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A Framework for the Design of Inclusive Community-Based Early Childhood Intervention Programs

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In this article, a framework for the creation of a fully inclusive and comprehensive early childhood intervention system is described. Although aspirational at this time, the potential for developmental science, intervention science, and implementation science to be integrated to maximize the effectiveness of early intervention systems is presented in the context of the Developmental Systems Approach. This framework guides a practice model emphasizing a family-centered problem-solving process that focuses on supporting well-characterized family patterns of interaction that contribute to children's development. Discussed as well is the ability of such an integrated system to be compatible with and incorporate principles and practices from a human rights perspective; all designed to support family and child goals. The transformational potential of this framework for organizing inclusive community-based early childhood programs is considered.
Key words: *developmental systems, inclusive community programs, integration of science and practice*

THE CENTRAL theme of this article is that major practice and policy advances in the field of early childhood intervention can be achieved through the application of a framework that systematically integrates developmental science, intervention science, and implementation science. Discussed later is an integrated framework grounded in systems principles that are capable of providing a developmentally based organization for family-centered practices, guiding the selection of child and family goals, utilizing assessment strategies that correspond to child-specific core aspects of development, and identifying interaction patterns among all those involved that can be readily utilized by families to optimally support children's social and cognitive development. Moreover, a foundation is established for a practice model that connects to this systems framework and serves as a catalyst and policy structure capable of maximizing a community's ability to provide essential and equitable resources to all families.

Fully recognized is the fact that such a comprehensive developmental systems framework with all its integrated features is clearly aspirational at this time. Yet, with

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appropriate resources organized as part of a well-articulated and generally accepted framework, the potential exists for such a transformation. Recognized as well is that any comprehensive framework serves as an hypothesis, with all its assumptions, core components, interpretations of data, and interacting processes constantly undergoing questioning, formal evaluations, and the eventual revisions. Frameworks are capable of providing organization and direction in any vital and complex field but must remain flexible, open to modification, and have the ability to adapt to and incorporate an ever expanding knowledge base. Adjustments and modifications occurring within a dynamic early intervention system are to be anticipated, as is the potential for retaining the foundational features of the framework under consideration.

With those aspirations in mind, the framework discussed in this article is the Developmental Systems Approach (DSA; Guralnick, 2001a, 2011, 2019a). The background and need for a systems framework such as the DSA to support the diverse group of children and families through early childhood intervention are first summarized. This is followed by a description of DSA components and levels and the process resulting in identifying core developmental mechanisms and interactions among those mechanisms. A practice model compatible with this systems approach and the potential of the DSA to serve as a comprehensive framework for the design of inclusive community programs applicable to all children are then presented. In so doing, evolving comprehensive community programs based on developmental systems are in an ideal position to recognize and support the goals and expectations of neurodiverse families who are part of our communities.

COMPLEXITY AND VULNERABILITY

The fact that we have reached the stage to even consider such a comprehensive systems framework is a tribute to the extraordinary advances that have occurred in the early childhood intervention field, especially since the passage of P.L. 99-457 in 1986 (Education of the Handicapped Act Amendments of 1986). The decade that followed this landmark legislation was particularly exciting and productive, with rapid progress occurring as a consequence of innovative ideas including new and creative approaches to intervention generated by early interventionists from numerous disciplines (Guralnick, 1997b). Continuing advances occurred applying this emerging knowledge base to interdisciplinary assessments (Guralnick, 2000), to daily intervention practices that are evidence-based (Reichow, 2016), to advances in second-generation research to better connect research to practice at the individual child and family levels (Guralnick, 1997a), to early childhood inclusion (Guralnick, 2001b), and to establishing family-centered practices as the cornerstone of the field of early childhood intervention (Bailey et al., 2006; Guralnick & Bruder, 2019). Progress in all of these areas has continued to this date, creating a vibrant yet complex field.

During this time, there were certainly many touch points among developmental, intervention, and implementation science and their mutual influences on policies and practices. Yet, the complexities of the developmental and behavioral characteristics of children who are at risk and those with established delays or disabilities and their families clearly created unusual challenges to establishing a comprehensive system of services and supports and arriving at a common framework. Consider for a moment the complexity of what is generally referred to as biological risk factors. This includes children born preterm (March of Dimes, 2022) but others as well such as risks to child development associated with infections or the increasingly identified number of genetic risk factors (Arnett, Wang, Eichler, & Bernier, 2021). Similarly, children identified as having delays with a known or unknown etiology in any of the conventionally defined

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domains related to cognition, language, motor, social-emotional, and sensory-perceptual development generate an extraordinary array of diverse patterns of development (Batshaw, Roizen, & Pellegrino, 2019). This complexity involving the varied and interacting developmental domains is further complicated by the increasing number of children receiving an autism spectrum disorder diagnosis, as they share major concerns with respect to reciprocal social interactions along with repetitive behavior and restricted interests (American Psychiatric Association, 2013). Finally, for all of the children in these broad categorical groups, there exists the potential for children's development to be further challenged because of disparities in community supports and services, creating risk factors associated with their home and neighborhood environment as well as by more systemic challenges to optimal child development (Dickerson & Dickerson, 2023; Evans & De France, 2022; Evans, Li, & Whipple, 2013; Hahn & Barnett, 2023; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987; Wade et al., 2018). These environmental risk factors are well known and include limited material resources in all forms, caregiver concerns such as their physical and mental health, and parenting patterns that are not fully supportive of child development. Cumulative effects of these environmental risk factors are particularly damaging, affecting children with or without other risk factors or developmental concerns.

Historically, this categorical organization has been valuable from a public health perspective, served important administrative functions related to service eligibility and corresponding assessments that are required to meet legal requirements for services, and provided a structure and rationale for organizing, implementing, and evaluating specialized early intervention programs for specific groups of children and families (U.S. Department of Education, 2020; Zablotsky et al., 2019). Research studies similarly focused on children and families meeting well-defined etiologic or categorical criteria.

Paralleling this categorical organization, however, has been an increasing recognition of the value of systems concepts emphasizing our understanding of commonly shared and crosscutting developmental mechanisms that guide the development of all children, irrespective of extant concerns or constraints on their development (Guralnick, 2019a). Clearly, a major challenge is to create practices derived from these systems-based interventions to establish highly individualized family-centered services and supports in inclusive communities. A plan to accomplish this comprehensive goal utilizing developmental mechanisms emphasizing family patterns of interaction (FPI) derived from the DSA framework is discussed next.

DEVELOPMENTAL MECHANISMS

The application of a systems framework to the field of early intervention draws upon concepts, processes, and advances from the field of developmental science. Often relying upon constructs at different levels of analysis, the transactional model (Sameroff, 2010), the developmental psychopathology approach (Cicchetti, 2006; Rutter & Sroufe, 2000), and neuroconstructivism (Karmiloff-Smith, 2009) have had major influences on the DSA and its applications to the field of early intervention. Foundational work in the field of intellectual disabilities has also provided an important developmental perspective for this highly diverse group of individuals (see Burack et al., 2021). Similarly, conceptualizations of evolving developmental processes (a developmental substructure) affected by genetic risk for autism spectrum and related disorders further expand our thinking about developmental systems and their implications for early intervention practice (Constantino, Charman, & Jones, 2021). Finally, current work on fundamental developmental mechanisms is consistent with a broader developmental systems perspective (Astle & Fletcher-Watson, 2020; Saffran, 2018).

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As described in detail elsewhere (see Guralnick, 2011, 2019a), the DSA consists of three major interacting behaviorally based interconnected levels composed of specific mechanisms that characterize (1) children's social and cognitive competence with connections to children's functional goals; (2) a family's pattern of interactions capable of supporting the development of those child competencies and goals; and (3) the resources needed by families to support FPI (see Figure 1). As seen in the figure, children's interpersonal goals and activities that organize their functional adaptive behaviors rely upon the level of children's social and cognitive competence. More specifically, these competencies consist of the developmental resources and organizational processes children draw upon to carry out their goals in all of the contexts they encounter. Components of well-established developmental resources are organized within cognitive, language,

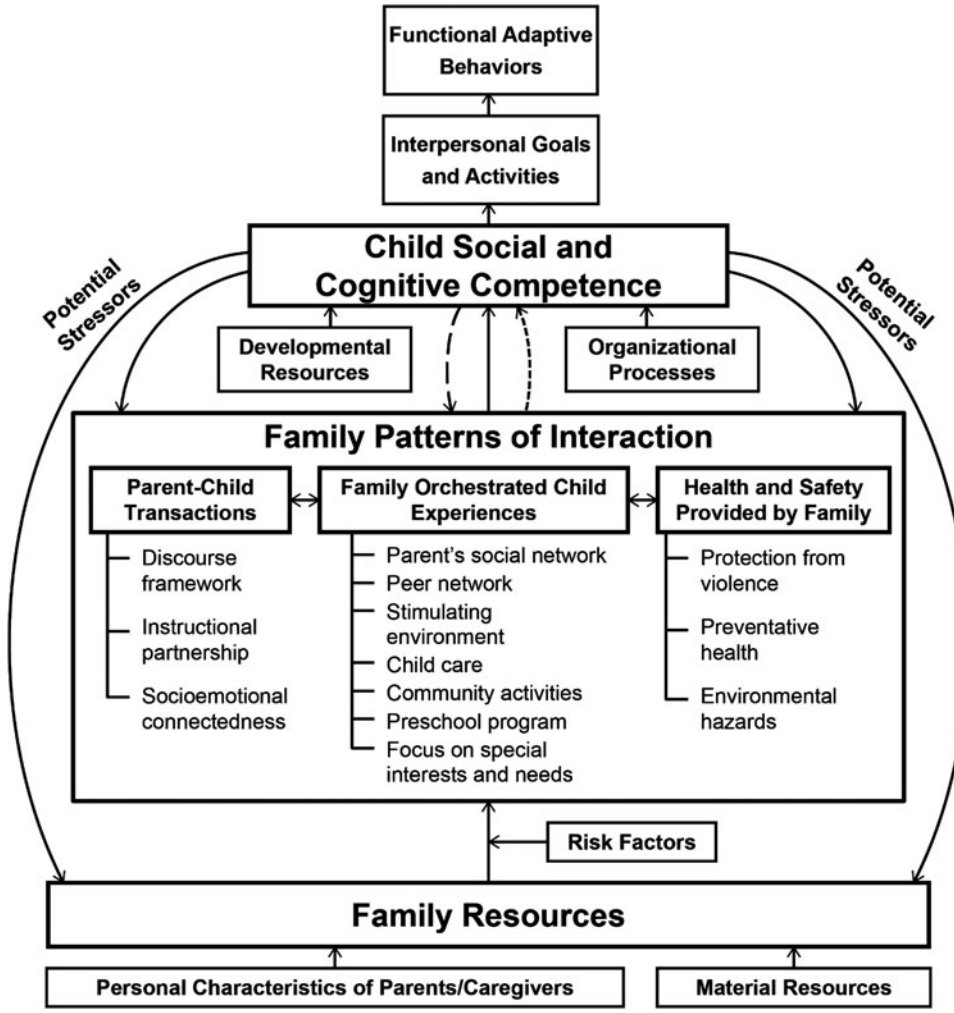

Figure 1. The Developmental Systems Approach illustrating the three interacting levels and components supporting children's development. Modified from "Why Early Intervention Works: A Systems Perspective," by M. J. Guralnick, 2011, *Infants and Young Children*, *24*, pp. 6-28. Adapted with permission.

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motor, social-emotional, and sensory-perceptual domains that enable each to be effectively assessed through conventional and other more situational measures. As conceptualized within the DSA, when children engage their social and cognitive environment these developmental resources are drawn upon and integrated by an array of what are referred to as organizational processes (executive function, metacognition, social cognition, motivation, and emotion regulation). Organizational processes that serve to integrate developmental resources to enable children to carry out their interpersonal goals and activities are also well-established developmental constructs and are linked to various forms of assessment.

Accordingly, the DSA's level of the child constitutes an interactive system that can be applied to all children and families. This DSA-based level of the child is also organized to capture the changing nature of children's developmental and behavioral patterns that occur over time as a consequence of the complex interplay of intrinsic and extrinsic processes (see Lerner, Hershberg, Hilliard, & Johnson, 2015). Key extrinsic processes are discussed next in the form of components comprising a family's pattern of interactions.

Within the DSA systems framework, FPI constitute a family's efforts to understand and adapt to their child's emerging developmental and behavioral patterns over time in order to establish relationships and provide experiences most likely to support their child's development in the context of everyday family and community life (see Figure 1). Developmental science has revealed that the domain of the quality of parent–child transactions can be organized in terms of components referred to as a discourse framework, an instructional partnership, and socioemotional connectedness. Each component displays consistent associations with children's developmental resources and organizational processes as well as with functional outcomes that express children's competencies (see Guralnick, 2019a for details of these association studies). Components of FPI at this systems level are also part of the domain of family-orchestrated child experiences that include involvement of the parent's social network, helping organize a peer network, providing specialized therapies, and selecting appropriate and high-quality early childhood programs, including childcare (see Figure 1). The quality of key components of this domain in both the home and the community has well-established associations with the levels of children's competencies (Dunst, 2017). The third major domain of a family's pattern of interactions is the quality of health and safety provided by the family; again, a domain that demonstrates important associations with components at the level of the child and interacts through a systems process with the other two FPI domains (McCormick et al., 2020; Turchi & Giardino, 2019).

Extensive association studies among the components embedded in the three domains of FPI (parent–child transactions, family-orchestrated child experiences, and health and safety provided by the family) and the child's social and cognitive competence and functional outcomes suggest that these components constitute the proximal developmental mechanisms supporting outcomes at the level of the child; all operating within a highly interactive systems context. Of importance, within this system the potential exists for the developmental and behavioral patterns at the level of the child to create circumstances that make it challenging for many involved to provide optimal FPI (see Guralnick, 2019a). These stressors to the system are illustrated in Figure 1 and can be addressed through the entire range of evidence-based informational, technical, and supportive strategies established by our field. Accordingly, these putative developmental mechanisms and their interactions provide guidance for the core organizational process of the DSA; one that utilizes the knowledge base of early intervention to design, implement, and evaluate early intervention programs and systems to enable FPI to be as optimal as possible.

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In addition to the reciprocal influences and adaptations based on a child's developmental and behavioral patterns generated at the level of the child by FPI, family resources (FR) also constitute critical influences on FPI (see Figure 1). Primarily operating through their effects on FPI, an extensive number of association studies have identified the components of FR as a set of risk and protective factors noted earlier (e.g., Dickerson & Dickerson, 2023; Wade et al., 2018). Within the DSA, these risk factors are organized in terms of components comprising the personal characteristics of the parents/caregivers and the availability of material resources. As is the case for FPI, these FR can be stressed by children's developmental and behavioral patterns potentially influencing numerous components of FR over and above risk factors that may already exist. Details of these complex and multiple influences and their effects can be found elsewhere (Guralnick, 2019a), but mental health issues in the form of maternal stress and concerns about a family's social support networks often arise for numerous groups of children with diverse developmental patterns (Guralnick, Hammond, Neville, & Connor, 2008).

Finally, it is also critical to note that larger societal and cultural forces, both supportive of child development and creating barriers, influence components at all levels of the DSA. A particular concern for children at risk for and those with established delays or disabilities and their families revolves around issues of equity and social justice, as the health and related disparities that exist are capable of influencing numerous DSA systems components and constrain optimal child development (Payne-Sturges et al., 2021).

FROM ASSOCIATION TO INTERVENTION

Paralleling the increasing number of both contemporaneous and long-term association studies were efforts to translate information on likely developmental mechanisms into specific interventions and to evaluate their effectiveness. As expected and needed, these intervention approaches were highly diverse, often focusing on categorical groups noted earlier and on specific areas of development. Groups may also have been organized at this stage in terms of common etiologies, developmental patterns, or clusters of risk factors. Emerging over time was a translational research cycle that guided an iterative process that enabled our field to generate an extraordinary number of diverse and innovative intervention curricula and strategies (Guralnick, 2019b).

As seen in Figure 2, this early intervention translational process was initiated by detailed characterizations of the developmental characteristics of specific groups of children. These analyses further contributed to our understanding of children's developmental resources and organizational processes as well as functional behavior patterns. For each group, carefully measured environmental factors drawn from association studies of the components noted in Figure 1 then led to the formulation of focused or comprehensive intervention targets that were then adapted to the various situations and circumstances within which they were implemented (Guralnick, 2019b). This was an important step in the cycle that would eventually result in conducting formal trials, as even when applying the most sophisticated statistical methods to identify likely causal factors association studies by their very nonexperimental nature require experimental validation (Bailey, Duncan, Watts, Clements, & Sarama, 2018). Measures and evaluations from these association studies, often implying or specifying a theory of change that corresponded to relationship-oriented developmental mechanisms that were part of the DSA, were then utilized as part of early experimental trials. Following preliminary work and revisions, randomized trials followed for promising interventions, along with manualized curricula and intervention strategies that could be eventually incorporated into practice (Farran, 2005; Guralnick, 2019a; Spiker, Hebbeler, & Mallik, 2005). These interventions were especially creative in their ability to organize

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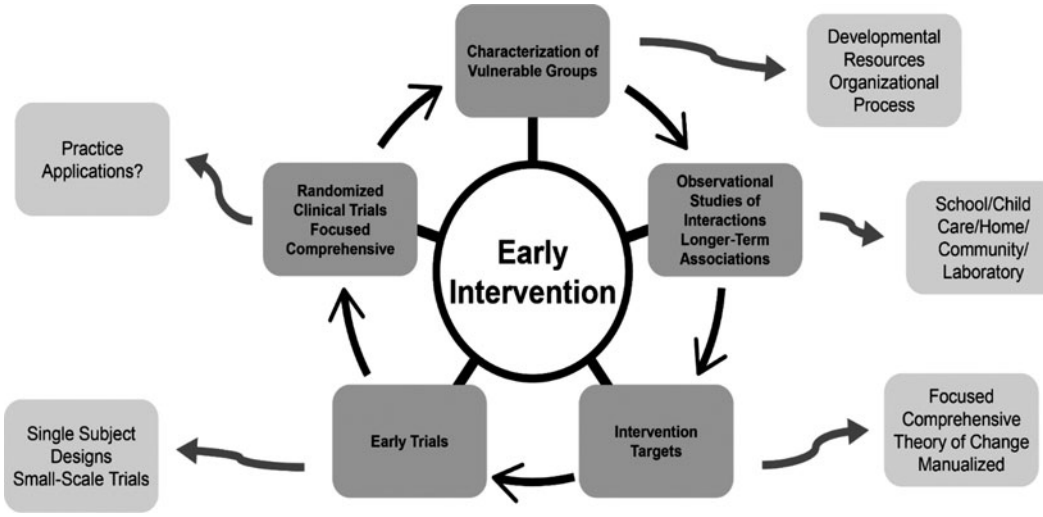

Figure 2. The early intervention translational research process. From La Ciencia de Implementar. Enfoque de los Sistemas de Desarrollo y Prácticas Centradas en la Familia. In C. Escorcia & L. Rodriguez (Eds.), *Prácticas de Atención Temprana Centradas en la Familia y en Entornos Naturales* (pp. 51–71), by M. J. Guralnick, 2019, Madrid, Spain: UNED Publishing. Reprinted with permission.

the environment utilizing formats that could be effectively applied through connections and collaborations generated by the early intervention team: parents, other caregivers, teachers, childcare staff, coordinators, specialists, and all other members of the child's community with the potential to enhance the quality of the developmental mechanisms that influence children's development. Indeed, many of these interventions were designed following the second-generation research translational model in an effort to better align research findings and practices at the individual child and family levels (Guralnick, 1997a). Increased emphasis was placed on matching child and family characteristics, intervention program features, and intervention goals and outcomes.

Despite expected variable outcomes following this translational research process, what emerged over time was an extraordinary body of intervention knowledge capable of being applied to highly diverse groups of children and families. This has truly been a remarkable accomplishment of our field. These advances also brought about an increasing recognition of the importance of the emerging field of implementation science (Fixsen, Blase, Naoom, & Wallace, 2009; Halle, Metz, & Martinez-Beck, 2013). Organizational drivers provided the structure for systems supports within identified early intervention communities. In turn, these implementation science systems components were linked to vital aspects of personnel preparation including recruitment and selection, preservice and ongoing professional training, consulting and coaching, and performance evaluations (Bruder, 2016; Bruder, Gundler, Stayton, & Kemp, 2021). As implementation science develops, integration into the systems framework discussed previously will further enhance the ability of early intervention programs to ideally support children and families.

In a real sense then, despite the complexity apparent at every level, a systems orientation was emerging as our field continued to evolve, applying and adapting new ideas and methods from diverse research and practice communities. As outlined in this article, the DSA is one such approach that

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was designed to provide a framework to organize current knowledge and to guide future advances in the field of early childhood intervention. As noted, central to this framework is the hypothesis that early intervention is most effective when FPI are as optimal as possible. To be sure, our ability to create such a well-defined and integrated system to achieve this goal will require, at minimum, an understanding of the developmental mechanisms most supportive of child development and our ability to select interventions that are scientifically sound that correspond to those mechanisms while ensuring that the system can be effectively implemented within communities. Unquestionably, this is a long-term process that will require extraordinary effort, a seemingly unprecedented level of cooperation among all involved, as well as resources commensurate with the needs of a family-centered system. Importantly, for current and future conceptual and empirical advances incorporating systems efforts such as the DSA to have a meaningful impact on children and families, they must be embedded in and provide a structure for a corresponding practice model. Such a practice model is described next.

PRACTICE MODEL

Building upon existing practice models that have been developed over the past decades, the DSA adds additional elements that emphasize the integrated developmental framework described in this article. As will be discussed, the practice model itself is ultimately intended to support a set of child functional adaptive behaviors (see Figure 1) that are linked to child goals and family priorities organized by topical goal areas that represent key domains of child development. In so doing, the developmental framework within the early intervention practice model is maintained, with child goals, family priorities, and ultimately intervention strategies mapping on to one another to maintain a developmental orientation within a systems framework. The link to development is further extended in the practice model by emphasizing the importance of enhancing the quality of FPI as an overarching intervention goal. Accordingly, an important feature of this practice model includes working with families to establish a long-term perspective of their child's development that is guided by the components of FPI and incorporating core DSA principles of relationships, comprehensiveness, and continuity into all aspects of an intervention program.

Figure 3 illustrates the DSA practice model process. Following established practices in the field of early intervention, emphasis is initially placed on setting child goals in the context of family priorities (Guralnick & Bruder, 2019; McWilliam, 2016). The foundation for this early phase of the process begins with one or more early intervention team members connecting with the family to build a relationship, understand key family concerns, initiate formal assessments to determine the child's eligibility for services, and conduct follow-up conventional and functional assessments as needed to further assess the child's developmental status and behavioral patterns. Follow-up plans introducing assessment practices that are more closely connected to the child's and family's everyday activities and experiences are included at this early phase of the process (Bagnato, 2005; Macy, Bagnato, & Gallen, 2016). Further health information may be gathered at this time as well and may be linked to those occasions where an etiology can be established. Depending on the circumstances, more detailed information may be obtained to provide a profile of the child's developmental resources and organizational processes; information that may be of value as intervention plans and their implementation proceed.

Obtaining information about a child's special interests and behavioral patterns is important at this stage of the process as well, carried out as part of the early informal relationship-building process. These initial interactions also enable the early intervention team to gain insight into FR including an understanding of the personal characteristics

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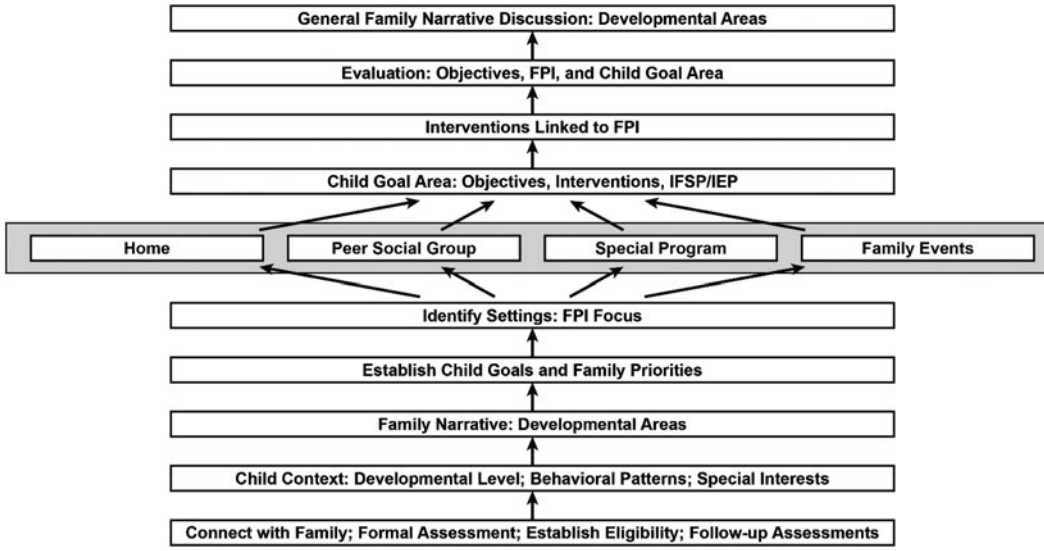

Figure 3. Practice model flowchart with sequences following the Developmental Systems Approach. FPI = family patterns of interaction; IEP = Individualized Education Program; IFSP = Individualized Family Service Plan.

of the parents/caregivers (e.g., mental and physical health; coping style) and the level of material resources available (e.g., social support). Information gained during this period enables the team to obtain a perspective on family risk and protective factors; information that will influence the selection and implementation of child goals and family priorities as well as provide guidance for generating connections with community services that can be of assistance. More general discussions of the existing resources available in the local community, how early intervention systems in their community are organized, and the expectations and responsibilities for all involved in a family-focused process are part of this initial orienting and relationship-building process (Bailey et al., 2006).

FAMILY NARRATIVE PROCESS

Once eligibility is established, the relationship process expands to gain a more in-depth understanding of the family through discussions of everyday routines (McWilliam, 2010). To place this in a developmental framework, as described elsewhere (Guralnick, 2020), a family narrative process is then initiated to provide an informal and collaborative structure for communicating with families about their child's activities in goal areas that are central to development. By organizing the family narrative in a context that has a clear developmental focus, an essential link between family priorities, child goals, and developmental science is established as part of the practice model. The child goal areas for this discussion in the narrative are listed in Table 1 and were selected to capture major domains of child development; ones that would be recognized as such by families. Exploring with families how their child functions in each of these developmental areas in different settings, along with expectations for further development, constitute key discussion points for each child goal in the narrative. As will be seen, identifying settings of importance to the family for each child goal area constitutes a critical part of the intervention process.

These child goal areas and corresponding discussions are intended to establish the functional relevance of the child's developmental goals and enable a better understanding the child's patterns of engaging the social and physical environment in the context of family

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Table 1. Child Goals

- 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

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life. Of note, as described earlier, these child goal areas that will ultimately link to a child's functional outcomes in the intervention phase depend upon the current status of a child's developmental resources and organizational processes at the DSA's level of the child. Accordingly, prior assessments reflecting child social and cognitive competence that have been carried out at the level of the child can be incorporated into and utilized by the practice model to inform functional outcomes as they depend upon children's developmental abilities and patterns of expression of those abilities. As will be seen, once high-priority child goals are identified, they can be mapped on to one or more of the DSA's 13 FPI, complementing and expanding interventions organized by the team.

GOAL PRIORITIES, SETTINGS, AND OBJECTIVES

With this background, a comprehensive early intervention program is created by the team focusing initially on the highest priority goal area or areas identified within the family narrative. Settings relevant to a specific goal are then identified by the team to ensure that a comprehensive array of interventions can be arranged. Figure 3 illustrates this process for one family child goal priority (consider communicating for social purposes as the priority). Of importance, settings that are selected are designed to be relevant to one or more of the 13 components of FPI (see Figure 1), thereby providing a context for communicating about longer-term interventions. Identifying those FPI-relevant settings that correspond to high-priority child goals further underscores the developmental framework within which early intervention activities will take place and provides further connections to developmental science.

As seen in Figure 3, now that a high-priority child goal has been identified by the team along with settings relevant to that goal, specific functional objectives focusing on the child (with respect to communicating for social purposes as the example) are created for each setting. Although specific settings will vary for each goal that emerges from the narrative and assessment information, one setting essential for all child goals is the home, as parent/caregiver–child transactions constitute the relationship domain that is most critical and constant in the child's life. As indicated, each setting selected is designed to be closely connected to one or more of the 13 FPI. Objectives (see Figure 3) would then follow the Individualized Family Service Plan (IFSP) and Individualized Education Program (IEP) formats developed separately for each setting identified. At this critical point in the process, the team would apply this framework building upon current practices and administrative requirements designed to enhance family-centered practices as specified in P.L. 99-457 and subsequent legislation (McLean, Sandall, & Smith, 2016; Yell, Bateman, & Shriner, 2020). Ongoing efforts in our field continue to improve the quality of IFSP and IEP objectives (Boavida, Aguiar, & McWilliam, 2014; McWilliam, 2010; Pretti-Frontczak & Bricker, 2000), and the DSA framework may provide further guidance. As noted, this comprehensive approach incorporates settings with objectives that can be

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readily connected to the components of FPI and to a broader developmental perspective.

INTERVENTIONS AND FPI

Continuing with this practice model, the specific interventions that follow would be selected and utilized with the potential to maintain or enhance the quality of relevant FPI components. To be sure, there are often urgent issues that need to be addressed such as behavioral concerns, but it is also important to adopt the longer-term developmental perspective that considers the overall quality of FPI. Specific intervention plans can then be established for each objective in the settings selected drawing upon the extensive evidence-based curricula and strategies established by our field noted earlier. For example, numerous FPI-relevant curricula and learning activities are available that can be adapted to various settings (e.g., Twombly & Fink, 2013), interventions that support a discourse framework (Kaiser & Roberts, 2013) provide strategies that can also enhance a child's peer network (Guralnick & Bruder, 2016; Guralnick, Connor, & Johnson, 2011), highly specialized techniques can be applied that are clearly supportive of this goal (Romski et al., 2010), characteristics of childcare or preschool programs can be identified that are most likely to support children's development for this and other goals (Phillips, Johnson, & Iruka, 2022), and developmentally supportive family events can be organized (Dunst, Bruder, Trivette, & Hamby, 2006). At various points, FPI can serve as an effective developmental filter for the selection of intervention strategies.

In this intervention context, monitoring and evaluations of possible stressors to FPI can be carried out. As needed, adjustments in the form of information, demonstrations, referrals, specialized curriculum techniques, or other supports can be offered to families and appropriate evaluations carried out. At the same time, emphasis is placed on current positive features connected to FPI, with more general considerations of their quality in support of children's development. This perspective is reflected in process and outcome evaluations as they are tied not only to objectives but also to assessments of the status of relevant FPI in the context of longer-term goals about the course of child development. Moreover, our increasing knowledge of children's developmental resources and organizational processes, especially derived from well-studied etiologic specific groups and subgroups, can be utilized to make current or consider further adjustments in designing interventions to maximize the quality of FPI in the context of specific objectives. As indicated in Figure 3, connecting objectives and interventions to FPI is most compatible with systems guided by a comprehensive developmental framework.

Finally, although often difficult to coordinate and address, it is critical within the DSA practice model to attend to the complex components of FR. As indicated in Figure 1, substantial influences on the level of the child can occur operating through FPI. Difficulties stem from the fact that many of the family resource issues that influence the components of FPI are long-term, such as parental mental or physical health, and community resources are often limited or difficult to coordinate. Other components of FR can be addressed more directly and immediately by the team, especially if they are connected to the child goal that has been prioritized. Assessment tools are available for some of the components at the level of FR, but valuable information and strategies for coordination with community resources arise as the team works together in the context of family priorities. Working in partnership with community programs or those with special expertise in applying new findings is especially critical. For example, recent work on the impact on brain activity and likely cognitive skills as well as a result of cash transfers constitutes an example of a hybrid model of collaboration that has the potential to encourage community supports that are empirically and developmentally sound (Troller-Renfree et al., 2022). Collectively, community partnerships

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can serve as an important catalyst for enhancing coordinated community resources for all families. Accordingly, within this broad systems framework, the early intervention practice model constitutes an ongoing team decision-making process drawing upon information from sources at all levels of the DSA to ultimately enhance FPI in support of children's development.

CHALLENGES AND FUTURE DIRECTIONS

The framework in the form of the DSA outlined in this article builds upon the conceptual and empirical advances that have emerged in recent decades in the fields of early childhood development and early childhood intervention. Relying on overarching principles of relationships, comprehensiveness, and continuity, the DSA was designed to integrate and apply these advances to enhance community systems that support family-centered early intervention programs. As described, core features of the DSA include strategies to further integrate developmental, intervention, and implementation science; identify and organize intervention strategies compatible with the components of FPI; adapt interventions to children's characteristics in relation to their developmental resources and organizational processes; and enhance the quality of FR that influence high-priority FPI by coordinating with community programs. A practice model derived from the framework provided by the DSA was presented along with a translational research process to further identify and evaluate intervention techniques and corresponding measures compatible with this systems approach. A conceptual shift was also proposed suggesting that the primary goal of early intervention is to enhance the quality of the components of FPI identified by the DSA. In this way, a new dimension is added to the meaning of family-centered practices, as families work as part of the team to find strategies and resources to maximize the quality of FPI for the long term. If successful, it is this developmental perspective and overall systems framework that carry forward to later developmental periods and, in many ways, constitute a grassroots catalyst for change and expanding community supports for all children and families.

Evident to us all in the early childhood intervention field is that immediate issues require our attention. Significant concerns are apparent with respect to the quality and availability of services and supports in far too many communities, often applying practices with insufficient evidence of their effectiveness and certainly without a community agreed upon system or framework. Moreover, many positive outcomes tend to fade over time (Bailey, Duncan, Cunha, Foorman, & Yeager, 2020), and inconsistent findings often result when interventions are scaled up in community programs (Sandbank et al., 2020). Nevertheless, the overall approach and corresponding principles discussed throughout this article provide a framework grounded in developmental science capable of generating specific hypotheses to guide conceptually compatible intervention strategies, community development, and a compatible practice model. Together, they have the potential to address these and related concerns and support the continued evolution of our field.

Beyond the focus to directly enhance the quality of FPI, the challenge to address components that are part of the DSA's level of FR in a manner that supports the components of FPI will require communities to collaborate in ways not previously considered. But in so doing an opportunity exists to meaningfully alter community resources for all families, with early intervention programs serving as the organizational framework for community development. After all, optimizing FPI applies to all families. Parallel efforts consistent with this framework would be required for all aspects of personnel preparation as well, guiding theory, content, and practices designed to optimize all components of FPI. There is considerable power in a shared and common framework.

I have no illusions about the demands and complexities involved in enhancing

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the systems components outlined in the DSA framework. Issues of equity and recognition that developmental and behavioral differences are an integral part of the human condition and that families are best supported comprehensively at the earliest periods possible are challenging but critical to this systems approach. Moreover, by their very nature, systems contain components that interact in complex ways, with most capable of moderating and mediating one another to generate diverse developmental patterns over time. So much remains to be discovered. Yet, the potential to advance our understanding of the meaning of family-centered practices in the context of a practice model compatible with an approach capable of integrating developmental, intervention, and implementation science can be truly transformative.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Arnett, A. B., Wang, T., Eichler, E. E., & Bernier, R. A. (2021). Reflections on the genetics-first approach to advancements in molecular genetic and neurobiological research on neurodevelopmental disorders. *Journal of Neurodevelopmental Disorders*, *13*, 24. doi:10.1186/s11689-021-09371-4

Astle, D. E., & Fletcher-Watson, S. (2020). Beyond the core-deficit hypothesis in developmental disorders. *Current Directions in Psychological Science*, *29*, 431–437. doi:10.1177/0963721420925518

Bagnato, S. J. (2005). The authentic alternative for assessment in early intervention: An emerging evidence-based practice. *Journal of Early Intervention*, *28*, 17–22. doi:10.1177/105381510502800102

Bailey, D. B., Bruder, M. B., Hebbeler, K., Carta, J., Defosset, M., Greenwood, C., … Barton, L. (2006). Recommended outcomes for families of young children with disabilities. *Journal of Early Intervention*, *28*, 227–251. doi:10.1177/105381510602800401

Bailey, D. H., Duncan, G. J., Cunha, F., Foorman, B. R., & Yeager, D. S. (2020). Persistence and fade-out of educational-intervention effects: Mechanisms and potential solutions. *Psychological Science in the Public Interest*, *21*, 55–97. doi:10.1177/1529100620915848

Bailey, D. H., Duncan, G. J., Watts, T., Clements, D. H., & Sarama, J. (2018). Risky business: Correlation and causation in longitudinal studies of skill development. *American Psychologist*, *73*, 81–94. doi:10.1037/amp0000146

Batshaw, M. L., Roizen, N. J., & Pellegrino, L. (Eds.). (2019). *Children with disabilities* (8th ed.). Baltimore, MD: Brookes Publishing.

Boavida, T., Aguiar, C., & McWilliam, R. A. (2014). A training program to improve IFSP/IEP goals and objectives through the routines-based interview. *Topics in Early Childhood Special Education*, *33*, 200–211. doi:10.1177/0271121413494416

Bruder, M. B. (2016). Personnel development practices in early childhood intervention. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of early childhood special education* (pp. 289–334). Switzerland: Springer.

Bruder, M. B., Gundler, D., Stayton, V., & Kemp, P. (2021). The early childhood personnel center: Building capacity to improve outcomes for infants and young children with disabilities and their families. *Infants & Young Children*, *34*, 69–82. doi:10.1097/Iyc.0000000000000191

Burack, J. A., Evans, D. W., Russo, N., Napoleon, J. S., Goldman, K. J., & Iarocci, G. (2021). Developmental perspectives on the study of persons with intellectual disability. *Annual Review of Clinical Psychology*, *17*, 339–363. doi:10.1146/annurev-clinpsy-081219-090532

Cicchetti, D. (2006). Development and psychopathology. In D. Cicchetti, & D. Cohen (Eds.), *Developmental psychopathology* (2nd ed., Vol. 1, pp. 1–23). Hoboken, NJ: John Wiley & Sons, Inc.

Constantino, J. N., Charman, T., & Jones, E. J. H. (2021). Clinical and translational implications of an emerging developmental substructure for autism. *Annual Review of Clinical Psychology*, *17*, 365–389. doi:10.1146/annurev-clinpsy-081219-110503

Dickerson, A. S., & Dickerson, A. S. (2023). Prenatal socioenvironmental exposures and autism spectrum disorder: A web of confusion. *Child Development Perspectives*, *17*, 32–38. doi:10.1111/cdep.12472

Dunst, C. J. (2017). Family systems early childhood intervention. In H. Sukkar, C. J. Dunst, & J. Kirkby (Eds.), *Early childhood intervention: Working with families of young children with special needs* (pp. 36–58). Oxon, England: Routledge Press.

Dunst, C. J., Bruder, M. B., Trivette, C. M., & Hamby, D. W. (2006). Everyday activity settings, natural learning environments, and early intervention practices. *Journal of Policy and Practice in Intellectual Disabilities*, *3*, 3–10. doi:10.1111/j.1741-1130.2006.00047.x

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Education of the Handicapped Act Amendments of 1986, Vol. U.S.C. PL 99-457, 20, U.S.C. §§ 1400 *et seq*.

Evans, G. W., & De France, K. (2022). Childhood poverty and psychological well-being: The mediating role of cumulative risk exposure. *Development and Psychopathology*, *34*, 911–921. doi:10.1017/S0954579420001947

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, *139*(6), 1342–1396. doi:10.1037/a0031808

Farran, D. C. (2005). Developing and implementing preventive intervention programs for children at risk: Poverty as a case in point. In M. J. Guralnick (Ed.), *The developmental systems approach to early intervention* (pp. 267–304). Baltimore, MD: Brookes Publishing.

Fixsen, D., Blase, K., Naoom, S. F., & Wallace, F. (2009). Core implementation components. *Research on Social Work Practice*, *19*, 531–540. doi:10.1177/1049731509335549

Guralnick, M. J. (1997a). Second generation research in the field of early intervention. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 3–22). Baltimore, MD: Brookes.

Guralnick, M. J. (Ed.). (1997b). *The effectiveness of early intervention*. Baltimore, MD: Brookes Publishing Co.

Guralnick, M. J. (Ed.). (2000). *Interdisciplinary clinical assessment for young children with developmental disabilities*. Baltimore, MD: Brookes Publishing Co.

Guralnick, M. J. (2001a). A developmental systems model for early intervention. *Infants & Young Children*, *14*, 1–18.

Guralnick, M. J. (Ed.). (2001b). *Early childhood inclusion: Focus on change*. Baltimore, MD: Brookes Publishing Co.

Guralnick, M. J. (2011). Why early intervention works: A systems perspective. *Infants & Young Children*, *24*(1), 6–28. doi:10.1097/IYC.0b013e3182002cfe

Guralnick, M. J. (2019a). *Effective early intervention: The developmental systems approach*. Baltimore, MD: Brookes Publishing.

Guralnick, M. J. (2019b). La ciencia de implementar. Enfoque de los sistemas de desarrollo y prácticas centradas en la familia. [Implementation science, the developmental systems approach, and family-centered practices]. In C. Escorcia, & L. Rodriguez (Eds.), *Prácticas de atención temprana centradas en la familia y en entornos naturales* (pp. 51–71). Madrid, Spain: UNED Publishing.

Guralnick, M. J. (2020). Applying the developmental systems approach to inclusive community-based early intervention programs: Process and practice. *Infants Young Child*, *33*(3), 173–183. doi:10.1097/IYC.0000000000000167

Guralnick, M. J., & Bruder, M. B. (2016). Early childhood inclusion in the United States: Goals, current status, and future directions. *Infants & Young Children*, *29*, 166–177. doi:10.1097/Iyc.0000000000000071

Guralnick, M. J., & Bruder, M. B. (2019). Early intervention. In J. L. Matson (Ed.), *Handbook of intellectual disabilities: Integrating theory, research, and practice* (pp. 717–741). Cham, Switzerland: Springer International Publishing.

Guralnick, M. J., Connor, R. T., & Johnson, L. C. (2011). The peer social networks of young children with Down syndrome in classroom programmes. *Journal of Applied Research in Intellectual Disabilities*, *24*(4), 310–321. doi:10.1111/j.1468-3148.2010.00619.x

Guralnick, M. J., Hammond, M. A., Neville, B., & Connor, R. T. (2008). The relationship between sources and functions of social support and dimensions of child- and parent-related stress. *Journal of Intellectual Disability Research*, *52*(12), 1138–1154. doi:10.1111/j.1365-2788.2008.01073.x

Hahn, R. A., & Barnett, W. S. (2023). Early childhood education: Health, equity, and economics. *Annual Review of Public Health*, *44*, 75–92. doi:10.1146/annurev-publhealth-071321-032337

Halle, T., Metz, A., & Martinez-Beck, I. (Eds.). (2013). *Applying implementation science in early childhood programs and systems*. Baltimore, MD: Brookes Publishing Co.

Kaiser, A. P., & Roberts, M. Y. (2013). Parent-implemented enhanced milieu teaching with preschool children who have intellectual disabilities. *Journal of Speech, Language, and Hearing Research*, *56*(1), 295–309. doi:10.1044/1092-4388(2012/11-0243

Karmiloff-Smith, A. (2009). Nativism versus neuroconstructivism: Rethinking the study of developmental disorders. *Developmental Psychology*, *45*(1), 56–63. doi:10.1037/a0014506

Lerner, R. M., Hershberg, R. M., Hilliard, L. J., & Johnson, S. K. (2015). Concepts and theories of human development. In M. H. Bornstein, & M. E. Lamb (Eds.), *Developmental science: An advanced textbook* (pp. 3–42). New York, NY: Psychology Press.

Macy, M., Bagnato, S., & Gallen, R. (2016). Authentic assessment: A venerable idea whose time is now. *Zero to Three*, *37*, 37–43.

March of Dimes. (2022). *2022 March of Dimes report card*. Retrieved November 15, 2022, from https://www.marchofdimes.org/report-card

McCormick, B. J. J., Caulfield, L. E., Richard, S. A., Pendergast, L., Seidman, J. C., Maphula, A., . . . MAL-ED Network Investigators. (2020). Early life experiences and trajectories of cognitive development. *Pediatrics*, *146*(3), e20193660. doi:10.1542/peds.2019-3660

McLean, M. E., Sandall, S. R., & Smith, B. J. (2016). A history of early childhood special education. In B. Reichow, B. A. Boyd, E. A. Barton, & S. L.

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Odom (Eds.), *Handbook of early childhood special education* (pp. 3–19). Switzerland: Springer.

McWilliam, R. A. (2010). *Routines-based early intervention: Supporting young children and their families*. Baltimore, MD: Paul H. Brookes.

McWilliam, R. A. (2016). Birth to three: Early intervention. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of early childhood special education* (pp. 75–88). Switzerland: Springer.

Payne-Sturges, D. C., Cory-Slechta, D. A., Puett, R. C., Thomas, S. B., Hammond, R., & Hovmand, P. S. (2021). Defining and intervening on cumulative environmental neurodevelopmental risks: Introducing a complex systems approach. *Environmental Health Perspectives*, *129*(3), 35001. doi:10.1289/EHP7333

Phillips, D. A., Johnson, A. D., & Iruka, I. U. (2022). Early care and education settings as contexts for socialization: New directions for quality assessment. *Child Development Perspectives*, *16*, 127–133. doi:10.1111/cdep.12460

Pretti-Frontczak, K., & Bricker, D. (2000). Enhancing the quality of individualized education plan (IEP) goals and objectives. *Journal of Early Intervention*, *23*, 92–105. doi:10.1177/105381510002300204

Reichow, B. (2016). Evidence-based practice in the context of early childhood special education. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of early childhood special education*, pp. 107–121. New York, NY: Springer.

Romski, M., Sevcik, R. A., Adamson, L. B., Cheslock, M., Smith, A., Barker, R. M., & Bakeman, R. (2010). Randomized comparison of augmented and nonaugmented language interventions for toddlers with developmental delays and their parents. *Journal of Speech Language and Hearing Research*, *53*(2), 350–364. doi:10.1044/1092-4388(2009/08-0156

Rutter, M., & Sroufe, L. A. (2000). Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*, *12*(3), 265–296. doi:10.1017/s0954579400003023

Saffran, J. R. (2018). Statistical learning as a window into developmental disabilities. *Journal of Neurodevelopmental Disorders*, *10*(1), 35. doi:10.1186/s11689-018-9252-y

Sameroff, A. (2010). A unified theory of development: A dialectic integration of nature and nurture. *Child Development*, *81*(1), 6–22. doi:10.1111/j.1467-8624.2009.01378.x

Sameroff, A. J., Seifer, R., Barocas, R., Zax, M., & Greenspan, S. (1987). Intelligence quotient scores of 4-year-old children: Social-environmental risk factors. *Pediatrics*, *79*(3), 343–350.

Sandbank, M., Bottema-Beutel, K., Crowley, S., Cassidy, M., Dunham, K., Feldman, J. I., … Woynaroski, T. G. (2020). Project AIM: Autism intervention meta-analysis for studies of young children. *Psychological Bulletin*, *146*(1), 1–29. doi:10.1037/bul0000215

Spiker, D., Hebbeler, K., & Mallik, S. (2005). Developing and implementing early intervention programs for children with established disabilities. In M. J. Guralnick (Ed.), *The developmental systems approach to early intervention* (pp. 305–349). Baltimore, MD: Brookes.

Troller-Renfree, S. V., Costanzo, M. A., Duncan, G. J., Magnuson, K., Gennetian, L. A., Yoshikawa, H., … Noble, K. G. (2022). The impact of a poverty reduction intervention on infant brain activity. *Proceedings of the National Academy of Sciences*, *119*(5), e2115649119. doi:10.1073/pnas.2115649119

Turchi, R. M., & Giardino, A. P. (2019). Medical home and health care systems. In M. L. Batshaw, N. J. Roizen, & L. Pellegrino (Eds.), *Children with disabilities* (8th ed., pp. 799–822). Baltimore, MD: Paul H. Brookes Publishing Company.

Twombly, E., & Fink, G. (2013). *ASQ-3 learning activities*. Baltimore, MD: Paul H. Brookes Publishing Company.

U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs. (2020). *42nd annual report to Congress on the implementation of the individuals with disabilities education act, parts B and C.* Washington, DC: U.S. Department of Education. Retrieved February 21, 2023, from https://sites.ed.gov/idea/2020-annual-report-congress-idea/

Wade, M., Madigan, S., Plamondon, A., Rodrigues, M., Browne, D., & Jenkins, J. M. (2018). Cumulative psychosocial risk, parental socialization, and child cognitive functioning: A longitudinal cascade model. *Developmental Psychology*, *54*(6), 1038–1050. doi:10.1037/dev0000493

Yell, M. L., Bateman, D., & Shriner, J. (2020). Developing and implementing educationally meaningful and legally sound IEPs: Bringing it all together. *Teaching Exceptional Children*, *52*, 344–347. doi:10.1177/0040059920919087

Zablotsky, B., Black, L. I., Maenner, M. J., Schieve, L. A., Danielson, M. L., Bitsko, R. H., … Boyle, C. A. (2019). Prevalence and trends of developmental disabilities among children in the United States: 2009–2017. *Pediatrics*, *144*(4), e20190811. doi:10.1542/peds.2019-0811

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