What implementation evidence matters: scaling-up nurturing interventions that promote early childhood development

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Research in early childhood development (ECD) has established the need for scaling-up multisectoral interventions for nurturing care to promote ECD, for improved socioeconomic outcomes for sustainable societies. However, key elements and processes for implementation and scale-up of such interventions are not well understood. This special series on implementation research and practice for ECD brings together evidence to inform effectiveness, quality, and scale in nurturing care programs; identifies knowledge gaps; and proposes further directions for research and practice. This paper frames the dimensions and components fundamental to the understanding of implementation processes for nurturing care interventions, factors for improving implementation of interventions, and strategies to scale by embedding interventions in delivery systems. We discuss emerging issues in implementation research for ECD, including (1) the role of context in adaptation and implementation, (2) standardized reporting of implementation research, (3) the importance of feasibility studies to inform scale-up and capacity building, (4) fidelity and program quality improvement, and (5) intervention integration into existing systems. Effective implementation of nurturing care interventions is at the heart of achieving positive developmental outcomes for young children. It is pivotal to adapt and implement these interventions based on evidence for high impact, especially in low-resource settings.

Keywords: implementation evidence; nurturing care; early childhood development; scale-up

Introduction

Why a special series on implementation research to promote early childhood development?

Since the turn of the 21st century, the evidence in support of why early childhood development (ECD) is critical to individuals and societies has burgeoned. Early childhood development programs enable children to develop and strengthen cognitive and social skills, increase adult income, and can break the intergenerational cycle of poverty and lost human capital.1 The arguments of “why” taking action to promote early development have been recognized at the highest levels of political commitment, for example, the Sustainable Development Goals endorsed by all nations of the world. The former United Nations Secretary General, Ban Ki-moon, acknowledged that “the Sustainable Development Goals recognize early childhood development can help drive the transformation we hope to achieve over the next 15 years.”2 At national levels as well, there is a greater attention being given to ECD with a significant increase in national multisector policies supporting children’s development.3

A second big advancement has occurred in defining “what” is ECD? The evidence from several fields of knowledge including neuroscience, social sciences, and economics has provided valuable knowledge to defining developmental potential and the process by which it occurs.4 From a bio-psychosocial ecological perspective, ECD is defined along two dimensions—the child (age and domains of

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development) and the environment. With respect to the child, the early childhood period is defined as beginning at conception until age of school entry, with developmentally distinct phases within that age span. Commonly used domains of development included in the definition are motor, cognitive, language, and social and emotional development. Development is a maturational process that results from the optimal, bi-directional interaction between the child and the environment. Though developmental processes are fairly similar across cultures, the progression rates vary as children acquire culture-specific skills and the influence of other contextual factors.5

The brain develops most rapidly in the first years of life, when neurons form new connections at the astounding rate of upward from 1000 per second.6 The science underscores that while genes provide the blueprint for the developing brain, it is a child’s environment that shapes development, which occurs in a relatively short period of time in order to establish the capacity to learn, adapt to change, and develop psychological resilience. This period of life is considered foundational for later health and well-being; therefore, strong foundations support a healthy developmental trajectory, while adversity may result in a poorer developmental trajectory, which is more challenging to improve with later life interventions.

The context, an important determinant of a child’s developmental potential, has been conceptualized as “nurturing care.”3 The five indivisible components of nurturing care are health, nutrition, security and safety, responsive caregiving, and early learning. Infants and children, early in life, who do not receive adequate health, nutrition, early stimulation, learning opportunities, care, and protection tend to have lowered cognitive, language, and psychosocial outcomes.7,8 The longer term consequences are noted not just in lowered productivity, earnings, but also in poor physical and mental health outcomes.9 The latest evidence indicates that early deprivation creates marks on our genetic endowment that are expressed in future generations as well.10 Nurturing care is what the infant’s brain needs and depends upon for healthy development.

With the “why” and “what” defined, the question yet unanswered is “how.” The Nurturing Care Framework developed by the WHO and UNICEF, supported by the Partnership for Maternal, Newborn & Child Health (PMNCH), the ECD Action Network (ECDAN), and many other partners, provides a roadmap for action. It builds upon state-of-the-art evidence of how child development unfolds and of the effective policies and interventions that can improve early childhood development. The Framework provides an approach to promote and strengthen the Nurturing Care of young children, including guiding principle, strategic actions, and the monitoring of targets and milestones that are essential to progress.

As countries, implementing partners, and communities are adopting the nurturing care agenda to promote ECD, the most common questions being raised are about the implementation of programs in the real world and the strategies to take them to scale and make them sustainable. The challenge is significant given that more than 250 million children fail to meet their cognitive developmental potential in the first 5 years of life.11,12 In order to continue to build the momentum for young children’s development and respond to the growing demand for services, addressing “how” in a timely manner is critical.

Despite consistent evidence about the types of interventions that are effective in promoting ECD, few interventions have gone to scale, quality is variable, and access to early childhood interventions remains low especially among the most disadvantaged children living in low- and middle-income countries.13–16 There is little understanding of how best to deliver these interventions across the full range of existing systems and in the wide diversity of possible settings. In order to thus advance access to effective and quality services, greater focus on implementation research of interventions promoting ECD is necessary.

Implementation research has been widely used in advancing health interventions to scale. Implementation research is broadly used to understand the processes used in the implementation of initiatives as well as the contextual factors that affect these processes. It can consider any aspect of implementation (e.g., income and geography), the processes of implementation (e.g., home visits and multisector coordination), and the results of implementation. Implementation research is a key tool to understand context, assess performance, facilitate systems strengthening, and inform large-scale use and sustainability of interventions. The intent is to understand what, why, and how interventions
work in real-world settings and to test approaches to improve them.\textsuperscript{16}

The special issue of \textit{Ann. N.Y. Acad. Sci.} (1419: 1–271, 2018, “Implementation Research and Practice for Early Childhood Development”) presents current evidence from implementation research on the area of ECD, and identifies gaps and future research directions to advance uptake and scale-up of nurturing care interventions that promote young children’s development. Several important questions were identified, with a specific focus on two broad implementation research and practice questions. First, in relation to enhancing the quality of interventions, was what features of implementation make interventions effective? Second, how can we transition nurturing care interventions to scale and achieve a sustainable impact?

\textbf{Dimensions and components of implementation of programs for young children and families}

Two salient dimensions understanding implementation processes are improving implementation of interventions and strategies that take interventions to scale and make them sustainable. These two dimensions mutually inform and reinforce each other.

\textbf{Dimension 1: improving implementation of interventions.} The most relevant aspects of implementation that need further research and understanding are linked to the dose, delivery, demand of the programs, and measurement of results. Dosage has been identified as important for program effectiveness. Stated simply, dose is the amount of the program that is delivered.\textsuperscript{17} The conceptualization of intervention dose contains three components: duration, frequency, and intensity. Duration is the length of the full program from start to finish. Frequency is how often the program is delivered (e.g., daily, weekly, and monthly). Intensity is the third component of dose and has been defined as the strength of an intervention or how much of the intervention is delivered within each session (e.g., the time allotted to each session and who is involved in the session).

The second component linked to program effectiveness and important to understand for implementation is delivery. This element also has three subcomponents: content, service provider, and mode of delivery informed by a theory of change. Program with a clear theory of change consistent with the needs of the identified target population, context, and program environment was a key determinant in a program’s success.\textsuperscript{18,19} Content refers to the curriculum, drawing on the theory of change, and information or commodities that are delivered through the program. The service provider for an ECD intervention is key, because change among parents or caregivers, as among children, occurs as a result of interaction with the social and physical environment, especially with skillful adults who help to provide a responsive and stimulating environment. The service provider therefore needs to be well trained to deliver these important skills and messages to the adults, and in the programs that serve children to the children. Mode of delivery, for some programs group modalities are better and for other programs, in home or clinic-based individual delivery. Also, linked to this aspect is virtual delivery of services, using digital platforms.

The third component linked to program effectiveness is linked to the beneficiaries. This component is understood from two perspectives—demand and for whom is the program designed. Typically, in proof-of-concept models, beneficiaries are enrolled into program, based on specific criteria and adherence is measured to the treatment protocols. However, when programs are implemented out of these controlled settings to understand take-up and sustainability, the demand factor is central to program effectiveness. Understanding the beneficiaries, with respect to universal or more targeted approaches, and particular socioeconomic or other vulnerabilities is key to effectiveness. The target population and their specific needs with respect to characteristics of the beneficiaries and classification by risk levels but also strengths has been linked to program success.\textsuperscript{18}

Critical for implementation is setting the right metrics to measure results. The metrics need to be aligned to the program theory of change and measure results at output, outcome, and impact level for the child and the context. The measurement of child outcomes needs to be predictive of later life outcomes. Conducting evaluations of implementation process as well as impact evaluations is important for generating results to inform program improvements.

With respect to ECD interventions, implementation research is warranted on dosage, delivery, and demand in order for implementers to make informed decisions on program design.\textsuperscript{20} With the
exception of an evaluation of a home visiting service in Jamaica, few studies have investigated the short- and long-term impacts of dosage on children’s development. While there are a number of curricula available for adaptation in different contexts, evidence on common ingredients and their association with specific outcomes of children’s development has not yet been reported. Moreover, many of the studies have been conducted with providers outside of existing health, education, and social welfare, providers who are the likely candidates in scaled up programs; it will be necessary in order to design interventions from the outset with the characteristics of the provider taken into consideration (e.g., burden of work and competency gaps). Phuka and colleagues analysis of provider candidates from health and child protection sectors in Malawi is one example of such research. Also, required consideration to the continuous process of improvement is necessary during the implementation process, for example, Plan-Do-Study-Act (PDSA) methods are useful for course correction and quality enhancements. While demand for ECD services has grown, as evidenced by increasing numbers of national policies on ECD, shaping demand among communities and programs to invest in quality services is necessary for uptake and sustainable impact. In sum, learning about how ECD programs work is necessary to improve the quality and effectiveness of interventions, and to inform decisions about what models are best suited for scaling-up in different contexts. Critically, given that multiple inputs (e.g., stimulation and early learning, responsive care, nutrition, safety and security, health) are required to support children’s development, research needs to focus on the bundling of complex interventions that enable nurturing care. For example, what interventions are needed for which child outcomes, are there unintended consequences of bundling interventions on independent outcomes, and are there additive benefits to outcomes as a result of bundling interventions? Consideration of a proof-of-concept model’s relevance of scale from the outset should be examined when discussing the generalizability of ECD interventions for future uptake by sectors.

**Dimension 2: strategies for taking intervention to scale.** It is recognized that interventions for promoting ECD are not stand alone, but part of a broader framework of nurturing care that will be embedded or integrated in an existing system. Implementation strategies focus on how best to embed individual interventions within existing systems to increase coverage and scale. There are six key strategies for the integration of ECD interventions in systems.

Given the nurturing care framework and the necessity that developing potential requires multisectoral inputs, the first strategy to expanded and effective implementation is adoption of multisectoral intervention packages. This requires identification of relevant delivery platforms for effective services that can be packaged together to address the developing needs of the young child and their caregivers, which may be the bundling together of interventions to create a specific child care package or the coordination of services within and between sectors. An enabling environment for multisectoral strategies requires coordinated national policies with implementable budgeted action plans that are governed by a coordinating body at national and subnational levels.

Second, strengthening the system to deliver quality of care through a trained workforce. Frontline workers need to be adequately trained, have access to supportive supervision, and informed of intersectoral referral mechanisms to help them deliver quality services to young children and families. Required are standards and accreditation systems that build the skills and knowledge of the workforce to desired levels of performance and competency. Further, an examination of competencies is needed: what knowledge and skills are common for effective delivery across a number of interventions and what are unique to ECD?

Third, broadening data and evidence systems. A key dimension to implementation is the ability to measure change, monitor progress, and use the data and evidence to inform improvements. This requires both the measurement metrics as indicated earlier and also the ability of existing information systems to include indicators on ECD as part of routine monitoring and reporting. Moreover, strategies to use these data to inform program quality improvements must be planned.

Fourth, costing and finance for sustainable and scaled up program delivery. Program implementation should be documented through costing and expenditure monitoring. Public finance strategies are key for scale-up of ECD.
Fifth, advocacy and communication strategies are important for building demand for services. Increasing knowledge of the general public, especially parents and caregivers, winning the support of decision makers, and private sector partners are important for generating demand and raising the visibility of the importance of early childhood. A key strategy is community-based communication and messages to caregivers that support their caregiving and provide the required information for creating nurturing environments.

Finally, the sixth strategy is to differentiate strategies based on country context. Implementation contexts vary from emergency and fragility to low-, medium-, and high-capacity condition. In emergency situations due to the exceptional burden on existing resources, the implementation strategies focus on surge capacity and delivering the essential interventions compared with low-capacity conditions, where the focus is on strengthening governance and accountability for services alongside building capacity of frontline workers. This differentiation can also occur within country, subnationally, with implications for prioritization of implementation strategies.

These scale-up implementation issues may be common across a number of early childhood interventions. The ECD agenda and the nurturing care framework present an opportunity to build evidence around holistic programs of care for children recognizing all outcomes (e.g., learning, safety and protection, nutritional well-being, mental health, and physical health) and are necessary for children to thrive.

The Ann. N.Y. Acad. Sci. special issue: new evidence and emerging issues

Peters and colleagues describe a framework for implementation research principles, outcomes, and processes. A modified definition of implementation research is the scientific inquiry into questions concerning activities undertaken as planned with the intention of producing an effect, which when applied to ECD can be on policies, programs, or individual practices (interventions) promote child development. Implementation variables often include acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost, coverage, and sustainability—all can serve as indicators of the success of implementation. In this series, the papers encompassed contexts affecting implementation, adaption and feasibility testing of programs for scales, documenting processes of implementation, evaluations of fidelity, description of how interventions are introduced into systems, and implications for scale and sustainability.

Implementation research evidence on dimension 1: improving implementation of interventions

The seven case examples of implementation of nurturing care programs, comprising early learning, nutrition, safety and protection, health, and responsive caregiving interventions, highlight the breadth of interventions that can potentially promote children’s development and the range of intervention settings, including Australia, Brazil, Colombia, Jamaica, Malawi, Pakistan, South Africa, and Zimbabwe, that will influence program planning with respect to dosage, delivery, and demand. Smith and colleagues describe their implementation evaluation (or process evaluation) of the Reach Up program in Brazil and Zimbabwe. Reach Up curriculum is rooted in a home visiting program originally developed in Jamaica and implemented as a weekly home visiting service; however, while efficacious to achieving beneficial ECD outcomes, this dosage was not feasible in the new settings. Preimplementation adaptation work informed choices made to on how to culturally adapt curriculum content and modify dosage. Additionally, the implementation evaluation conducted at the end of the research further informed modifications that would be needed in scaling-up Reach Up in Brazil and Zimbabwe. In a parenting program in Malawi and in a school-based program in Jamaica, intervention adaptation work was combined with feasibility studies using the United Kingdom’s Medical Research Council framework for developing complex interventions allowing for an iterative process of intervention development or adaptation, piloting, and modifications to develop a feasible model of implementation in a specific context. Findings from Malawi and Jamaica underscore that effective and feasible adaption of interventions for new settings requires an understanding of the core ingredients of interventions that make them effective as well as participatory approaches with implementing partners to optimize local relevance and feasibility, and piloting to
understand how implementation decisions might influence desired outcomes. As noted in the violence prevention in schools work in Jamaica, the core ingredients are not only the content of curriculum messages, advice, and activities but also the behavior change techniques that support delivery which should not be overlooked in adaptation of curricula. Understanding the context for adaption is underscored by Murphy and colleagues who describe the urgent need for implementation of ECD support services in humanitarian contexts where evidence building must be responsive to rapidly changing situations and embedded in practice partnerships.28

Retaining fidelity to a program is considered a critical feature in achieving desired impacts; however, fidelity to intended program designs has not been frequently reported in nurturing care interventions.20 Goldfeld and colleagues report three important factors related to understanding variance in effectiveness of sustained nurse home visiting programs and how these were addressed in the right@home program: (1) inclusion of logic or a theory of change that appropriately aligns program goals, inputs, and outcomes measured; (2) fidelity to core ingredients of program; and (3) quality improvements that enable modification and embedment in a system.32 The lessons learned from this paper draw attention to the importance of both outcome and implementation evaluations that are designed to measure what the curriculum is intended to influence and to inform quality improvement decisions with implementation partners. Program implementation is dynamic and changes over time influenced by context, complex systems, and the relationship between providers and beneficiaries. The tension between fidelity and flexibility to improve quality requires knowledge of the theories, ingredients, and contextual influences (e.g., variation of risk exposures in families and characteristics of systems) that make a program effective and how these might be achieved through flexible pathways that allow for modification and adaptation. The implications for program evaluation are designing implementation evaluations that allow information on program quality to be collected over time and to design impact evaluations with outcome measures that align with the theory of change or logic model and with realistic expectations of what might be achievable in a specified duration of implementation.

The value of an implementation evaluation is dependent upon the how data are used to inform decisions about quality improvements. Data from program monitoring in programs and implementation evaluations need to be made available in a timely manner to providers as demonstrated in the large-scale implementation of an early childhood education program in Colombia (e.g., the aeioTU program) when early data on process quality enabled course corrections to be made to support the skills development of teachers.25 The experience of teachers enacting the curriculum and trainings that responded to the information in the early data improved quality. In Pakistan and South Africa,29 supportive supervision and feedback loops were identified as key ingredients that facilitated quality improvements informed by monitoring of providers. The characteristics of the provider, identification and capacity development activities to build competencies to effectively deliver nurturing care interventions, and strategies that supported building relationships of trust with caregiver and children were recognized across the seven case studies in this series. Measuring skills of providers and their relationships with caregivers and young children can serve to understand implementation quality and effectiveness.

All program evaluations in this series concluded an acceptance of interventions by program recipients. Demand for nurturing care interventions that promote ECD is shaped by caregivers’ experiences of services. Caregivers value interventions that support their young children’s well-being and education, but intentional effort to shape demand is also a factor that influences quality improvements as demonstrated in Jain and colleagues work with the affordable preschool sector in India. Strategies that enabled parents and early educators to see the learning benefits of child-centered approaches rather than traditional rote learning pedagogy enabled scaling-up of quality improvement interventions in preschools. More studies on dimensions of implementation and their components are needed in the field of nurturing care. These papers represent interventions researched within systems (both in government systems and in services provided by nongovernment organizations), which is critical for guiding scaling-up services.
Implementation research evidence on dimension 2: strategies for taking interventions to scale

The components of taking interventions to scale described under dimension 2 require not only evidence-based models, but also leadership, adequate workforces, effective partnerships with a range of implementation stakeholders, financing, and governance as shown in the framework reported by Nores and Fernandez drawing on lessons learned from scaling-up in the health and education sectors. However, few studies have focused on these components. Cost data about nurturing interventions that might inform financial planning for programs at scale are limited, but employing standardized costing tools outlined by Gustafsson-Wright and Boggild-Jones provides a way forward. Radner and colleagues reviewed a portfolio of studies funded by the Saving Brains program, Grand Challenges Canada and identify a series of lessons that support evidence building for scale and sustainability including strong entrepreneurial leadership, rigorous measurement and active use of data in support of adaptive learning, and champions acting at subnational levels. These findings underscore the need for implementation partnerships between policy makers, program implementers, communities, and researchers from the outset.

If the evidence in these papers is to be built upon, greater attention to reporting implementation processes is needed. Too few evaluations on implementation are disseminated and there is great variation in constructs. A recommendation from this series is to systematically report implementation evaluations of nurturing care interventions. Yousafzai and colleagues describe guidelines developed from an expert e-Delphi process provide an approach to systematically report program implementation that might facilitate share learning. In recent years, attention on measurement of ECD outcomes has resulted in the development of a number of tools and guidance on measurement of outcomes. Aboud and Prado present guidance on monitoring and evaluating implementation processes for interventions that promote ECD reinforcing the need for rigorous program measurement. Aboud and colleagues describe key research areas for strengthening evidence on quality and program effectiveness for scale including systemic adaptation to context and program, reporting implementation evaluations, and adopting mixed method approaches and quality improvement studies in evaluating implementation. Critically to advance scale of nurturing care, greater attention on transitioning small programs to systems and research on integrated child programs is needed. Partnerships, multidisciplinary research, and learning lessons from other sectoral interventions are essential components of the process.

What lessons can be learned from implementation evidence in other interventions?

There are lessons learned from the scale-up of parallel health, nutrition, and education programs, which are applicable to the scale-up of ECD programs. Given the broad scope of ECD programs, it is important to first define what we are trying to scale. Second, it is important to define what we mean by scale, and so we will focus on lessons required to take a pilot program to subnational or national impact, within a single country. Scale in this manner is broader than just coverage, it also includes depth (or quality), sustainability, and shift in ownership (from an external to internal program). This section primarily draws on experience from scaling-up antenatal care (ANC), the integrated management of childhood illness (IMCI), and the Alive and Thrive nutrition initiative, with reference to other programs where relevant.

Lessons learned for dimension 1: improving implementation of interventions for effectiveness

When considering the service provider, we can draw lessons from other programs in how to recruit, train, supervise, and incentivize healthcare workers. For example, innovative training methods to strengthen basic emergency obstetric and newborn care have moved away from a traditional 2-week offsite intensive training program to low-dose high-frequency training. This involves shorter onsite training (in the facility where people work), coupled with high-frequency mentorship, peer practice, and text message reminders to healthcare workers. In Ghana, low-dose high-frequency training of midwives and nurses improved health outcomes (reducing early newborn mortality by 48% in the first 1–6 months following training), at cost per disability-adjusted life year (DALY) of $53.
health systems, there is an early body of evidence suggesting that emphasis on career possibilities in community health worker (CHW) recruitment, supervision that follows up with underperforming CHWs, tailored incentives for CHWs, and use of mobile phone-based procedural guidance can improve CHW quality of care. This body of research remains nascent, and caveats must be noted. In particular, CHWs have a heterogeneous range of experience, supervision, and training, suggesting the external validity of research may be limited.

With respect to strengthening demand for ECD programs, we can learn lessons from the Alive and Thrive program. From the outset, this program was focused on understanding how to deliver infant and young child feeding (including breastfeeding and complementary feeding) at scale, and testing across three diverse country contexts—Bangladesh, Ethiopia, and Vietnam. On the demand side, teams used deep national situational analyses to identify country-specific barriers at a household, community, and institutional level, to breastfeeding and complementary feeding behaviors. Communication strategies were multipronged, including print materials for front-line workers, “leave behind” materials for mothers and families, community meetings (e.g., food demonstrations), and mass media campaigns. In addition, the Alive and Thrive program did not target mothers alone, but identified critical secondary audiences—including fathers, grandmothers, religious leaders, and other community elders.

As coverage of ECD programs scales up, it is critical to maintain focus on quality, as also discussed earlier on the elements of improving implementation of interventions. Quality improvement in healthcare often uses a PDSA cycle—a pragmatic, small-scale iterative approach for testing changes in complex systems, often led by frontline workers. Most research assessing the impact of PDSA cycles for quality improvement has been conducted in high-income settings, and shows that there is evidence of impact on health outcomes, but variable fidelity to process. Research has shown that similar quality improvement processes can improve maternal and child health processes and outcomes in Ghana—including an increase in early ANC attendance from 37% to 48%.

As the ECD community seeks to develop programmatic guidelines for interventions, we can learn from the structure and process to develop WHO recommendations on ANC for a positive pregnancy experience, also providing methodological recommendations for conducting implementation research. The goal was not to define a single, universal ANC process, but rather to develop a picture of globally recommended guidance, and context-specific guidance. For example, the 2016 guidelines define a recommended dosage for ANC care—recently shifted from four visits to eight visits, based on available evidence. Some elements of ANC content are globally recommended (e.g., asking all women about tobacco use and substance use); whereas some content elements are context specific (e.g., enquiry about intimate partner violence is only recommended when there is the capacity to provide a supportive response). Similarly, elements related to the service provider are also context specific, with guidance for midwife-led continuity of care from ANC to intrapartum and postpartum care, only in countries which have sufficient midwife capacity. The guidelines are not static and are open to the possibility of further adaptation and learning (e.g., group ANC is recommended in the context of rigorous research).

**Lessons learned for dimension 2: taking interventions to scale**

Qualitative research suggests that simple, scientifically robust programs can be scaled up, in the context of strong leadership, engagement with local implementers, when run in a phased manner. As noted by Milagros and Fernandez, taking interventions to scale typically requires integration into existing delivery platforms. There remains limited evidence understanding how best to do this, particularly in the context of a technical capacity gap in national planning and implementing bodies in many high burden countries.

This gap in delivery capacity has been demonstrated in other parallel programs, for example, the IMCI strategy, which was launched by the WHO in 1996. A multicountry evaluation conducted in Bangladesh, Brazil, Peru, Tanzania, and Uganda found that the WHO expected IMCI would be implemented fully regardless of the strength of the health system, and this assumption did not hold true. As the authors state: “Countries that had the mortality level and cause profile that most required IMCI often lacked the basic systems infrastructure and support to deliver it.”
The Alive & Thrive nutrition program (aliveandthrive.org) also noted this gap in national delivery capacity. While they attempted to integrate the intervention into existing maternal, newborn, and child health delivery platforms, the implementers noted that “rapid geographic expansion places additional burdens on service delivery systems.” Like Gladstone and colleagues’ work to introduce care for child development in Malawi, the Alive & Thrive implementers assessed delivery capacity in each country when planning implementation, including an assessment of human resource capacity, and ability of service delivery platform to scale. Using the WHO’s health system building blocks model, they identified country-specific needs in: (1) service delivery—specifically guidelines and protocols; (2) health workforce—specifically training and performance support at all levels, from CHWs to subnational managers and national program organizers; and (3) health information systems—specifically monitoring and evaluation for program improvement. Alive & Thrives infant and young child feeding package did not include nutrition interventions alone, but also included an emphasis on targeted elements of systems strengthening, with deliberate investments to strengthen the broader health system capacity.

Identifying and strategically strengthening gaps in service delivery capacity raises programmatic costs, threatening financial sustainability of a program. As recommended by Gustafsson-Wright and Bogglid-Jones, systematically gathering comprehensive costing data for ECD interventions will allow for more direct comparison between programs and an assessment of a comprehensive return on investment (ROI). This kind of ROI analysis has been developed for health interventions, and forms an important part of global and national advocacy. Two examples are the Lancet Commission on investing in health and the 2015 WHO report “Strengthening Primary Health Care through Community Health Workers: Investment Case and Financing Recommendations,” which found that investment in CHWs can result in an economic return of 10:1.

A final note from the Alive & Thrive program is the importance of early, theory-driven process evaluation. Alive & Thrive evaluators developed detailed project implementation plans (PIPs) for each country, in collaboration with the implementers. These PIPs were similar to theories of change and outlined impact pathways linking interventions to desired outcomes. Critically, the Alive & Thrive PIPs were complex, interconnected, and nonlinear, articulating multiple potential pathways to impact. The mixed methods implementation or process evaluation was linked to these PIPs, using country-specific process metrics and intermediate outcomes that emerged from the complex impact pathways.

This process was high cost, requiring close collaboration between implementers and evaluators from day 1 but has enabled the generation of a large body of implementation evidence on how best to deliver nutrition programming at scale.

Conclusions

As we look toward strengthening implementation practice, there are key areas that need to be informed by research. While there is a lot we already know, there needs to be a systematic process of inquiry that identifies and draws attention to the gaps in knowledge and an understanding of why these areas have not been addressed. In areas we have made progress, such as community delivery and building capacity, there are still gaps in evidence that are handicapping effectiveness and scale up. For example, we know more about public and community delivery than about private (for fee) services. More attention needs to be paid to the role of private sector in the provision of services and also shaping demand for services. Also, understanding that often private and public are not separate, implementation research also needs to investigate local or community-level partnerships, for example, public–private, that enable the scale up of services. Another area where we have some understanding is in capacity building for delivery of services. The papers address training and capacity building as key foci of implementation; however, we know more about the one-to-one service delivery (e.g., service provider to caregiver) and less about service providers to a group of beneficiaries. What is the type of training and supervision that will address that delivery modality and what can we learn from adult education services?

There are other areas of implementation where the evidence is quite sparse and knowledge is emerging. For example, we know very little about how to shape demand which occurs at several levels from
Box 1.

Recommendations from the *Ann. N.Y. Acad. Sci.* special issue

- Transparent reporting of implementation research
- Improved use of existing data
- Implementation research questions (e.g., action research and implementation tools)
- Partnerships for implementation research
- Funding of communication, knowledge hubs, and advocacy
- Technical expertise for local research leadership
- Innovation in delivery of multisectoral interventions
- Better alignment between supply and demand

the beneficiaries to the policy makers. While the former requires compelling communication strategies to demonstrate “what quality looks like” to systematic advocacy approaches at the level of decision makers. Other areas where the implementation research agenda needs to be bolstered are in costing and governance of finance for taking programs to scale. There is a need for systematic investigation in public finance, cost to expenditure data, and understanding of effective models of resource allocation. Finally and key to implementation is developing differentiated response strategies based on the geography and context for deliver. Our review demonstrated that there are more data from Latin America on these varied contexts; however, from other regions, this information is thin and even more limited from implementation in humanitarian contexts.

As has been presented in the Nurturing Care Framework, we now know that the developing child and brain need and expect in order to achieve their potential. This special issue provides evidence to operationalize that framework, by presenting a series of papers to strengthen interventions and strategies for embedding them within systems (Box 1). This special issue makes significant strides in unpacking the “how” of implementation; however, greater efforts are needed to operationalize the multisectoral delivery through evidence-based practice and differentiated by delivery.

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Competing interests

The authors declare no competing interests.

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