Modified from Coburn et al.[23]

partnerships, there is a foundation of trust on both sides that develops with time and an awareness that the partnership is mutually advantageous. Obstacles are often encountered in the process of building an evidence base (eg, recruitment of research participants, protocol breach), and RPPs grounded in long-term relationships allow partners to more effectively navigate challenges. Long-term relationships also improve the capacity of partners to jointly seek out funding opportunities that can provide the context for furthering the evidence base even more. Furthermore, a shared history characterized by mutual priorities improves the partnership's readiness to try new approaches. In addition to existing partnerships, all EHSUP teams also established new partnerships to meet projects' necessary sampling requirements and navigate changes in administration within organizations. Even when engaging in new partnerships, the intent was to continue these relationships beyond current projects.

Second, in successful RPPs, the *research itself should be designed to address problems relevant to practice and develop solutions to these problems.* To be relevant, research must be grounded in real-world situations encountered by practitioners yet grounded in a strong scientific base.[33] In the case of our EHSUP work, relationships and family

engagement are both part of the EHS regulations/program standards and elements of local programming. Therefore, federal leadership identified teacher and parent interventions for infant/toddler programs as specific areas of need. Robust research in this area supports the role of relationships in children's development. The charge for our EHSUP projects was to test sustainable interventions that could promote relationships between teachers and children as well as support families. In addition to the connection to the EHS framework, each research team shared their proposed project plans with their partners to ensure that the interventions were relevant to the local programs. The research teams took time to understand the needs of programs, including those of individual teachers and classrooms. Research activities were created and adapted according to co-created priorities prior to and in some cases throughout study implementation.

A third feature of RPPs is *mutualistic collaborations between researchers and practitioners.* Researchers and practitioners jointly define problems of practice with relevance to all partners[34] and must involve learning and joint work across the boundaries of research and practice.[35] The EHSUP partnerships were beneficial to our research teams because they allowed us to place intervention approaches into real-world contexts. Researchers need the perspective of those working in the field to make the interventions work. It is critical to understand the feasibility, acceptability, and practicality of interventions if they are to survive outside of a research paradigm. Further, modifications to our approaches are often required to "fit" into practice settings, and feedback from practice partners is essential to understand the need and nature of such modifications.[30] Collaborative conversations about opportunities, needs, and challenges are important as agencies engage in scale-up activities related to the EHSUP interventions. All EHSUP teams provided opportunities for our partners to provide input and needed modifications to their interventions prior to and in some cases throughout implementation. In this way, the programs became more tailored to the sites' unique populations, structures, and needs, thereby benefiting them.

Mutual collaborations between partners are characterized by trust. This includes trusting relationships between all partners as they develop, implement, and evaluate interventions. As an iterative process, opportunities and mechanisms to provide feedback are needed along the way. Trust is built and reinforced through open communication and two-way sharing of challenges and successes among partners. Likewise, researchers are seen as trustworthy when they are consistent, accountable, and reliable, and when they share decision making with their field-based

partners. This way sites know they can rely on researchers as partners who are invested in them and their success, and not simply in the research project or data.

Another point of mutual collaboration is shared responsibility for interpreting data and findings. By working in close collaboration, partners can determine appropriate methods for data collection and identify efficiencies, thereby benefiting both researchers and site-based partners. For example, several agencies were able to utilize data collected for other reporting requirements (eg, quality rating of classroom environments) or as part of programming rather than adding additional measures. This reduced the agency's burden of data collection in terms of cost and demand on teachers, parents, and children.

Fourth, RPPs *use intentional strategies to create processes that foster partnerships.* Our EHSUP teams implemented a variety of strategies to encourage and sustain our respective RPPs, including data use agreements, regular communications, and meetings. Ideally, strategies are implemented at multiple organizational levels. Our EHSUP teams engaged regularly with families, teachers, center directors, and program administrators through consistent, planned interactions designed to support their active involvement.

Finally, *data reports that are relevant to the RPP should be produced and shared.* Although the research teams have not yet reached this stage of the partnership process, planning for dissemination has begun both within individual teams and as a consortium. There are many ways data sharing can occur, and research teams are working to identify individuals who are skilled at communicating and sharing data with practitioners grounded in simple descriptive statistics.[36] Part of our charge as EHSUP research teams is to inform and advance the evidence base around teacher-parent interventions to positively impact children's development. Commonly, this is accomplished via peer-reviewed journals and conference presentations that focus specifically on intervention effects. When building an evidence base, the dissemination of findings should extend beyond research conferences and academic journals. Sharing results with program partners, using language that is accessible to practitioners, and facilitating a discussion to interpret the findings and together consider the implications for their programs are necessary practices. Likewise, presentations at practitioner conferences using techniques that tailor the presentation to the audience's knowledge base and interests are important means of communication and dissemination.

Ensuring that the RPPs yield findings that have practical significance may require research teams to examine questions beyond their original

research plans that are particularly relevant to program partners. For example, a program leader may pose the following questions: "Does education or experience level of the teacher relate to their effectiveness in engaging with families?" or "How does the rated quality of the classroom environment change from year to year?" When researchers facilitate a process that allows program partners to pose such questions and analyze data accordingly, a real-world evidence base that can transform practice is built.

BUILDING A REAL-WORLD EVIDENCE BASE: THE INTERSECTION OF IMPLEMENTATION AND RESEARCH/EVALUATION

Implementation

The primary goal of implementing our interventions was to identify and test the effectiveness of practices that improve adult-child and family interactions and enhance the cognitive, language, and social-emotional skills of infants and toddlers. Alignment between our interventions' and our partners' goals and priorities played a role in the success of implementing our interventions. This alignment was critical across various levels: federal, agency, site, and individual participant (teachers and parents) levels.

Across our interventions, we experienced varying degrees of alignment, which impacted teams' abilities to implement interventions and evaluate their effects. It was challenging to maintain adequate fidelity to the core components of our interventions while being flexible and responsive to the realities of our partners' contexts. When there was misalignment, working within RPPs facilitated dialogue between researchers and partners to improve the feasibility of implementation in the field. Facilitating alignment across the federal, agency, site, and participant levels translated into intervention uptake and increased the likelihood of sustainability.

Federal level. It was critical for our interventions to be aligned with the federal priorities of the EHS program, as these priorities translate to program requirements. As a federal program, EHS emphasizes professional development for staff, parent/family engagement, and the importance of research. Accordingly, agencies delivering EHS programming support these practices. For example, the Head Start standards require ongoing professional development for a minimum of 15 hours per year and "coordinated coaching" for teachers.[37] Because interventions across all sites included these elements, we could clearly demonstrate our alignment and ability to assist in meeting the standards with our agency partners, which facilitated buy-in. Similarly, family

engagement is a cornerstone of the Head Start model; thus, the inclusion of family components within our programs further aligned with the EHS philosophy. Head Start has also supported research through funding for projects and biennial research conferences aimed at supporting an active dialogue among researchers, policymakers, and agency administrators and staff. The program routinely uses research to guide improvement efforts nationally and locally. Due to the in-place structure of EHS that focuses strongly on teacher professional development, parent outreach, and the importance of research, our interventions were closely aligned at the federal level. In fact, the interventions implemented across the EHSUP greatly benefited from the existing structural supports within Head Start agencies.

Agency level. Alignment at the agency level was essential for successful implementation. Through federal requirements, agencies are responsible for programmatically prioritizing teacher professional development and family engagement opportunities. Across our projects, we found that most agencies were searching for or open to opportunities to partner with researchers to improve the services they provide for teachers, parents, and children. In line with our RPP approach, researchers collaborated with agency leaders to co-construct goals and ensure that the interventions and research questions were designed to address local priorities. Because of this alignment and our willingness to be flexible to the local priorities, agencies in turn were committed to helping us recruit and establish buy-in from sites. In fact, some agency leaders invited the research teams to present the intervention research project at director meetings and infant/toddler specialist staff meetings. As part of these meetings, agency leaders emphasized the long-standing relationship with the research team and the importance of these interventions to their EHS program and their national implications. Several teachers mentioned that they decided to participate because directors and infant/toddler specialists were encouraging and highlighted the potential benefits of participating in the projects.

Despite this alignment with federal- and agency-level priorities, there was some variability in the alignment between individual EHS agency priorities and our interventions, which target both teachers and parents of infants and toddlers. For example, some agencies placed a greater priority (and thus resources) on teacher-child relationships, whereas others were more dedicated to their mission of family engagement. Similarly, some agency administrators had to juggle the needs of their preschool program with those of their infant and toddler program. As a result, the limited professional development opportunities within the agencies' calendars were

often targeted at the larger preschool program, limiting support and resources for their smaller infant and toddler programs.

Site level. The success of our interventions also depended on our alignment with site-level priorities. In general, we found that sites' priorities were more aligned with the intervention aspects of the projects than the research-specific aspects. For example, most site leaders were excited about intervention aspects that involved coaching for teachers and parents. In these cases, administrators were accommodating and encouraged participation. On the other hand, some of those same site leaders did not prioritize the research aspects of the project and were less accommodating in helping the team obtain child consents from families, allocating space for direct assessments, and completing measures.

Although not formally documented, we found that effective leaders facilitated the implementation of our projects. Directors or managers who served as "organizational champions"[38] facilitated a culture that was aligned with our project priorities. Organizational champions recognized and supported the individual needs of their teachers and parents, facilitating participation in and benefiting from the intervention. For example, they protected teacher time for coaching sessions, provided substitutes to cover classrooms while teachers participated in coaching sessions, allocated space for training and data collection, and supported teachers in coordinating teacher-parent meetings. Anecdotally, it appeared that teachers with supportive leaders appeared to have greater satisfaction with the interventions and experienced fewer difficulties completing the program.

Consistency in site leadership was also critical, cultivating ongoing support to facilitate intervention implementation. For sites that experienced administrative turnover during the year or between study years, research teams often found it challenging to ensure that intervention efforts, and thus research projects, remained a priority. Changes in leadership often result in alterations to agency priorities and processes that affect implementation.[39] Across all our projects, there was great variability in the percentage of programs that experienced a change in leadership, ranging from 7% to 81%, with some sites experiencing leadership changes multiple times in one academic year. To weather leadership changes, regular communication with partner sites, established memoranda of understanding, and clear on-boarding protocols were essential to ensure that implementation was not interrupted.

In an effort to optimize alignment, some of the research teams found it helpful to interview site administrators and directors to better understand processes, procedures, and site/teacher characteristics that could potentially impact implementation. The interviews included discussions

about fit of the interventions with the program's professional development activities, policies around child and teacher movement, questions pertaining to teacher and family turnover rates, and assessment of necessary resources and accommodations (eg, access to and familiarity with using a computer, and space and time available for coaching sessions and child assessments). The interview data were used to modify interventions in an effort to better align with program-level priorities. For example, one team requested the sites' lesson plan formats and then integrated the implementation plans to be aligned. The interviews also served to distinguish between programs that were more versus less "ready" to participate in the interventions. For example, in some cases it was necessary for teachers to dedicate substantial time for the intervention to be successful. Through interview questions, the teams were able to determine which administrators were willing to make such accommodations to protect and prioritize teachers' participation.

Participant level. It was necessary to consider the alignment between our research plans and participants' competing priorities and individual needs. Teachers and parents had other responsibilities and priorities that in some cases interfered with how they participated in the interventions and research activities. At times, it was challenging to find the balance between individualizing the content and delivery of the intervention components, ensuring fidelity to the core of the intervention approaches, and maintaining the scientific rigor of the research studies. We achieved this by being flexible in how and when training, coaching, and data collection were conducted to maximize feasibility of implementation and ease of participation.

As Aiken and colleagues[40] note, rigid adherence to original protocols is likely to lead to implementation and study failure. Thus, teams made adjustments "in the service of maximizing rigor and relevance."[30] For example, when teachers or parents cancelled or did not attend scheduled sessions, team members worked to ensure that they received the intended content by adjusting timelines or integrating the content in subsequent sessions. Similarly, when one team learned from their implementation interviews that parents preferred the intervention to be delivered by their child's teacher, rather than learning from "outside experts," they worked with EHS partners to determine how to train and support teachers to co-facilitate the parent intervention with the study facilitators/trainers.

Some research teams were able to align and integrate their intervention elements into EHS agency structures for sharing and building knowledge and skills. In fact, they capitalized on this structure by providing training for intervention teachers on scheduled professional development

days. Other research teams found that the partners' professional development days were filled with mandated training, such as those related to licensing (eg, CPR, safe sleep), assessment, and documentation of curriculum. Thus, it was necessary to find additional time for providing content training (eg, skills for working with children/families) to intervention teachers, which proved challenging. To make the training more accessible to teachers, project staff offered several options. For example, in some cases training on specific topics was offered in shorter 1- or 2-hour sessions, during naptime, in the evenings, or on the weekends and scheduled holiday breaks (with overtime pay). One research team provided online modules that could be completed at the teachers' individual pace and timeline; another provided one-on-one individualized training for teachers.

Several of the projects engaged in weekly coaching sessions with teachers either in person or via remote video calls. However, this also proved to be challenging. Meetings while children rested interrupted the time teachers needed for documentation and planning, or precluded teachers from having required breaks. When these meetings took place in the classroom, teachers were sometimes distracted by children who were not asleep. Facilitating meetings outside of the classroom seemed to improve teachers' focus, but this was not always possible due to lack of private space within the facility or lack of available coverage (even when projects provided the funds for substitutes). Scheduling meetings during other times of the day (eg, early morning or evenings) and providing other modalities for the meetings (eg, remote meetings or using phone calls instead of video calls) were effective for encouraging consistent teacher participation. One research team provided teachers with a stipend for participation outside of their standard work hours.

During the projects' planning phase some EHS partners agreed that participation in training and coaching during teachers' existing weekly schedules would be feasible if funds were provided for substitute teachers. Despite the availability of project funds for substitutes, this was unsuccessful in cases where insufficient staff were available to provide coverage for coaching and professional development during the regular existing weekly schedules. In fact, we learned that some sites were struggling to recruit and retain enough teachers to fill classrooms and did not have a pool of substitutes or "floaters" to provide coverage during regular center operations. Even if staffing were available, paying for substitute care or additional staff is likely not a sustainable option beyond grant-funded program implementation.

Similarly, parents had difficulty attending regular in-person or remote sessions, even when accommodations such as meals, childcare,

transportation, and compensation for their time were provided. Thus, most sites conducting parent training sessions adapted the delivery of the intervention to make it more feasible for parents to participate, ranging from offering fewer meetings, delivering frequent but brief meetings during convenient times (pickup/dropoff), and providing remote sessions through phone or video chat. Interventions had to be flexible and accommodate a variety of modalities and formats to engage parents in the interventions. Projects that were flexible in how they provided parent engagement activities were more likely to have parent participation in meetings and other sessions. One site did not require parent participation outside of the standard program offerings and embedded all engagement activities in standard agency-offered parent activities.

Research teams also had to be flexible when the project's data collection needs were not consistent with or aligned to the needs and priorities of teachers and parents. For example, some teachers indicated that it was a disruption for research assistants to be in the classroom assessing children over several days. In the spirit of our RPP approach, researchers engaged in reflective dialogue with teachers and administrators, ultimately agreeing to make use of programmatic data to reduce some of the direct assessments. Similarly, some parents communicated that it was challenging to keep track of paper assessments or that it was hard to dedicate time to completing measures during child dropoff or pickup times. In response, researchers provided parents with electronic versions of the assessments and sent them links so that they had the option to complete the measures remotely. Through our RPPs, we were able to co-construct innovative ways to conduct the research without overburdening participants or compromising scientific rigor.

For teachers and parents to fully benefit from the interventions, research teams also had to be flexible with intervention protocols and procedures. For example, one coach reported that a teacher was understandably upset about having her co-teacher moved into another classroom without notice. Given the teacher's emotional state, the coach decided to put aside the coaching plan and was instead responsive to and supportive of the teacher's distress. Although this was a deviation from the protocol and delayed the coaching schedule, this responsivity was important for the teacher's wellbeing and their mutual coaching relationship. This type of responsivity is consistent with the RPP philosophy.[23]

Some research teams also decided to individualize their professional development content and/or coaching intensity to meet participants "where they were," given there was variability in teachers' and parents' baseline understanding about the intervention strategies, even within the same site.

For example, in some sites there were highly experienced teachers who had received substantial training and support and were implementing strategies to support children's development. In contrast, other sites had teachers who had only received health and safety training and needed more support in implementing best practices. Similarly, some parents needed more time to understand and apply the target strategies; in such cases, coaches offered them additional sessions to enhance their understanding.

Research and Evaluation

The complexities of creating real-world evidence present thorny practice issues and raise challenges associated with virtually all aspects of applied research, such as design, measurement, sampling, and analyses. Within the EHSUP partnerships, relationships between researchers and practitioners provided opportunities to modify and test interventions that are likely to be relevant and sustainable. At the same time, being responsive to feedback and suggestions from our partners challenged aspects associated with the rigor required in randomized controlled trials (RCTs). For some teams, flexibility increased the feasibility for partner sites' participation; however, it introduced heterogeneity in the intervention delivery with implications associated with fidelity and variability that must be considered when analyzing and interpreting outcome data.

A requirement of the EHSUP funding mechanism was the use of RCTs to test the interventions' effects. RCTs typically examine effects under ideal study conditions, but such "ideal" conditions typically do not conform to the realities of EHS programs. Whereas RCTs are the gold standard for determining an intervention's efficacy, the challenges raised above often make it difficult to translate practices and findings to real-world settings. Building an empirical foundation for field-based programs requires integrating elements of scientific rigor (as in the case of RCTs) with practical realities associated with RPPs (eg, modifications surrounding implementation and fidelity).

In this section, we discuss the tensions inherent in conducting RCTs in the context of RPPs and suggest methods that allow us to build an evidence base alongside our partners. Random assignment of study participants to experimental (intervention) and control conditions, and protection from contamination of the counterfactual/control group, are 2 requisite components of RCTs that present challenges in EHS and other practice sites. In addition, movement of participants and measurement/data collection issues in infant/toddler programs yield unique issues. Each of these is explored below.

Random assignment. Random assignment requires that research participants (eg, individuals, classrooms, centers, or agencies) be randomly assigned to a treatment or control condition. In some projects, randomization occurred at the level of the agency, with all centers assigned to the same condition, whereas in others, randomization occurred at the level of the center, which resulted in centers within the same agency having different experiences (treatment vs. control). Some program partners struggled with the concept of RCTs for a number of reasons. For example, some did not see the value of a rigorous RCT because they believed a priori that the intervention "worked" based on experience rather than relying on research evidence.[41] Some agency and center leaders questioned the need for control groups and asked why teams could not share intervention resources with all teachers. Some asked whether specific teachers or families "who need it most" could participate in treatment groups, rather than being subject to random assignment. It was common for researchers to hold several meetings with program leadership to discuss the advantages of starting with small random samples and testing effects systematically prior to scaling up.

To offset agency concerns and hesitations, some teams agreed to share resources with control teachers and center leadership once the research study was completed. Although they were not provided with coaching supports, partners were assured that they could implement interventions with control participants in similar ways. One team ultimately adopted a wait-list control design to allow control sites to receive the intervention as part of a later cohort. Furthermore, some research teams explored opportunities to apply for shared funding opportunities to build capacity within agencies to train their program coaches, specialists, and site leaders and sustain the intervention in programs into the future.

Control/counterfactual condition. A critical feature of RCT design is that control participants act as the counterfactual; that is, they do not receive the supports of the intervention and continue working with "business as usual."[42] The EHSUP projects focused on providing support services to young children and their families and occurred within the context of EHS, an intervention in itself. Therefore, research teams were required to evaluate the "added value" of their interventions when implemented under the auspices of EHS, rather than the "pure effects" of independent interventions in classrooms.

As part of EHS, every teacher in our programs participated in required professional development opportunities offered by agency leadership, independent of whether they were part of the control or intervention group. This has important implications to the design and

interpretation of outcomes of the research projects. First, some control participants received supports that were targeting the same outcomes as the intervention (ie, quality of interactions between teachers and children, parents and children, and teachers and parents). The fact that teachers, parents, and children in control classrooms may have experienced similar content as those in experimental classrooms raised methodological difficulties. Although it will not fully account for the content and quality of teachers' experiences, one team provided identical levels of meeting time to control and intervention teachers to minimize confounds associated with attention. Another team requested professional development records for all participating teachers (intervention and control) to quantify and control statistically for number of teacher professional development hours. Second, site-based training and supports were often planned separately from those planned by researchers. Therefore, in some cases their content was misaligned or conflicting with what is presented to intervention participants. This created challenges for teachers who were asked to implement content that may contradict what is presented to them by their administration. To rectify, some research teams collaborated with administrators to develop and offer training for administrators, site leaders, and education associates so that they could support teachers in using intervention content in the classroom. This same strategy was not appropriate for other research teams, who were concerned that training of agency administrators might create contamination in cases where the administrators were responsible for teachers in both the experimental and control groups. Further, during scale-up efforts where sites were trained to deliver the intervention in collaboration with group facilitators from the research team, one research team gave teachers in the control group the opportunity to opt into the scale-up training before it was opened up to the larger group of teachers who had previously opted out of the research.

Participant movement. Across projects, we experienced a challenge associated with teacher, parent, and child "movement" that is different from typical research study attrition but presents a methodological challenge nonetheless. Rather than individual participants withdrawing from the study, at times they were moved into other classrooms. For example, children who were in intervention classrooms at one site were at times reassigned by an administrator into control classrooms, or at other times into classrooms that were not participating in the project. It was not uncommon for teachers to be reassigned to a different classroom or to a different co-teacher, breaking up teaching teams and disrupting continuity of care for children. In some instances, teachers in treatment classrooms were moved to control classrooms, presenting a risk of contamination.

Other examples of movement were less systematic. At times teachers and children were moved in and out of classrooms to accommodate ratio requirements or were moved between home- and center-based program options. These changes created significant logistical challenges for intervention implementation, affected a study's sample size, impacted the validity of data, and may have affected researchers' ability to quantify accurately the efficacy of the intervention. When children and teachers were moved permanently, this resulted in missing data and increased study attrition rates, requiring that we employ advanced statistical approaches to test for the potential effects of and account for "missingness" (further described below).

High teacher turnover and teacher shortages--attributed to myriad factors such as low wages, high levels of stress, and lack of support from center leadership[43,44]--are a broader challenge faced by the early childhood education field and one that impacts the ability to build an evidence base in early care and education settings. In fact, estimates of early childhood teacher turnover are 4 times higher than school-aged teacher turnover, ranging from 13% to 25%.[45,46] We anticipated that teacher turnover would be a challenge to our research, potentially increasing typical research study attrition rates. Across our projects, 12% to 27% of teachers did not complete the intervention due to some form of movement.

In addition to staff movement, all research teams experienced child and family attrition. One project, for example, spanned 2 years and experienced a loss of nearly 50% of children who enrolled and provided baseline information. All teams expected and planned for family and child attrition by oversampling or recruiting, when available, a higher number of participants than what power analyses originally suggested. In some cases, early teacher attrition was addressed by recruiting additional sites to replace participants that were lost. It is worth noting that the low teacher-to-child ratios in EHS settings (4 children to 1 teacher) limited our ability to oversample children and families, which is much more feasible in preschool and school-aged settings with higher ratios and larger group sizes.

Despite these design considerations, we will examine the effect of turnover on our outcome data. Specifically, we will examine whether data are missing completely at random, missing at random, or not missing at random (NMAR). If we find systematic patterns of differences in the characteristics between intervention completers and noncompleters (thus, NMAR), we will employ statistical techniques such as multiple imputation (MI) or full information maximum likelihood (FIML[47]) to account for potential bias in our data. Other advanced statistical approaches such as hierarchical linear modeling in an intent-to-treat (ITT) framework will allows us to retain

data for participants with at least one measurement occasion in most cases. The use of such advanced techniques affords us the opportunity to continue evaluating the effects of our interventions in field-based RPP work.

Research teams made other methodological decisions to account for teacher and child instability. For example, teams carefully documented treatment dosage and teacher and child movement across classrooms to account for instability in analyses. One research team also conducted individual teacher observations, using a measure that is typically used at the classroom level. The scores were later aggregated at the classroom level for analyses and interpretation. This approach allowed the team to retain the teacher-level data if one of the teachers withdrew or was moved prior to completing the study. Projects also worked closely with administrators, discussing the implications of movement of children from classroom to classroom to the research project, to minimize the movement. This type of conversation was helpful in some but not all instances.

Measurement and data collection. Collecting reliable and valid data is a requirement for objectively evaluating outcomes in field-based partnership research. A major challenge in infant/toddler settings is the scarcity of measures with adequate psychometric evidence. Often researchers must adapt existing measures or pilot new measures to capture the construct that aligns with their theory of change. For example, one site was interested in measuring the organizational climate of each center. However, the only accessible, published, and validated measure was developed for use in pre-kindergarten programs so the items were not relevant to the specific nuances of infant/toddler environments. The site collaborated with the authors of the original scale to develop and pilot a measure of organizational climate reflective of infant/toddler programs. Another site that used an attachment-based curriculum adapted measures of parental reflective functioning and helplessness for teachers. Many sites also used a mixed-methods approach, combining qualitative and quantitative data. For example, 2 research teams completed focus groups or individual interviews with teachers and parents after each study year to understand the elements of the interventions that were most effective and to identify barriers to implementation of the intervention. In this way, relevant information was collected in the absence of established measures.

Once teams identified measures to assess outcomes, data collection in field sites was often challenging. Some teams collected classroom observation data via video recording (versus in-person observation) to facilitate reliability coding and ensure that coders were blind to condition and time point. Parental permission for video recordings for each child in the classroom was required. Sometimes parents' work and

school schedules did not allow them to drop off or pick up their child after their day, and special efforts had to be made to obtain video consent. Other times, a parent was not willing to provide permission for his/her child to be included on a video record of the observation. At each study time point, permissions were reviewed and compared to class lists, as children moved from one classroom to another. A careful system for ensuring that videos contained only children whose parents provided consent and blinding videos when a child without permission moved into the video frame was developed. The extra step of checking and blinding videos added to the cost of assessment and the time to complete coding.

NEXT STEPS IN BUILDING AN EVIDENCE BASE

As an early childhood intervention research consortium, our goal is to identify approaches that can have an immediate and sustained impact on infant/toddler development. Research-practice partnerships are essential to this goal. Through RPPs we are learning strategies that are evidence-based but grounded in real-world practice and, therefore, more relevant and readily implemented. Fortunately, partnerships with EHS agencies have been central to the EHSUP research consortium. Through these partnerships, teams have been able to identify and evaluate promising approaches to improve integrated parent and teacher practices to promote infant/toddler development. It is noteworthy that this grant program provided a unique opportunity to support the planning and testing of interventions in partnership with EHS programs, which was essential to the success of the projects.

If the field is to continue exploring ways to build the evidence base through partnerships, it is incumbent that the components of RPPs, and their efficacy, be evaluated. It will be necessary to document that RPPs operate in ways that are optimal at designing, implementing, and testing interventions. This evaluation goes beyond the specific research questions and seeks to understand how the partnership is working for research teams and for collaborating agencies. Though our EHSUP research teams did not systematically gather this information, it is critical for consideration as researchers move forward in partnership with practitioner organizations.

In conclusion, and consistent with previous research,[30,32,40,48] we found that the characteristics of strong RPPs (eg, trust and collaboration around problems of practice) were essential in our research teams' abilities to have both flexibility and rigor in implementation and evaluation of our interventions and to find solutions when challenges occurred. We argue from our experience that in any productive RPP, researchers need to work

to support the partner organization in achieving its own goals outside of the shared research activities by sharing data that can yield improvement strategies for the organization. We suggest that such long-term and generalized effects be carefully examined in future studies. Successful RPPs (including some of the RPPs showcased here) can also generate evidence that transcends the partnership, including new tools, measures, and findings that may impact the broader field of programming for infants and toddlers. Finally, future research must consider if RPPs increase the capacity of EHS partners to engage in ongoing partnership work. Partners must be encouraged to and supported as they develop professional identities that value collaborative inquiry. These metrics of evaluating partnerships can be helpful as researchers move forward with this type of collaborative work.

APPENDIX. DESCRIPTIONS OF EHSUP PROGRAMS

Hearts and Minds on Babies (Wayne State University, Michigan State University, and University of Michigan)

Hearts and Minds on Babies (HMB) is an attachment-based professional development training program for Early Head Start (EHS) teachers and parents. It was adapted from the Mom Power Intervention,[49] an attachment-based parenting and self-care group intervention for parents that includes 10 group sessions and 3 individual parent sessions. Like Mom Power, HMB aims to improve responsive caregiving by increasing reflective functioning, which enables center-based teachers and parents to understand and respond to children's developmental and emotional needs. HMB also supports adult stress reduction and emotion regulation by introducing mindfulness-based self-care exercises. In addition, teachers are encouraged to share learned concepts with parents during daily interactions and the 3 parent meetings.

The HMB training aims to promote secure attachment between teachers and children and positive relationships between parents and teachers. Throughout the training, attachment concepts are depicted using a tree metaphor. The tree illustrates the role of parents and teachers in creating a secure base and safe haven from which children can learn, connect, thrive, and grow in day-to-day interactions. Within this metaphor, tree branches represent children's exploration to learn and meet developmental milestones, whereas tree roots represent moments of distress when children may need connection and support for their attachment needs. Tree roots and branches are symmetrical to symbolize that children are better able to explore, learn, and develop when they have strong connections with parents and teachers. Teachers use the tree to work through video and case material provided in the curriculum or through examples they bring from their own work with children in the classroom. Training facilitators scaffold teachers' insight into the meaning of children's behaviors from an attachment perspective. Teachers reflect on children's behavior, wonder about the feelings and needs behind behavior, and consider how to respond to children's needs. There is also a focus on the teachers' emotional responses to children and ways to self-regulate their own distress. Once teachers have learned to use the HMB concepts in the classroom, they work with facilitators to think about how to share content with parents to create a shared language about children's attachment needs. Information is shared with parents when they drop off and pick up their children, at home visits, and through co-facilitation of 3 parent groups

at their center to promote a deeper relationship between the teachers and parents.

The HMB professional development training is conducted in groups of 10 to 15 teachers and co-facilitated by 2 professionals, 1 of whom has training in a mental health field. These small groups create a safe environment for deep learning and a parallel process whereby teachers can have their needs for connection met, while also branching out and trying new ways of interacting with infants and toddlers in their classroom. Teachers engage in 7 to 14 group sessions of varying length and format and 3 individual coaching sessions. The length and format of the group sessions vary based on the needs and structure of the program, but all participating teachers complete a total of 28 hours of professional development training. The individual sessions help build rapport and provide an opportunity to address individual needs of teachers.

While teachers participate in HMB training, site and building administrators and specialists participate in a parallel group where they are exposed to the same concepts and learn ways to support teachers' use of the concepts. This critical training component provides administrators with skills and abilities to meet teachers' needs for connection and growth.

The adaptation of Mom Power into an integrated intervention for EHS parents and teachers and the evaluation of feasibility and effectiveness were accomplished in partnership with 7 EHS programs across 5 Michigan counties. The work took place in 3 phases. First, 2 EHS education associates were trained in the Mom Power curriculum; these individuals helped the university team make adaptations so that content and activities were relevant for teachers. The adapted teacher content was piloted with 15 teachers with whom implementation interviews were conducted to inform additional changes. Next, the parent and teacher interventions were tested in an open trial in 2 counties (26 teachers, 18 parents). Implementation interviews and surveys informed further adaptations to better integrate parent and teacher interventions and make the delivery of the intervention more feasible. In the final phase, the integrated intervention was pilot-tested by 2 programs and then tested in a randomized controlled trial (RCT) in 7 programs across 5 counties (87 teachers, 55 parents). Following the RCT, programs were trained to deliver the intervention and provided with coaching and reflective supervision.

Getting Ready 0-3 (GR03): Supporting the Development of Infants/Toddlers through an Integrated Parent-Teacher Relationship-based Approach (University of Nebraska-Lincoln)

Getting Ready 0-3 (GR03) is a strength-based intervention aimed at enhancing the language and social-emotional development of young children through the delivery of developmentally appropriate, child-focused practices across homes and early childcare settings. It focuses on strengthening relationships in children's lives, including relationships between parents, teachers, and young children. As an extension of the Getting Ready (GR) intervention,[50] GR03 focuses on relationships and experiences for infants and toddlers across their homes and early care centers. Teachers participate in formal training for blending important developmental objectives with effective parent-child and teacher-child interactions. GR03 promotes a relationship-building process of interacting with families that occurs during all exchanges between teachers and parents (eg, home visits, conferences, informal interactions, dropoff, pickup). It builds on culturally relevant family and child strengths. It is not a curriculum or a packaged, stand-alone program but an intentional approach for infusing meaningful parent engagement and educator-child relationships into all environments experienced by children. It is defined by 8 strategies and a collaborative structure used to guide all parent/educator contacts.

The 8 Getting Ready strategies support parents' competencies to facilitate their child's learning across contexts and reinforce parents' active engagement in their child's development. Strategies used by teachers include (a) establishing the parent-child interaction, (b) communicating openly, (c) affirming parent competencies, (d) focusing parent's attention, (e) sharing information and resources, (f) using observations and data to guide decisions, (g) making mutual/joint decisions; and (h) modeling/suggesting as needed.[50] In addition, structured collaborative planning procedures (including observation review, supported parent–child interaction, and the creation of home-center plans) are incorporated into family contacts that occurred 6 times annually to promote shared responsibility between parents and teachers for encouraging children's development. Twelve formal contacts between teachers and families occurred over 2 study years (ie, 6 contacts annually) to deliver the GR03 strategies and collaboration planning structure. To the greatest extent possible, the contacts were incorporated into agency-scheduled interactions with families, such as home visits or parent-teacher conferences. Thus, 4 contacts per year occurred as part of regularly scheduled programmatic activities, and 2 contacts per year were added. Teachers were also encouraged to use these strategies during all informal interactions with parents (eg, dropoff and pickup times; regular center communications; and occasional informal notes, emails, text messages, or telephone calls).

Families and teachers were recruited for 2 years of participation in the project. Over their 2 years of involvement, teachers received ongoing coaching from a master coach to support their use of strategies that promote adult-child (parent-child; teacher-child) interactions and parent-teacher partnerships, including collaborative goal setting with parents to support their children's development. Each month, teachers participated in 90 minutes of one-on-one coaching, with this same coach observing the teacher during classroom interactions for 8 hours monthly in the first year and 4 hours monthly in the second year.

The refinement and randomized trial of GR03 took place in 9 rural and urban communities across 2 midwestern states. We worked in close partnership with 7 community agencies that operated EHS center-based programs in these communities. The EHS centers varied in size (1 to 8 infant/toddler rooms). The study included 57 classrooms. A total of 85 teachers and 151 children were involved.

Supporting Sprouts from Home to School (University of Texas Health Science Center at Houston)

Supporting Sprouts from Home to School is a research program developed by the Children's Learning Institute at the University of Texas Health Science Center at Houston. This study was designed to assess whether a combination of 2 theoretically aligned programs that targeted teachers (Strategies for Early Education and Developmental Success [SEEDS]) and parents/primary caregivers (Play And Learning Strategies [PALS]) would together increase children's language, self-regulation, and social-emotional development relative to a business-as-usual control condition. The programs both focused on aspects of parent and teacher responsivity including warm/sensitive responses, contingent responses, language-stimulating responses, as well as early behavioral management. As part of participation in the randomized trial, 18 urban and suburban sites were included near Houston, Texas. The study included 104 teachers and 298 children. Following the trial, coaches from one EHS agency were trained to deliver the interventions. Feedback on implementation needs was gathered to strengthen the training and guidance provided.

PALS[51,52] is a research-based, online parenting program consisting of 11 sessions for caregivers of infants (ages 5 to15 months) and 14 sessions for caregivers of toddlers (ages 16 months to 3 years). Each PALS session includes a review of the previous session's topic, introduction of a new topic, viewing of a PALS curriculum video with examples of parents and young children demonstrating targeted behaviors, guided practice time

in which the PALS coach facilitates and videotapes the parent using the new skills with her child, and a review of the videotape to further highlight interaction sequences and allow the parent to observe and critique herself. The PALS model includes 3 features: (1) research-based parenting curriculum videos, (2) active parent involvement during and between PALS sessions, and (3) competent and experienced staff who build trusting relationships with families.

The SEEDS program was adapted from a research-based program for at-home childcare providers[53] to focus on infant and toddler center-based teachers. The program consists of 14 online sessions that include interactive materials focused on specific topics. Each week, the online course introduces a new concept and/or strategy that promotes the positive development of infants and toddlers. Each session includes: (a) Review: review previous session; (b) Learn: new SEEDS concept is introduced and illustrated with videos; (c) Test Your Knowledge: knowledge-based open-ended questions linked to video clips, case studies, and multiple-choice quizzes to test teachers' understanding of SEEDS concepts; (d) Reflect, Practice, and Discuss: tips to put new strategies into action, and a forum to discuss experiences with other center-based teachers; and (e) Treasure Chest: activities, handouts, additional video clips, and online resources to learn more about the new strategies. Following the completion of each online course, teachers videorecord themselves in the classroom practicing the skills demonstrated in the session. Finally, they conduct a video conference with a coach to discuss the content, review the video, and guide the caregiver through self-reflection.

Coaching UP (University of Miami)

The goal of Coaching UP is to support children's social-emotional and cognitive development by implementing a coaching approach with teachers and families that is responsive and inquiry-based. The approach is tailored to the existing strengths and unexplored capacities of the programs, teachers, parents, and children. Through an inquiry-based approach, coaches develop intentional questions to scaffold teachers to have their own realizations and draw conclusions.

During phase one, coaches engaged teachers in iterative coaching cycles: knowledge-building, supporting transfer to practice, and guided-reflection. Weekly coaching meetings were conducted with all classroom teachers to promote collaboration and help them support children's development. During phase two, coaches added an emphasis on teacher-family communication. This involved planning for and reflecting on

communication with families to connect children's learning across the classroom and home environments.

Phase one of Coaching UP begins with a focus on establishing collaborative partnerships and understanding teachers' baseline practices (ie, strengths, goals, and interests). Establishing and maintaining trust and mutual understanding is a central goal during these initial structured meetings and classroom observations. During weekly 1-hour coaching meetings, teachers engage in interactive and targeted knowledge-building modules focused on understanding the connections between children's development and effective teaching practices (eg, the power of play, supporting higher-order thinking skills, and asking intentional questions). Coaches use inquiry to scaffold teachers in making connections between the module content, their practice, and children's learning. Then, coaches support teachers as they reflect on observations of children in their classroom to identify children's interests and abilities. Together, they co-construct learning goals for children and create flexible plans to support these goals by (a) preparing the environment and setting up provocations (eg, selecting materials and engaging children), (b) planning responsive interactions, (c) identifying opportunities for embedding high-order thinking into their routines (eg, cause and effect during diapering, comparisons during meals, predictions while playing with soft blocks), (d) brainstorming potential questions to provoke thinking and scaffold learning, and (e) engaging in role-playing to anticipate children's responses and sustained exchanges. To engage in reflection, coaches choose a short video clip of a recorded interaction that highlights an effective teacher practice in connection with children's engagement, behavior, and/or learning. They ask probing questions and engage teachers in video-guided reflection to help refine their observation skills (ie, describing actions, the context, and identifying strengths) and to realize the connection between what teachers say and do and children's actions and reactions. The conclusions drawn from these reflections are used to refine the module content and to inform subsequent goals, thereby restarting a coaching cycle. On average, teachers participated in 14 coaching meetings (ranging from 7 to 22 sessions).

During phase two of Coaching UP, an emphasis on communication between teachers and families is added, connecting children's learning in the classroom and home environments. Coaches and teachers plan for brief interactions with families during times when they are already at the center and/or meeting with teachers (eg, pickup/dropoff times, home visits). To establish a trusting relationship between teachers and families, coaches help teachers write and share with families positive notes about children's

interests and abilities. Coaches then support teachers in asking families to share reflections about their children's interests, abilities, and positive behaviors at home, as well as questions to understand their family's routines and culture. Teachers begin communicating about shared goals with families by discussing with families their goals for children and asking families about their expectations. Coaches and teachers use information obtained from families to plan responsive experiences and interactions.

Coaching UP was developed and implemented by the University of Miami in collaboration with 3 Early Head Start-Child Care Partnership (EHS-CCP) grantees across 7 urban communities in South Florida. The RCT was implemented in 21 center-based programs and 74 classrooms (35 intervention; 39 control), with participation from 141 teachers, 336 families, and 435 children.

REFERENCES

1. Center on the Developing Child at Harvard University. A science-based framework for early childhood policy: using evidence to improve outcomes in learning, behavior, and health for vulnerable children. https://developingchild.harvard.edu/resources/a-science-based-framework-for-early-childhood-policy/. Published April 20, 2007. Accessed October 23, 2020.

2. Shonkoff JP, Phillips DA, eds. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: National Academies Press; 2000.

3. Landry SH, Smith KE, Swank PR, Assel MA, Vellet S. Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Dev Psychol*. 2001;37(3):387-403.

4. Pungello L, Iruka IU, Dotterer AM, Mills-Koonce R, Reznick S. The effects of income, race, and sensitive and harsh parenting on receptive and expressive language development in early childhood. *Dev Psychol*. 2009;45:544-557.

5. Mortensen JA, Barnett MA. Teacher–child interactions in infant/toddler childcare and socioemotional development. *Early Educ Dev*. 2015;26:209-229.

6. NICHD Early Child Care Research Network. Early child care and self-control, compliance, and problem behavior at twenty-four and thirty-six months. *Child Dev*. 1998;69(4):1145-1170.

7. Phillips DA, Lowenstein AE. Early care, education, and child development. *Annu Rev Psychol*. 2011;62:483-500.

8. Brotman LM, Calzada E, Huang KY, et al. Promoting effective parenting practices and preventing child behavior problems in school among ethnically diverse families from underserved, urban communities. *Child Dev*. 2011;82(1):258-276.

9. Bierman KL, Sheridan SM. Family-school partnerships at school entry: developmental and conceptual frameworks for action. In: Bierman KL, Sheridan SM, eds. *Fostering Productive Family-School Partnerships at School Entry: Translating Research into Practice*. New York, NY: Springer. In press.

10. Durlak JA, DuPre EP. Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation. *Am J Community Psychol*. 2008;41(3-4):327-350.

11. Crosnoe R. Opportunities for and challenges of translating educational and developmental research. In: Wethington E, Dunifon RE, eds. *Research for the Public Good: Applying the Methods of Translational Research to Improve Human Health and Well-Being.* Washington, DC: American Psychological Association; 2012:53-72.

12. Head Start Early Childhood Learning and Knowledge Center (ECLKC). Early Head Start programs. https://eclkc.ohs.acf.hhs.gov/programs/article/early-head-start-programs. Last updated March 30, 2020. Accessed October 23, 2020.

13. Sheridan SM, Edwards CP, Marvin CA, Knoche LL. Professional development in early childhood programs: process issues and research needs. *Early Educ Dev*. 2009;20(3):377-401.

14. Love JM, Kisker EE, Ross CM, et al. Making a difference in the lives of infants and toddlers and their families: the impacts of early Head Start. Volume I: Final technical report. Washington, DC: US Dept of Health and Human Services, Administration for Children and Families, Office of Planning, Research and Evaluation. https://www.acf.hhs.gov/opre/resource/making-a-difference-in-the-lives-of-infants-and-toddlers-and-their-families-0. Published June 15, 2002. Last reviewed April 29, 2019. Accessed October 23, 2020.

15. Wandersman AH, Lesesne CA. If translational research is the answer, what's the question? Who gets to ask it? In: Wethington E, Dunifon RE, eds. *Research for the Public Good: Applying the Methods of Translational Research to Improve Human Health and Well-Being.* Washington, DC: American Psychological Association; 2012:33-52.

16. Glasgow RE, Magid DJ, Beck A, Ritzwoller D, Estabrooks PA. Practical clinical trials for translating research to practice: design and measurement recommendations. *Med Care*. 2005;43(6):551-557.

17. Balas EA, Boren SA. Managing clinical knowledge for health care improvement. *Yearb Med Inform.* 2000;(1):65-70.

18. Cook BG, Odom SL. Evidence-based practices and implementation science in special education. *Exceptional Child*. 2013;79(3):135-144.

19. Fixsen DL, Naoom SF, Blasé KA, Friedman RM, Wallace F. *Implementation Research: A Synthesis of the Literature*. National Implementation Research Network. https://nirn.fpg.unc.edu/sites/nirn.fpg.unc.edu/files/resources/NIRN-

MonographFull-01-2005.pdf. Published 2005. Accessed October 23, 2020.

20. Contopoulos-Ioannidis DG, Ntzani E, Ioannidis JP. Translation of highly promising basic science research into clinical applications. *Am J Med*. 2003;114(6):477-484.

21. Drolet BC, Lorenzi NM. Translational research: understanding the continuum from bench to bedside. *Transl Res*. 2011;157(1):1-5.

22. Wethington E, Dunifon RE, eds. *Research for the Public Good: Applying the Methods of Translational Research to Improve Human Health and Well-Being.* Washington, DC: American Psychological Association; 2012.

23. Coburn CE, Penuel WR, Geil KE. Research-practice partnerships: a strategy for leveraging research for educational improvement in school districts. William T. Grant Foundation. https://wtgrantfoundation.org/library/uploads/2015/10/Research-Practice-Partnerships-at-the-District-Level.pdf. Published January 2013. Accessed October 23, 2020.

24. Christopher S, Watts V, McCormick AK, Young S. Building and maintaining trust in a community-based participatory research partnership. *Am J Public Health*. 2008;98(8):1398-1406.

25. Wethington E, Pillemer K, Meador R. Community-researcher partnerships in aging: the Cornell Institute for Translational Research on Aging. In: Wethington E, Dunifon RE, eds. *Research for the Public Good: Applying the Methods of Translational Research to Improve Human Health and Well-Being*. Washington, DC: American Psychological Association; 2012:169-190.

26. Ispa JM. Pursuing and sharing knowledge to inform practice and policy: the value of qualitative research in translational research. In: Wethington E, Dunifon RE, eds. *Research for the Public Good: Applying the Methods of Translational Research to Improve Human Health and Well-Being*. Washington, DC: American Psychological Association; 2012:103-125.

27. Coburn CE, Penuel WR. Research–practice partnerships in education: outcomes, dynamics, and open questions. *Educ Researcher*. 2016;45(1):48-54.

28. Rosenblum KL, Muzik M, Morelen DM, et al. A community-based randomized controlled trial of Mom Power parenting intervention for mothers with interpersonal trauma histories and their young children. *Arch Womens Ment Health*. 2017;20(5):673-686.

29. Rosenblum K, Lawler J, Alfafara E, Miller N, Schuster M, Muzik M. Improving maternal representations in high-risk mothers: a

randomized, controlled trial of the Mom Power parenting intervention. *Child Psychiatry Hum Dev*. 2018;49(3):372-384.

30. Gopalan G, Bunger AC, Powell BJ. Skills for developing and maintaining community-partnerships for dissemination and implementation research in children's behavioral health: implications for research infrastructure and training of early career investigators. *Adm Policy Ment Health*. 2020;47(2):227-243.

31. Hurlburt M, Aarons GA, Fettes D, Willging C, Gunderson L, Chaffin MJ. Interagency collaborative team Model for capacity building to scale-up evidence-based practice. *Child Youth Serv Rev*. 2014;39:160-168.

32. Shea CM, Young TL, Powell BJ, et al. Researcher readiness for participating in community-engaged dissemination and implementation research: a conceptual framework of core competencies. *Transl Behav Med*. 2017;7(3):393-404.

33. Donovan MS. Generating improvement through research and development in education systems. *Science*. 2013;340(6130):317-319.

34. Tseng V. Partnerships: shifting the dynamics between research and practice. William T. Grant Foundation. http://wtgrantfoundation.org/library/uploads/2015/10/Partnerships-Shifting-the-Dynamics-of-Research-and-Practice1.pdf. Published July 2012. Accessed October 23, 2020.

35. Penuel WR, Allen A, Coburn CE, Farrell C. Conceptualizing research–practice partnerships as joint work at boundaries. *J Education for Students Placed at Risk*. 2015;20:182-197.

36. Booker L, Conaway C, Schwartz N. Five ways RPPs can fail and how to avoid them: applying conceptual frameworks to improve RPPs. William T. Grant Foundation. http://wtgrantfoundation.org/library/uploads/2019/06/Five-Ways-RPPs-Can-Fail.pdf. Published May 2019. Accessed October 23, 2020.

37. Head Start Early Childhood Learning and Knowledge Center (ECLKC). Training and professional development. https://eclkc.ohs.acf.hhs.gov/policy/45-cfr-chap-xiii/1302-92-training-professional-development. Published 2016. Accessed October 23, 2020.

38. Aarons GA, Hurlburt M, Horwitz SM. Advancing a conceptual model of evidence-based practice implementation in public service sectors. *Adm Policy Ment Health*. 2011;38(1):4-23.

39. Rosenquist BA, Henrick EC, Smith T. Research-practice partnerships to support the development of high quality mathematics instruction for all students. *J Education for Students Placed at Risk.* 2015;20:42–57.

40. Aiken BA, Strolin-Goltzmah J, Collins-Camargo C. Successes and challenges in developing trauma-informed child welfare systems: a real-world case study of exploration and initial implementation. *Child Youth Serv Rev.* 2017;82:42-52.

41. Goodkind JR, Amer S, Christian C, et al. Challenges and Innovations in a community-based participatory randomized controlled trial. *Health Educ Behav.* 2017;44(1):123-130.

42. Boylan M, Demack S. Innovation, evaluation design and typologies of professional learning. *Educ Res.* 2018;60(3):336-356.

43. Hale-Jinks C, Knopf H, Knopf H. Tackling teacher turnover in childcare: understanding causes and consequences, identifying solutions. *Child Educ.* 2006;82(4):219-226.

44. Whitebook M, Austin LJE, Amanta F. Addressing infant toddler teacher compensation. Early Educator Central. https://earlyeducatorcentral.acf.hhs.gov/sites/default/files/public/resources/Addressing%20Infant_Toddler%20Teacher%20Compensation.pdf. Published 2015. Accessed October 23, 2020.

45. Whitebook M, Phillips D, Howes C. Worthy work, STILL unlivable wages: the early childhood workforce 25 years after the National Child Care Staffing Study. Center for the Study of Child Care Employment. https://cscce.berkeley.edu/files/2014/ReportFINAL.pdf. Published 2014. Accessed October 23, 2020.

46. Whitebook M, Sakai L. Turnover begets turnover: an examination of job and occupational instability among childcare center staff. *Early Child Res Q.* 2003;18:273-293.

47. Enders CK. The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychol Methods.* 2001;6(4):352–370.

48. Henrick EC, Cobb P, Penuel WR, Jackson K, Clark T. Assessing research-practice partnerships: five dimensions of effectiveness. William T. Grant Foundation. https://wtgrantfoundation.org/library/uploads/2017/10/Assessing-Research-Practice-Partnerships.pdf. Published 2017. Accessed October 23, 2020.

49. Muzik M, Rosenblum K, Schuster M. Mom Power curriculum (unpublished manual). Ann Arbor, MI: University of Michigan; 2010.

50. Sheridan SM, Marvin CA, Knoche LL, Edwards CP. Getting ready: promoting school readiness through a relationship-based partnership model. *Early Child Serv.* 2008;2:149-172.

51. Landry SH, Smith KE, Swank PR. Responsive parenting: establishing early foundations for social, communication, and independent problem-solving skills. *Dev Psychol.* 2006;42(4):627-642.

52. Landry SH, Smith KE, Swank PR, Guttentag C. A responsive parenting intervention: the optimal timing across early childhood for impacting maternal behaviors and child outcomes. *Dev Psychol.* 2008;44(5):1335-1353.

53. Merz EC, Landry SH, Johnson UY, Williams JM, Jung K. Effects of a responsiveness-focused intervention in family child care homes on children's executive function. *Early Child Res Q.* 2016;34:128-139.