

Applying the Developmental Systems Approach to Inclusive Community-Based Early Intervention Programs

Process and Practice

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A developmentally oriented framework is presented designed to establish or enhance the quality of inclusive community-based early intervention systems. This conceptually and empirically integrated developmental approach supports a comprehensive family-centered model. Outlined is a process that coordinates children's goals with family priorities, identifies developmental pathways most likely to influence those goals, guides the selection of objectives and intervention activities, and provides an approach for evaluation and problem solving. Principles of relationships, comprehensiveness, and continuity are central to this framework and address the general problem of "what to implement" in inclusive community-based early childhood programs. **Key words:** *Developmental Systems Approach, early intervention process, integrated practice model*

THE DEVELOPMENTAL SYSTEMS APPROACH (DSA) is designed to serve as a framework for the establishment and refinement of inclusive community-based early intervention (EI) systems in support of children at risk for or with established develop-

mental delays or disabilities and their families (Guralnick, 2019a). Early intervention principles of this family-centered approach emphasize the significance of forming relationships among all those involved, the importance of designing interventions that are comprehensive, and the development of procedures that maintain continuity of intervention across the early childhood period. These DSA principles are embedded within an overarching framework that integrates developmental science, knowledge of risk and disability, and intervention science, all intended to work in harmony to create a practice model.

Translating broad principles and a guiding framework such as the DSA into actual practice in inclusive community-based programs, however, constitutes an extraordinary challenge. The purpose of this article is to provide a process for doing so, emphasizing how communities can select and implement conceptually sound and evidence-based interventions within this framework for the diverse groups of children and families that constitute all communities. As described later, the

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complexity of the numerous experiential influences on children's social and cognitive development is recognized by considering the mutual and reciprocal patterns of influence on children's development of specific components of the DSA for which substantial evidence exists at the level of the child, the level of family patterns of interaction (FPI), and the level of family resources (FR). Each of the components of the DSA (see later) serves as a developmental pathway that interacts with and influences components within each of the three levels as well as components across levels. It is this highly interactive system of influences that guides the process associated with the selection and implementation of effective EI practices.

In anticipation of subsequent discussions, the process of applying the DSA in inclusive community-based settings is designed to first assist EI teams and families to identify children's goals consistent with family priorities, select components (developmental pathways) at the DSA's level of FPI that are most likely to be of value in supporting child development in relation to those child goals, identify and organize evidence-based practices that are consistent with high-priority DSA components in the form of objectives and intervention activities, select strategies for evaluating short- and long-term outcomes, and develop methods for problem solving when concerns about progress emerge.

BRIEF OVERVIEW OF DSA LEVELS

Central to the DSA are those components that constitute the level of FPI (see Figure 1). Family patterns of interaction, the most proximal of influences affecting the level of the child, have a strong evidence base and are described in detail elsewhere (Guralnick, 2001, 2005a, 2011). Pathways associated with FPI influence the level of the child in many ways including facilitating the integration of the components of children's developmental resources (e.g., cognition, language) and organizational processes (e.g., executive function, emotion regulation, social cognition)

as children carry out their goals in various contexts and settings. This integration generates the functional outcomes associated with children's social and cognitive competence. As discussed later, the specific influences of FPI constitute the core of EI and encompass the three domains of parent-child transactions, family-orchestrated child experiences, and child health and safety as organized and provided by the family.

Family patterns of interaction can certainly be influenced by the developmental and behavioral patterns of the children themselves (social and cognitive competence) displayed in a variety of typical situations. Although appropriate adjustments by families in the components of FPI frequently occur to these child-specific patterns (see dashed line arrow in Figure 1), child influences on FPI (see solid arrows from level of the child in Figure 1) often present significant challenges (stressors) to the provision of optimal FPIs for children who are vulnerable to developmental problems due to biological and other constraints. As such, attention within this systems framework must be given to possible child patterns that can create stressors that adversely affect FPI. The complexity of the adjustment process at the level of FPI and the EI efforts to support this process are considerable, especially given the moderating influences of child characteristics (developmental resources, organizational processes) that generate extensive variability in child social and cognitive competence (see dotted line arrow in Figure 1). As our understanding of child characteristics that moderate EI improves, so will the EI field's ability to problem solve and personalize our intervention strategies.

In addition to influences by displays of children's social and cognitive competence in everyday situations, FPIs are also affected by FR. Resources at this third level of the DSA include the personal characteristics of parents or other caregivers (e.g., their mental health, coping styles) as well as material resources that are available (e.g., financial resources, social supports). Many components of FR may be compromised at the time of a child's birth

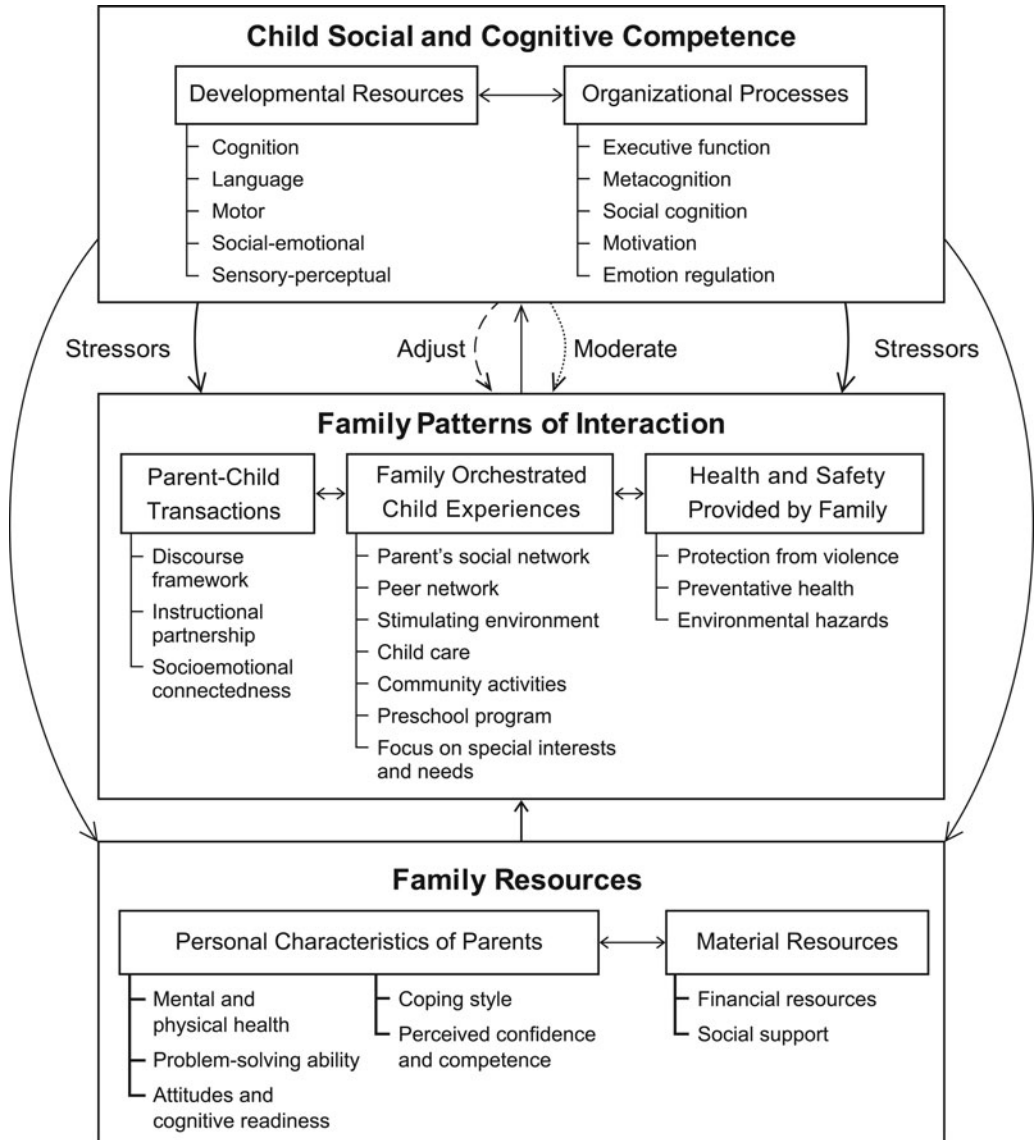


Figure 1. The Developmental Systems Approach illustrating levels, components, and relationships. From “Why Early Intervention Works: A Systems Perspective,” by M. J. Guralnick, 2011, *Infants & Young Children*, 24, pp. 6–28. Adapted with permission.

(i.e., serve as risk factors), thereby creating child vulnerability that also operates primarily through adverse influences on FPI (see Figure 1; Evans, Li, & Whipple, 2013). However, even in the absence of initial family risk factors, child social and cognitive competence patterns emerging over time caused by any combination of biological or environmental

factors can create stressors (e.g., generate substantial financial pressures) acting on the various components of FR as well as FPI (Lugo-Gil & Tamis-LeMonda, 2008).

Accordingly, as represented in Figure 1, the DSA constitutes a multilevel system of risk and protective factors each interacting within and across the DSA’s three levels to

influence children's development throughout the early childhood period. It is certainly the case that many other potential developmental mechanisms are likely to produce complex patterns of influence that remain to be determined by future research. Nevertheless, sufficient evidence is available in support of the importance of the developmental pathways described earlier as part of a system influencing the development of all children (Guralnick, 2019a). Within this systems framework, the effectiveness of EI is determined by its ability to maximize the quality of FPI for children and their families, ideally carried out in inclusive community-based programs.

THE PROCESS

Given the diversity of child and family characteristics as well as family environments, how can the EI team (which includes parents as full partners) develop strategies that will most effectively optimize the 13 components of FPI in the context of inclusive community-based EI systems? The process outlined later is designed to enable the team to first establish broad child goals as prioritized by parents and then develop short-term objectives and intervention activities for those FPI components that are linked to each prioritized child goal. Accordingly, selecting intervention activities in the context of child goals consistent with the DSA's developmental mechanisms of influence and that have a substantial evidence base constitutes a process guiding "what to implement."

As a consequence of this process, team members are provided with a common conceptual and evidence framework and a correspondingly common language to facilitate effective communication. Moreover, this process provides the overall structure for developing specific intervention plans required by most countries with well-developed systems of EI. A prime example is the Individualized Family Service Plan and the Individualized Education Program required by PL 99-457 in the United States (Education of the Handicapped Act Amendments of 1986). Taken to-

gether, the intervention plan is intended to provide a family-oriented vision that employs the DSA's principles of relationships, comprehensiveness, and continuity across the early childhood period guided by a firm understanding of the developmental mechanisms that influence children's development.

EARLY MEETINGS

Following assessments to qualify for eligibility for EI including assessments by community professionals that may have occurred as a consequence of early identified concerns about a child's development, initial meetings between an EI service coordinator or other professionals and the family are primarily designed to gather information and begin to form a relationship with family members. The formation of a thoughtful professional-family relationship is, of course, critical. Fortunately, many of the relationship principles and strategies derived from the field of infant mental health can be especially useful for EI professionals (see Foley & Hochman, 2006).

Gaining information early on about a family's configuration, daily schedules, job status, and general interests will enable more productive and comfortable subsequent discussions about their child's development and related behavioral patterns. These early meetings will also facilitate the gathering of more detailed information about FR and their potential influence on the selection and implementation of specific objectives and intervention activities (see later discussion regarding the influence of FR). Subsequent but still preliminary meetings would include discussions of existing child assessment information and how a family's activities and routines are already or might be affected by their child's developmental and behavioral patterns in various contexts. Further child-specific assessments may be recommended and arranged, including parent reports and more formal testing of the child's current level of social and cognitive competence. This would include functional assessments to identify behavioral patterns evident in settings and situations that frequently

occur. A wealth of assessment tools are available capturing a wide range of childrens' abilities to assist in intervention program planning (Guralnick, 2005b; McConnell & Rahn, 2016).

Consistent with recommended outcomes for families (Bailey et al., 2006; Bailey, Hebbeler, Olmsted, Raspa, & Bruder, 2008), also discussed in these early meetings, are expectations about EI services as articulated in relevant laws, the importance of advocating on behalf of their child, how the EI team operates within the family context, the way community services are organized, and the availability of services in the local community. It is these services and supports as well as others that are to be integrated into the plan designed to enhance components of FPI.

CHILD DEVELOPMENT GOALS

Once the early information gathering, information exchange, and initial relationship building are complete, the process shifts to the identification of potential broad child goals in the context of family priorities. It is this process that will ultimately lead to short-term objectives and intervention activities focusing on those components of FPI that are connected to selected child goals. Moreover, discussions of broad child goals and family priorities at this stage of team interaction help further build relationships between families and EI professionals and emphasize the family-centered nature of EI (Dunst, 2017).

The broadly conceptualized child goals listed next are central to discussions of children's developmental patterns and reflect themes found in developmental assessment protocols. For each goal, parents are encouraged to elaborate upon and generate a narrative of their child's developmental and behavioral patterns including current status and expectations. Child goals presented for discussion are as follows:

- Participating in family activities and routines
- Exploring the environment independently and gaining information
- Communicating for social purposes
- Playing independently and constructively
- Developing self-help skills
- Playing jointly with others and in a productive manner
- Communicating needs clearly
- Engaging in efforts with others to solve problems and acquire knowledge
- Responding to requests to start, stop, or modify activities

These goals are certainly not exhaustive and overlap to some extent, but each is important in its own right. Discussions of broad child goals and priorities as expressed by families help organize the process of identifying specific objectives and intervention activities. It further provides an opportunity to discuss examples of children's development and behavior for each of these goals in the context of daily activities (McWilliam, 2010). As a consequence, more concrete information about a child's strengths and concerns is obtained in an informal, relaxed manner. It also makes apparent that EI efforts are designed to foster child outcomes that are functional, as goals represent child social and cognitive competence expressed in common and highly valued family activities.

FPI: OBJECTIVES AND INTERVENTION ACTIVITIES

Following identification and discussion of three to four high-priority child goals, the intervention team introduces those FPI that are closely associated with supporting identified child goals. This critical phase of the EI process provides the conceptual framework that is linked to influencing child goals (i.e., established FPI developmental pathways capable of influencing child social and cognitive competence compatible with selected child goals). Based on this information, the team designs an integrated array of short-term objectives and intervention activities that constitute the initial EI program. Although the intervention itself is designed to enhance the quality of selected components of FPI in the context of family priorities identified in discussions of child goals, the specific intervention

activities and settings in which intervention activities are to take place must be organized by considering the child's developmental level, behavioral patterns, and special interests, as well as any other factors that would enhance FPI. As indicated in Figure 1, each FPI component is embedded within the three domains of parent-child transactions, family-orchestrated child experiences, and child health and safety as provided by the family. Ideally, objectives and corresponding intervention activities selected by the team consistent with these pathways will have a strong evidence base as supported by intervention science.

Accordingly, within the DSA framework, the team's initial focus is not directly on child developmental milestones or skills but rather on the details of the components of FPI that are relevant to broad child goals and to the more specific circumstances and contexts identified by families. This initial focus on the quality of FPI is designed to emphasize the developmental influences at work that will form the core of the intervention team's activities and to further orient all involved to a problem-solving process that is consistent with the DSA principles of relationships, comprehensiveness, and continuity. By carefully selecting FPI components relevant to high-priority child goals, a common language and common set of concepts become central to EI team discussions and continue to further the development of a meaningful partnership between families and professionals.

A PROCESS EXAMPLE

As an example, family priorities for child goals of "communicating needs clearly" and "communicating for social purposes" would suggest that one intervention approach should be designed to promote a discourse framework. This is a developmental pathway that is part of the parent-child transaction domain of FPI. Following assessments discussed later, it is at this point that specific objectives intended to promote a discourse framework would be developed, with corresponding in-

tervention activities to be carried out within typical family activities and settings. Families would determine the contexts (e.g., meals, playtime) and identify as many key settings or circumstances as possible that are most likely to prompt children to communicate needs and to encourage communication for social purposes in order to maximize engagement. Objectives and intervention activities designed to promote a discourse framework also would be guided by children's developmental level and related child characteristics, including their special interests, strengths, and constraints.

More specifically, extensive evidence is available for a wide range of vulnerable groups indicating that a discourse framework can be promoted by ensuring parent responsibility to child cues and rapid responding contingent upon the child's behavior, maintaining the child's interest in activities by following the child's lead, verbally elaborating on the topic at hand, and maximizing balanced exchanges, among other strategies that can be integrated within a specific context (Landry, Smith, Swank, & Guttentag, 2008; Shire, Gulsrud, & Kasari, 2016; Trivette, 2003). Objectives would be developed for this cluster of discourse-related patterns in identified contexts focusing on encouraging and supporting children's communication of needs and for social purposes. Ideally, contexts would be carefully mapped and records maintained to ensure opportunities for frequent engagement in intervention activities.

Adult learning models utilizing sequences of teach—model—coach—review and variations of coaching techniques constitute valuable EI discourse-relevant strategies (Kemp & Turnbull, 2014; Wright & Kaiser, 2017). Early intervention professionals provide immediate feedback based on observations of parent-child interactions as well as through ongoing consultations often using video to capture interactions in the selected contexts and specific family activities (Poslawsky et al., 2015; Siller, Hutman, & Sigman, 2013). Strategies, including those designed to foster a discourse framework, are often implemented in

a curriculum format with manualized protocols and corresponding outcome measures with time-specific expectations. Particularly at early stages, many of these intervention activities promote easily measured relationship resources, that is, parent sensitive responsiveness, positive affect, and engagement (see Guralnick, 2019a). The long-term consequence of intervention activities is intended to build on these relationship resources to strengthen deeper relationships in the form of a discourse framework that promotes identified child goals.

EVALUATION

Screening and assessment tools (including those for a discourse framework) are available or can be modified to evaluate the three relationship processes directly (e.g., Biringen, Fidler, Barrett, & Kubicek, 2005). Evaluations specific to a discourse framework, in particular, can benefit from analyses of recordings of parent-child activities commonly used in research studies to capture dyadic interactions. In the absence of normative values for these dyadic measures, however, it is the responsibility of the entire team to specify expectations for discourse framework measures and have them reflected in the objectives. Periodic assessments will determine the frequency and intensity of corresponding intervention activities needed. It is also important to supplement the measurement of objectives associated with supporting a discourse framework through intervention activities with direct measures of child outcomes. These could be derived from the dyadic interactions observed or based on measures taken in other naturalistic settings. Standardized measures related to communication in this case could also be utilized to provide a different perspective of the child's communicative development.

Of importance, in some instances, a lack of correspondence will exist between enhancements in FPI quality that occur and assessed child outcomes. Such a lack of correspondence is not uncommon and may reflect the need for more time for children to practice, integrate, and consolidate the specific

information and interaction patterns generated through enhanced FPI quality. It could also be due to the influence of child-level organizational processes such as motivation or emotion regulation that constrain the display of competencies in both formal testing and less familiar naturalistic situations. This highlights once again that EI constitutes a problem-solving process ideally conducted with recognition of the systems nature of the complex interactions that exist among the components at all the levels illustrated in Figure 1.

As noted, initial assessments of FPI components as part of this process are likely to reveal that many families do already provide a high-quality discourse framework. In these instances, the EI professional's role is to continue to emphasize the importance of these and other parent-child transactions and the opportunities that exist in numerous well-defined contexts. Nevertheless, periodic assessments of the quality of a discourse framework and formally assessed child communicative development over time may reveal subsequent concerns (stressors), as it is quite common for problems to arise as development proceeds and parents and children encounter challenging circumstances and tasks. Clearly, continuity of EI is essential even if minimal involvement of the team is required during certain developmental periods. Various risk factors at the level of the child and the level of FR may be useful in alerting the EI team as to which subgroups of children or families are likely to require more intensive involvement or modification of intervention activities over time to enhance the quality of FPI.

COMPREHENSIVENESS

Following the DSA principle of comprehensiveness, child goals related to "communicating needs clearly" and "communicating for social purposes" can and should be further supported by and coordinated with other FPI components. Enlisting FPI components related to family-orchestrated child experiences is most common (see Figure 1). These DSA components might include a focus on a child's special needs, resulting in objectives

and intervention activities carried out in a clinical setting to improve articulation or to reinforce parent-child discourse objectives. In many instances, a combination of parent-child discourse objectives and intervention activities along with clinician objectives and interventions can be most effective (e.g., Kaiser & Roberts, 2013). Similarly, coordinating the DSA parent-child discourse framework objectives with child care objectives or preschool program objectives to encourage teacher-child or caregiver-child transactions that correspond with parent-child transactions, particularly in connection with a discourse framework, provides a level of consistency and comprehensiveness that further contributes to children's social and cognitive competence (Dickinson & Porche, 2011; Spilt, Koomen, & Harrison, 2015).

The EI team can also help identify quality inclusive programs, as benefits to language and communication and to social interaction in these settings have been well documented (Guralnick & Bruder, 2016; Justice, Logan, Lin, & Kaderavek, 2014; Phillips & Meloy, 2012). Advocacy on the part of families supported by the EI team may be required to find the most appropriate local child care or preschool setting. A key point here is that each of the 13 FPI components may be relevant to varying degrees to the child goals selected and should be considered in the context of short- and long-term plans to ensure both comprehensiveness and continuity over time. Admittedly, these team efforts to build a conceptually coherent and evidence-based comprehensive plan will require considerable coordination, with resources dependent on many service sectors. As child development is a consequence of a system of linked influences, successful interventions associated with each of the FPI generate a cumulative benefit.

FAMILY RESOURCES

Early intervention requires a constant series of minor and major adaptations as the process moves forward. On occasion, difficulties

can be anticipated on the basis of etiologic-specific information (Iarocci & Petrill, 2012). Additional information gathered at the level of the child can also be utilized to adjust interventions for various components of FPI. Importantly, adjustments in FPI at any time may also be required on the basis of information obtained from components at the level of FR. Accordingly, before establishing FPI-specific objectives and intervention activities, it is advisable to determine risk and protective factors associated with FR.

The quality of components of the personal characteristics of the parents and their material resources noted in Figure 1 can substantially influence the ability of families to optimize many of the components of FPI. Preexisting risk factors at the level of the family or stressors to FR created by their child's characteristics will help determine which objectives and intervention activities are feasible at the outset. Conversations about FR can be difficult and require a high level of sensitivity on the part of other team members, especially of the service coordinator who will often take on this responsibility. Focusing on child goals initially as noted previously, along with earlier conversations about the family configuration and aspirations, can provide a sense for both a family's strengths and constraints and also help further strengthen the parent-professional relationship.

Utilizing formal assessments for many of the components of FR provides a more structured basis to determine risk and protective factors at this level (see Kelly, Booth-LaForce, & Spieker, 2005). Many such measures are available including those that rely on parent self-report. Interventions directly addressing family risk factors, often carried out through referrals to and consultations with community services, can strengthen families and help minimize any adverse influences on FPI. Informational materials and discussions of factors governing child development and consideration of other strategies specific to areas of concern identified, such as increased parental stress (Orsmond, 2005), can parallel the broader intervention program focusing on components

at the level of FPI. Of note, the need for community-based services for children at risk for developmental problems due to family resource risk factors (environmental risk), particularly characterized by poverty and instability in its many forms, continues to constitute an extraordinary challenge (Reynolds, Ou, Mondì, & Giovanelli, 2019). Community-based EI approaches consistent with the DSA to address this complex problem have been proposed (Guralnick, 2013, 2019a).

WHAT TO IMPLEMENT IN INCLUSIVE COMMUNITY-BASED PROGRAMS

Given the vast array of comprehensive or focused EI programs and curricula as well as the numerous specific strategies and corresponding intervention activities that are available, a key question is what should be implemented in the ever-increasing number of inclusive community-based programs to generate individualized programs for children and families. Indeed, EI research has been extraordinarily productive, generating numerous interventions with differing theories of change, degrees of specificity, instructional paradigms, and expected range of application to diverse populations. Many have been designed for specific groups of children whether defined categorically or etiologically (e.g., biological risk, autism spectrum disorder, Down syndrome). Despite these differences, evidence-based interventions that have been developed have generally followed what might be best described as an EI translational research cycle (see Guralnick, 2019b for details). Collectively, EI studies that have followed this translational process have generated strong support for overall effectiveness as well as momentum to establish, expand, and refine EI programs throughout the world (Guralnick, 2019a,b). At the same time, as might be expected, the diversity of interventions that were prompted in part by the heterogeneity and complexity of children and families has resulted in varying degrees of confidence in EI outcome effectiveness. This is the case, especially when seeking to generalize findings to

different groups and contexts and to settings with more limited resources (see Sandbank et al., 2020).

How then, can communities construct and arrange a conceptually sound and empirically supported EI program? The suggestion in this article is that there appears to be a sufficient conceptual basis for and corresponding empirical evidence to support interventions that are consistent with the developmental processes associated with each of the 13 FPI of the DSA and that can be adapted to the influences of child-specific stressors and FR (Guralnick, 2019a). In this way, the conceptual and evidence framework organized within the DSA serves as a filter to apply to the vast array of interventions that are available despite widely different child patterns of interacting and developmental concerns as well as FR (see Figure 2). The principles of relationships, comprehensiveness, and continuity provide guidance as well for program design, and available evidence indicates that the developmental pathways identified within the DSA are relevant to all children, irrespective of vulnerability (Guralnick, 2019a). Accordingly, this overarching framework provides a developmental rationale in support of principles related to children’s rights and, more specifically, to philosophical, legal, and legislative considerations for constructing truly inclusive community-based early childhood programs (Brown & Guralnick, 2012; Bruder, 2010).

Finally, as indicated at the bottom of Figure 2, the entire EI process can benefit

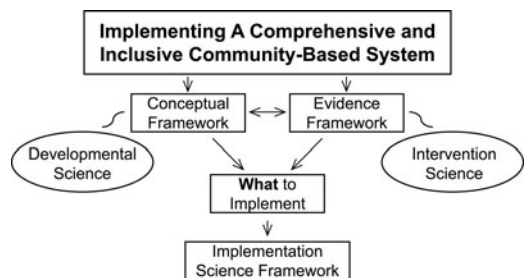


Figure 2. A framework for implementing a comprehensive and inclusive community-based early intervention system.

from the emerging work of colleagues in the field of implementation science (Curran, Bauer, Mittman, Pyne, & Stetler, 2012; Fixsen, Blase, Metz, & Van Dyke, 2013; Halle, Metz, & Martinez-Beck, 2013). As illustrated in Figures 1 and 2, a well-defined set of developmental mechanisms organized within a conceptual framework and based on intervention science supports a process for establishing effective inclusive community-based programs across the entire EI period. The task of applying current and newly emerging evidence derived from the EI translational research cycle

into community practices is certainly as complex as generating the practice evidence itself (Kemp, 2020). This long-term and demanding process involving developmental and intervention science, including knowledge of risk and disability, will also require administrative structures and supportive resources consistent with the developmentally oriented principles and practices outlined previously. The collective result is designed to generate optimal inclusive community-based practices capable of substantially enhancing children's development and family well-being.

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