Effective Early Intervention

The Developmental Systems Approach

Michael J. Guralnick

Effective Early Intervention

The Developmental Systems Approach

by

Michael J. Guralnick, Ph.D.
University of Washington
Seattle, Washington

DISCLAIMER

All examples in this book are composites. Any similarity to actual individuals or circumstances is coincidental, and no implications should be inferred.

Contents

About the Author

Michael J. Guralnick, Ph.D., University of Washington, Seattle

Michael J. Guralnick, Ph.D., is Director of the Center on Human Development and Disability (CHDD) and Professor of Psychology and Pediatrics at the University of Washington. Comprised of both a University Center for Excellence in Developmental Disabilities and a Eunice Kennedy Shriver Intellectual and Developmental Disabilities Research Center, the CHDD is one of the largest interdisciplinary research and training centers in the United States addressing issues directly related to developmental disabilities. More than 600 faculty, staff, and doctoral and postdoctoral students operate within the four CHDD buildings on the campus of the University of Washington and in other university and community sites to conduct basic and translational research, to provide clinical services to individuals and their families, to provide interdisciplinary clinical and research training, and to provide technical assistance and outreach training to practitioners and community agencies.

Dr. Guralnick has directed numerous research, professional training, and development projects in the fields of early childhood development and intervention, with a special interest in the design and effectiveness of early intervention programs, peer-related social competence, and early childhood inclusion. He has published more than 150 articles and book chapters (including eight edited volumes), and his publications have appeared in a diverse group of well-respected journals spanning a range of disciplines. Major research has included a randomized clinical trial to determine the effectiveness of a comprehensive early intervention program in promoting the peer-related social competence of young children with developmental delays and a multi-context investigation of the factors influencing the peer interactions and peer social networks of children with Down syndrome. Current projects focus on the peer relationships of children with autism, the further development and application of the Developmental Systems Approach to early intervention, and international activities designed to integrate research and practice in the field of early intervention.

Dr. Guralnick received the 1994 Research Award from the American Association on Intellectual and Developmental Disabilities, the 1997 Distinguished Research Award from the Arc of the United States, and the Edgar A. Doll Award in 2008 from Division 33 of the American Psychological Association for outstanding scientific contributions to the field of intellectual and developmental disabilities. He is a past President of the Association of University Centers on Disabilities, the Council for Exceptional Children's Division for Early

Childhood, and the Academy on Intellectual and Developmental Disabilities, and a former Chair of the Intellectual and Developmental Disabilities Research Center Directors. He served as editor of the journal *Infants and Young Children* from 2003 to 2009 and is the founder and Chair of the International Society on Early Intervention.

Preface

Systems of services and supports for young vulnerable children and their families are now fundamental features of numerous and diverse communities throughout the world. Indeed, decades of research, program development, professional training, legislation, and policy initiatives have contributed to establishing community-based systems of early intervention with the expectation that both children and families will benefit substantially. While there are limits with respect to what can be accomplished today, our field of early intervention continues to explore new approaches and strategies that, if effective, can be incorporated into current systems of services and supports.

Any observer of the rapid evolution of the field of early intervention over the past few decades can only be impressed by both the passionate commitment to young children and their families and the corresponding evidence-based development of creative approaches to promote the well-being of those children and families. The extraordinary diversity of children who are vulnerable to developmental problems has led to an equally extraordinary array of conceptual models, curricula, instructional approaches, and intervention strategies that communities can draw upon to organize early intervention systems. However, this very level of diversity and complexity

has also created challenges for communities to design and implement conceptually sound and highly effective intervention programs.

A central thesis of this book is that the field has now reached a stage in its development in which systems of early intervention can be understood within a common framework. As described throughout this volume, the common framework proposed is the Developmental Systems Approach (DSA) and is based on an integration of developmental science, our knowledge of risk and disability, intervention science, and community practices. With a focus on the formation of relationships, the DSA is a family-centered framework designed to enhance the quality of the key family patterns of interaction that influence children's development. This volume suggests that such a framework can guide the establishment, refinement, and future directions of comprehensive and inclusive community-based early intervention systems.

The context of this overarching framework ensures a respect for children's different learning styles and consideration of both their strengths and constraints. Through the early intervention problem-solving process, the intent of the DSA is to provide children with tools to exercise their rights to pursue their own goals and to do so with necessary supports. A similar

respect for family diversity, including their goals and their priorities, is integral to the many components of the DSA's level of family resources.

The introductory chapters in the first section of this volume provide an overview of the DSA, emphasizing both its systems nature and relevance to all children. Highlighted is the complexity of the known and potential interactions occurring among the various components of the DSA at the level of the child, the level of family patterns of interaction, and the level of family resources. In the next four sections, evidence is examined with respect to both the developmental mechanisms governing child development suggested within the DSA and the corresponding intervention science for four highly prevalent vulnerable groups. The groups included are children at risk due to biological factors, specifically preterm birth; children at risk due to environmental factors; children with developmental delays; and children with an autism spectrum disorder diagnosis. For each of these groups, suggestions are presented with respect to how those communities that find the approach and evidence sufficiently compelling can adopt the DSA framework and put it into practice.

The potential of our field to advance further within the context of the DSA framework is considered in the final chapter. A long-term vision is presented, recognizing the potential to do far better when problem solving and innovation are carried out within a well-established developmental framework. This is especially the case when connected with supportive and creative policy initiatives. From a practice perspective, this volume presents a contemporary developmental approach and a corresponding organizational framework capable of enhancing comprehensive and inclusive community-based systems of early intervention.

1

Foundations of Early Intervention

Children become members of a family and a community long before they are born. Visions of new dimensions of family life, enhanced personal relationships, and expanded community connections merge with visions of the child as a developing individual. As time goes by, these visions are somehow transformed into reality, not quite like the ones that were anticipated, but often similar enough nevertheless. Especially during the first few years of life, evidence for a child's rapid growth and development is abundant, as is the emergence of the child's unique style of engaging the world. These developments take seemingly self-directed paths and are driven by forces not entirely clear to even the most vigilant and perceptive of parents. Also emerging during this early period is a special sense of enjoyment and satisfaction as the child bonds with family members and becomes integrated into more stable family routines.

Of course, even in the best of situations, numerous problems arise. Disruptions to family routines created by unexpected child needs easily occur, and new resources, often drawing heavily on a family's social network, are required to assist with parenting tasks that are ever increasing in magnitude and complexity. Relationships at all levels are affected, including not only those involving immediate and extended family members, but also those involving individuals in the neighborhood and workplace. To be sure, instances of children's illness, unpredictable behavior, or unevenness in development create palpable tension for caregivers. Fortunately, these very real concerns about their child often dissipate with an increased understanding of their child's behavior, the truly transient nature of many problems, and the continuing achievement of expected developmental milestones. Even when parents themselves face very difficult personal circumstances, the vast majority find ways to adapt and to create an optimal developmental environment for their child, in the hope of realizing their original visions.

Yet, the situation is dramatically different when concerns regarding a child's development persist or when unusual vulnerability is apparent. In some instances, the increased likelihood that children will be facing developmental difficulties is evident immediately after birth—as occurs in the case of genetic syndromes that are easily recognizable, when a child is born extremely preterm, or when other biological factors exist that substantially increase a child's vulnerability. For others, at various points in time, trauma, infectious disease, or other

3

health-related problems, such as seizures, may signal potential long-term developmental difficulties. In most instances, however, problems gradually emerge over the early childhood period as parents and others become aware of the child's unusual developmental and behavioral patterns.

In all of these circumstances, when some threshold level of concern about a child's development is reached, a process is initiated whereby professionals become involved and conduct assessments of the child's cognitive, language, motor, social-emotional, and sensory-perceptual development. Such professionals also gather related information from health records and family histories and conduct additional follow-up, including medical and more in-depth developmental testing to complete this initial process. As a result of this diagnostic/assessment process, categorical diagnoses (e.g., developmental delay, autism spectrum disorder [ASD], deafness, specific language impairment) may be assigned to the child. Etiologic information, especially following genetic testing that indicates the likely underlying cause of the developmental problems, may also become available. Given the often-changing nature and course of initial concerns, other diagnostic categories may be considered over time with varying degrees of certainty. Some children may not receive a specific diagnosis at all but are followed closely by professionals who consider them to be at high risk for future difficulties.

Of course, even when a specific diagnostic category and etiology are established with confidence, they do not capture the remarkable diversity and complexity of an individual child's behavior, nor do they define a rigid developmental trajectory. Yet whether a diagnostic category is applied with confidence at a particular point in time or whether the specific etiology of the child's apparent developmental problems can be identified, the fact remains that this process has a profound impact on all family members and those in the family's social network. Over time, the nature of a child's vulnerability with respect to biological factors

and the constraints that follow may well call for a substantial restructuring of the family's original vision for their child. Without question, working through complex psychological processes requiring extensive revisions and adjustments of life cycle expectations is a highly stressful experience. During the early childhood period, a major challenge for families with a child who is so vulnerable as a consequence of biological factors is how to provide patterns of interaction that create an optimally supportive developmental environment. Supporting this goal constitutes the primary task for early intervention systems.

Child vulnerability takes many forms, and the family environment contains many potential sources of risk as well. Although most families have the resources to cope and adjust to changing circumstances and everyday challenges to effectively support their child's development, the demands placed on many families who are themselves vulnerable can quickly deplete those resources. When a lack of material resources is compounded by personal issues that can prevent parents from providing optimal care and support for their child, the risk for child developmental problems, even in the absence of other major child vulnerabilities, is substantial. For example, as discussed later in this volume, the severe and chronic absence of parental financial resources makes it difficult to support a child's basic needs for safety, nutrition, and general health and interferes with supportive parent-child patterns of interaction as well. Similarly, profound parental difficulties involving illegal drug use, abuse of alcohol, mental health concerns, and limited or inappropriate abilities and skills as caretakers also contribute to substantially increasing a child's vulnerability to developmental problems. In many of these situations, a child's risk for experiencing a general developmental delay, a learning difficulty, or a behavior problem, and even physical harm, is considerably elevated. These and other environmentally based difficulties often co-occur with biological risk factors or specific biologically

based conditions affecting the child, creating extraordinary barriers to optimal child development. Therefore, another critical component of early childhood intervention systems is to address risk and protective factors associated with a family's resources, to enable parents to provide as optimal a developmental environment as possible for their child.

SYSTEMS OF SUPPORT

Throughout history, all societies have developed at least informal systems of supports to nurture children within their communities, often involving extended families and community networks. This is especially the case during the early childhood period, primarily the time between birth through 5 years of age, which is the focus of this volume. Given the complexities and challenges of daily life in contemporary societies, many of these informal systems remain intact today but have been supplemented by more formal structures such as child care, preschool programs, and organized parent groups. The availability of these formal supports and their quality varies considerably from community to community, but nevertheless, such structures provide important resources for families during the early childhood years.

For clearly vulnerable children, a different and more comprehensive array of formal systems of support for families has emerged in modern societies. Instead of relying solely on grass roots community programs or market forces, formal support systems have been established in many countries around the world through a series of important legislative efforts (see Bruder & Guralnick, 2012). The legislative history of early intervention in the United States provides an interesting and instructive example of how these systems evolved (for reviews, see Hauser-Cram & Warfield, 2009; Trohanis, 2008). In brief, programs to support maternal and child health and development began with the establishment of the Children's Bureau in 1912 (see Lesser, 1985) and continue today in the context of the Social Security Act of 1935 (PL 74-271; mainly Title V and Title XIX) and related legislation (see Hutchins, 1994; Ireys & Nelson, 1992). Similarly, the Head Start program, and more recently the Early Head Start program, was developed and established across the nation, focused on providing early childhood supports to children living in poverty. Emphasizing the link between health and child development, these programs also continued efforts to establish a comprehensive array of community-based integrated services, designed to promote children's cognitive and social competence (Gilliam, 2008; Zigler & Valentine, 1979).

Although many of these early federally initiated programs involved children with established disabilities, widespread support for young children with disabilities did not occur until the United States Department of Education began to take responsibility (Long, 2013; Meisels & Shonkoff, 2000; Smith & McKenna, 1994; Wise & Richmond, 2008). Beginning with the Handicapped Children's Early Education Act of 1968 (PL 90-538), followed by the Education for All Handicapped Children Act of 1975 (PL 94-142), and culminating with the Education of the Handicapped Act Amendments of 1986 (PL 99-457), a formal support system for infants, toddlers, and preschoolers with established disabilities was put in place. Children with certain risk factors could also be served within this framework. Continuing legislation has refined and extended this early intervention system for vulnerable children and their families and encouraged adherence to program rules and regulations (Individuals with Disabilities Education Improvement Act [IDEA] of 2004, PL 108-446).

As a result of these and related initiatives, numerous model programs focusing on supports and interventions for vulnerable children and their families were developed, implemented, and evaluated. Many were adopted and modified by community programs for more widespread implementation. As part of this process, formal curricula to accompany these early intervention

programs were devised, new professional training programs were established, and creative connections among disciplines and agencies in the context of services and supports were forged. Indeed, despite the many flaws that are apparent today, a true early intervention system exists in the United States with the expectation that this system of services and supports represents the ideal combination of well-documented practices and sound clinical judgment.

CHARACTERISTICS OF THE EARLY INTERVENTION PROGRAMS

The characteristics of early intervention programs that emerged as part of the system that paralleled the comprehensive legislation in the United States outlined in the previous section developed unusually diverse characteristics. This is likewise the case for programs developed around the world during this period. In part, these wide-ranging differences were due to efforts to address the specific concerns of subgroups of vulnerable children with unique risks or disabilities, identified at different developmental periods. However, even considering this diversity, nearly overwhelming differences in philosophy, goals, approach, content, and emphases were apparent in the available early intervention programs (see Bailey, 1997; Bruder, 1997). Compounding this complexity was the fact that reasonably rigorous evaluations of effectiveness were spotty at best, with support for one or another model, curriculum, or program often being based on limited or inconsistent evidence. Replication, especially following sound methodologies meeting established standards suggesting that the models were evidence-based, was rare. Nevertheless, a comprehensive review of the state of the evidence for early intervention practices, conducted 10 years following the enactment of the Education of the Handicapped Act Amendments of 1986 (PL 99-457), captured the extraordinary creativity of the diverse interventions that were developed for vulnerable children birth through 5 years of age and identified those interventions and approaches that appeared to be most effective (Guralnick, 1997b). Additional efforts along these lines have continued as numerous new forms of intervention and models have become available and been evaluated. Many of these interventions have focused on specific subgroups of children (Guralnick, 2005b, 2012, 2013, 2017; Hill, Brooks-Gunn, & Waldfogel, 2003; Rogers & Talbott, 2016; Votruba-Drzal & Dearing, 2017). Moreover, some general systems guidelines, including essential structural features for early intervention programs supported by a research base as well as generally agreed upon values and principles, can now be found in legislation (Bruder, 2010; Guralnick & Conlon, 2007; Long, 2013). In fact, many of these principles and values have now achieved international consensus (Guralnick, 2008).

To be sure, the complexity and diversity of child risk and disability conditions and the circumstances of the families themselves have brought attention to specific groups and subgroups, as researchers and other professionals seek an understanding of the generality and limitations of intervention program accomplishments. Especially when examining the effectiveness of early intervention program practices, careful consideration must be given not only to what works, but also for whom and under what conditions. Considering outcomes within this framework of "second generation" research (Guralnick, 1997a, 2001) is clearly important, with the expected benefit of bringing research and practice into better alignment. However, in view of the complexity and diversity of programs that have evolved to meet individual child and family needs, an overarching vision is necessary to avoid becoming mired in myriad, often inconsistent, details of early intervention program philosophy, design, content, implementation, and outcome. Fortunately, this field may have reached the point in which it is now possible to attempt to organize and analyze these diverse accomplishments within a common framework and to have this framework serve as a guide to early

intervention decision making at all levels of research, practice, and community-based systems development. Although admittedly ambitious, the primary goal of this volume is to provide such a comprehensive understanding and to organize and examine the many recent accomplishments in the early intervention field within that framework. In so doing, the analyses of specific research findings themselves will be more meaningful, links between seemingly disparate areas will be established, the developmental mechanisms at work will become more apparent, and new directions for research will emerge. In addition, the ability to address future developmental, educational, clinical, and organizational issues within community programs in more creative and consistent ways may well be enhanced.

THE DEVELOPMENTAL SYSTEMS APPROACH

The overarching framework adopted to carry out these analyses is referred to as the Developmental Systems Approach (DSA; Guralnick, 2005a). Presented in the first three introductory chapters in this volume, the DSA emphasizes family patterns of interaction that are affected by the presence of a child at biological risk or one with an established disability, how those alterations in family patterns affect the provision of an optimal developmental environment for the child, and the role of early intervention in bringing about or restoring as optimal an environment as possible. The DSA also considers environmental risk factors in the form of limited family resources, which can increase child vulnerability operating through nonoptimal family patterns of interaction. As will be discussed, an essential feature of this framework is the ability of the DSA to integrate the developmental science of normative development, a developmental focus on risk and disability, and intervention science in the context of early intervention practice (Guralnick, 2001, 2006, 2011, 2017).

The DSA draws from a class of developmental models that have a systems orientation as a core concept (Lerner, Theokas, & Bobek, 2005; Sameroff, 2010). This includes the transactional model (Sameroff, 2009), the developmental psychobiological systems view (Gottlieb, Wahlstein, & Lickliter, 1998), the organizational perspective (Cicchetti & Tucker, 1994; Rutter & Sroufe, 2000), developmental systems theory (Ford & Lerner, 1992), bioecological theory (Bronfenbrenner, 2001; Bronfenbrenner & Morris, 1998), the parenting process model (Belsky, 1984), and dynamic systems theory (Thelen & Smith, 1998), among others. These systems approaches provide important insights into the interactions occurring among biological mechanisms, particularly those with a genetic basis, emerging developmental and behavioral patterns, and environmental influences.

At the heart of these systems models is an emphasis on the hierarchical organization of development. In this organization, the various components in the developmental system have the potential to interact with one another, to combine and recombine to form more complex subsystems, and to function in a manner that creates integrated developmental processes over time. This cascade of events as development proceeds is critical to understanding developmental systems (Bornstein, Hahn, & Wolke, 2013; Cox, Mills-Koonce, Propper, & Gariépy, 2010). The result is a coherent developmental trajectory in which children increasingly become socially and cognitively competent as they pursue goals of interest. Of importance, these systems developmental approaches also provide a framework for models focused on developmental risk and disabilities, including the highly influential developmental psychopathology approach (Cicchetti, 2006; Rutter & Sroufe, 2000) and the emerging model of neuroconstructivism (Karmiloff-Smith, 2009).

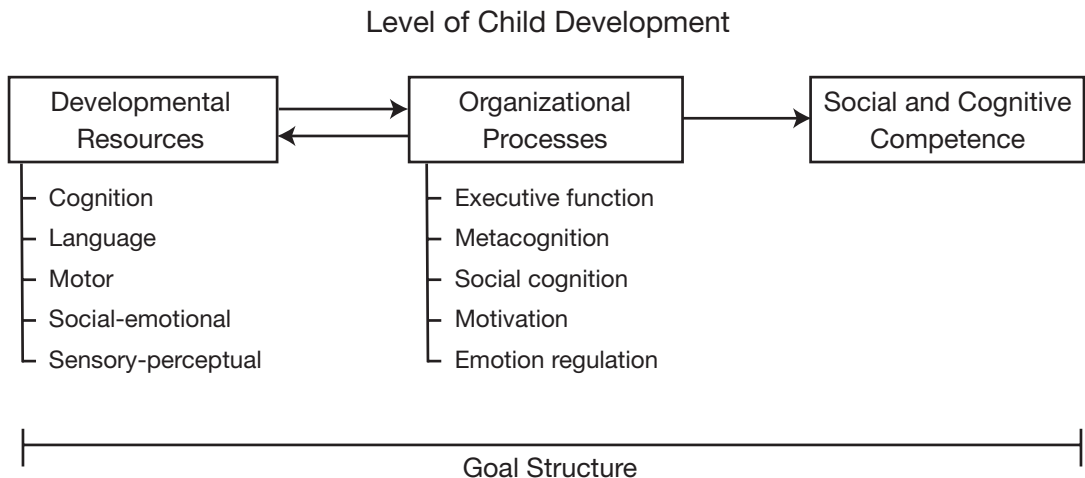## LEVEL OF CHILD DEVELOPMENT IN THE DEVELOPMENTAL SYSTEMS APPROACH

At the level of a child's development, two forms of related developmental constructs

are central to the DSA with respect to establishing children's competencies in carrying out social and cognitive tasks. The first emphasizes "developmental resources": fundamental contributions by each of the conventionally identified and defined major domains of development (cognition, language, motor, social-emotional, and sensory-perceptual) that underlie children's developing competence. These domain-specific abilities, skills, and knowledge become more differentiated over time as developmental resources become more numerous and complex. Moreover, when additional resources do become available to a child within a domain (e.g., increased vocabulary), more possibilities for combining resources within and across domains are created. In these instances, development is characterized by increasing degrees of integration. At the same time as these domain-specific patterns are emerging, the second construct, a series of organizational processes, develops. *Organizational processes* are higher-order processes that coordinate, integrate, and organize existing developmental resources, and do so in an integrated fashion when needed to achieve some child-specific goal. Five such organizational processes are central to the DSA: executive function (EF), metacognition, social cognition, motivation, and emotion regulation. When one or more of these organizational processes are engaged in a harmonious and synchronous manner to successfully address child-specific tasks or goals, children are said to display social and cognitive competence. Successful demonstrations of competence are generally consistent with normative and cultural expectations. Figure 1.1 illustrates the relationships among these major components of the DSA at the level of child development.

Notably, there exist well-identified and specific family patterns of interaction, described in detail in Chapter 2, that are essential to support both the growth, differentiation, and integration of children's developmental resources and the increased sophistication and functioning of organizational processes. This is the case even when children's developmental resources and organizational processes are constrained as a result of biologically based factors. However, the DSA further suggests that when children have established delays or disabilities or are at risk for developmental problems due primarily to biological factors, family patterns of interaction may become less than optimal (i.e., experience stressors), thereby compromising the development of a child's developmental resources and organizational processes even further.

Level of Child Development

Figure 1.1.   Model illustrating how organizational processes and developmental resources, framed by a goal structure, constitute the basis for a child's social and cognitive competence.

Moreover, various levels of child vulnerability can be created by nonoptimal family patterns of interaction that are already present as a consequence of limited family resources, such as the existence of environmental risk factors. Accordingly, within the DSA framework, early intervention must collaborate with families to devise strategies to establish, support, and enhance those family patterns of interaction that will have a positive impact on children's developmental resources and organizational processes. The net effect of these interventions will be seen in the enhanced development of children's social and cognitive competence, which becomes evident as they pursue important goals across developmental periods.

Developmental Goals

In many respects, the rapid developmental growth that occurs during the first few years of life can be viewed through the lens of children's increasing attempts to carry out an everchanging and more demanding series of goals or tasks. Indeed, such goal-directed behavior is evident in early infancy (Meltzoff, 1995; Woodward, 2009). As can be imagined, these goals span an enormous range of sophistication during the early childhood years, and the nature and complexity of those goals are governed by many factors, including accommodating to culturally specific demands (see Feldman & Masalha, 2010). At early stages, many goals are prompted by specific, often immediate, stress-reducing needs, such as maintaining one's physiological state within a certain range or coping with the experience of discomfort due to the temporary absence of a primary caregiver. However, other discrete goals such as exploring interesting objects are apparent as well. Over time, more sophisticated, longer-term, and complex goals that reflect ongoing efforts toward initiating, maintaining, and understanding relationships, as well as developing one's self-regulation, knowledge and skills, and self-efficacy, become more prominent. A key point is that the specific goals children seek to achieve are both constrained by and rely upon emerging developmental resources and organizational processes.

Developmental Resources

Children's developmental resources can be used effectively to achieve diverse goals and, of equal importance, to enable new and more sophisticated, often longer-term, goals to emerge. Consider the remarkable developmental changes in language ability that occur during early childhood as children become capable of both understanding and expressing complex linguistic forms. The ability to question, comment, and otherwise engage in meaningful discourse about the world constitutes a critical developmental resource. These changes in developmental resources are made possible through advances in phonology, dramatic increases in vocabulary, the emergence of morphosyntactical systems, and a grasp of the rules of discourse (for reviews, see Wagner & Hoff, 2012; Waxman & Lidz, 2006). The "units" or components of these language-based developmental resources continue to become differentiated within this developmental domain (e.g., larger vocabulary) and become more sophisticated (e.g., more complex syntax). Increasing as well is the ability to organize and recombine these resources in a hierarchical way. Access to all components of developmental resources associated with this domain contributes to children's continuing achievements in language development.

Similar advances can be found in the domain of cognitive development (for reviews, see Barr, 2006; Birney, Citron-Pousty, Lutz, & Sternberg, 2005; Feldman, 2013; Gelman, 2006). Early on, children display an initial grasp of many cognitive functions and use these abilities to further organize knowledge about how the world works. Reasoning skills, especially those regarding causality, also emerge early, as do cognitive abilities that enable children to begin to mentally represent their experiences

and expand their working memory (Garon, Bryson, & Smith, 2008; Schneider & Ornstein, 2015). Mental representation includes the social realm, as children begin to understand and reason about the mental states of others who interact with them (e.g., their intentions or emotions). As development proceeds, this ability, often referred to as "theory of mind" (Baron-Cohen, Tager-Flusberg, & Lombardo, 2013), becomes an essential developmental resource to help children achieve their interpersonal or social goals. Clearly, advances in cognition generate developmental resources in various forms that can be applied to child-specific goals (Halford & Andrews, 2006).

The processes underlying this remarkable growth are becoming increasingly well understood. Of most significance, it is evident that children's own actions with and observations of the physical and social world provide the "data" with which they generate hypotheses about the causal structure of the events they experience. Children appear to function as "rational constructivists," extracting principles from their experiences to generate higher-order and specific principles of understanding and action (Gopnik & Wellman, 2012; Walker & Gopnik, 2014; Xu & Kushnir, 2013). Statistical and inferential mechanisms drive these learning processes. Ideally, by being provided with as high-quality an array of family patterns of interaction as possible, children will have sufficient information to construct accurate representations of the world and generate principles to help them engage that world in a competent manner (see Meltzoff, Waismeyer, & Gopnik, 2012).

Conceptually distinct developmental resources can be measured and tracked. This is the case not only for cognition and language, but also for motor, social-emotional, and sensory-perceptual domains as well. Even for less easily defined social-emotional developmental resources, numerous useful instruments are available that utilize a variety of approaches (Brownell, Lemerise, Pelphrey, & Roisman, 2015). In general, excellent standardized assessment instruments that focus on developmental milestones and developmental levels are available, and equally valuable laboratory-type measures exist. These measurements can provide information regarding the current status of a child's developmental progress for discrete components (e.g., vocabulary count) or more organized subsystems (e.g., pragmatic language use).

Even though assessments of a child's current developmental status can be obtained in a domain-specific way, all domains are interdependent, especially throughout the early childhood period. That is, advances in one developmental resource domain typically depend on a corresponding level of development in other domains, thereby providing an illustration of the interactions occurring within a systems framework. For example, the mental state ability with respect to understanding the emotions, intentions, and desires of others depends upon corresponding advances in the domain of social-emotional development (for reviews, see Lewis, 2000; Thompson & Lagattuta, 2006). More specifically, for the domain of social-emotional development, the ability to recognize complex emotions is required for an accurate understanding of other's mental states, a cognitive domain. All of this relies upon developmental resources provided by intact sensory-perceptual abilities, such as visual acuity and spatial orientation of faces, which themselves become more differentiated and sophisticated over time (for reviews, see Kellman & Arterberry, 2006; Saffran, Werker, & Werner, 2006). Similarly, the deployment of attentional and motor skills in the context of parent-child exchanges, for example, are associated with later mental state language abilities. This suggests developmental continuity for this emerging developmental resource as well as linkages with experiential factors (Kristen, Sodian, Thoermer, & Perst, 2011). Fundamental cognitive abilities, such as information processing skills, also have the potential to influence so many domains and, ultimately, competencies over time, in conjunction with numerous experiential

influences (Bornstein, Hahn, & Wolke, 2013). Language, in particular, is dependent on cognitive skills related to memory, attention, processing speed, and representational competence (Rose, Feldman, & Jankowski, 2009). These cognitive skills facilitate language development in many ways, including helping to segment the auditory stream, processing rapidly changing speech, and assisting the child to shift attention and engage in different aspects of the social exchange in social communicative contexts. As another example, advances in most domains are expressed as motor behaviors. Developed at rapid race in the first 2 years of life, motor behaviors such as reaching, grasping, and manipulating are observable skills that allow children to communicate about their internal states and help them to generate new developmental resources to maximize their ability to accomplish their goals (Adolph & Berger, 2005). Indeed, motorically mature children set into motion what is best considered a developmental cascade of developmentally supportive (e.g., eliciting more learning opportunities and fostering exploration) events, leading to many developmental advances over time (Bornstein, Hahn, & Suwalsky, 2013).

Organizational Processes

Developmental resources are tapped when children are faced with accomplishing a particular goal; growth in social and cognitive competence corresponds to growth in these resources. However, in order for growth to occur, these resources must be coordinated, integrated, and organized in a systematic manner in the service of a task or goal. This requires a different and far more integrated array of higher-order or overarching processes, referred to here as organizational processes (see Figure 1.1). As conceptualized within the DSA, the five organizational processes noted earlier are as follows: 1) EF, 2) metacognition, 3) social cognition, 4) motivation, and 5) emotion regulation. These processes are the organizational forces for goal attainment. Moreover,

these processes are involved in specific efforts that enhance children's developmental resources (e.g., engage in tasks that gain specific information). In many instances, most or all five organizational processes are engaged to some extent, whether the goal is primarily social or cognitive.

Although difficult to define and measure, these five organizational processes are nevertheless central constructs in the field of child development. Each has been extensively analyzed, evaluated, and tracked over time and been linked to children's developing social and cognitive competence (e.g., for EF correspondence to social and cognitive competence, see Blair & Razza, 2007; as well as Riggs, Jahromi, Razza, Dilworth-Bart, & Mueller, 2006). In many respects, each of these organizational processes can be conceptualized as being composed of an organized system of higher-order components, which work together to constitute the organizational process itself; many of these organizational processes share some of the same components. Moreover, most of the organizational processes in the DSA have an identifiable neurobiological basis, characterized by interconnected neural systems (e.g., Blair, 2002; Grossman, 2015; Johnson, 2001; Yeates et al., 2007), with the availability and recombination of specific neural circuits underlying plasticity and competence (Johnson, 2000; Mercado, 2008).

EF is a higher-order cognitive process that frames all of the developmental resources and the other organizational processes in a manner that is consistent with a projected task outcome or goal; the focus is on long-term planning (see Anderson, 2002; Banich, 2009; Espy, 2016; as well as Welsh, Friedman, & Spieker, 2006). Although this construct, like the other organizational processes, has a unifying function (see Garon et al., 2008), EF relies on specific component abilities consisting, in this case, of working memory, attentional shifting, and the ability to inhibit a prepotent response or strategy in order to maintain a coherent goal orientation (Best & Miller, 2010; Blair, 2006; Blakey, Visser, & Carroll, 2016; Diamond, Barnett,

Thomas, & Munro, 2007). Although assessment of EF and its component processes is complex, major advances in the measurement of this organizational process during early childhood have been achieved with tasks appropriate to children in this age range (Carlson, 2005; Garon et al., 2008; Garon, Smith, & Bryson, 2014; McClelland & Cameron, 2012; Miller & Marcovitch, 2015).

The organizational process of metacognition overlaps conceptually with and, in some respects, can be thought of as being embedded within EF (Borkowski & Burke, 1996; Sternberg, 1998). However, a distinctive aspect of metacognitive processes is an emphasis on children's developing awareness of and knowledge about the strategies they can utilize when faced with a particular task (Kuhn, 2000), including those involving memory (Geurten & Willems, 2016). As Pintrich (2000) noted, metacognitive knowledge involves the what, how, when, and why to use the various cognitive strategies available, as well as the monitoring of those strategies. Complex strategies involved in knowledge acquisition, for example, provide information that can further refine and understand the goal being pursued (Kuhn, 2001). These knowledge acquisition activities are central to this organizational process and rely upon numerous strategies related to gaining access to information, formulating questions, and generating possible outcomes relevant to a given goal. Effective use of metacognitive strategies is the key to transferring knowledge from one situation to the next.

For goals that primarily require an understanding of social circumstances, a related organizational process, social cognition, can be identified. More specifically, when confronted by tasks or goals involving interpersonal problem solving, a number of social-cognitive components are relevant that, together, form a coherent organizational process. Components of that process include encoding social information, interpreting that social information, generating alternative responses, and considering contextual information that will help a child most appropriately select and execute a particular response during a goal sequence. A number of such social-cognitive or social-information processing models have been put forward, each containing many similar components and mechanisms (Beauchamp & Anderson, 2010; Crick & Dodge, 1994; Dodge, Pettit, McClaskey, Brown, & Gottman, 1986; Guralnick, 1999; Lemerise & Arsenio, 2000; Rose-Krasnor, 1997). As is the case for all of the organizational processes, developmental resources are drawn upon to support each of the processes' components. Examples of relevant developmental resources required for the various components of the social cognition organizational process are the ability to accurately recognize facial expressions (for the encoding component), the ability to infer others' social intentions (for the interpreting component), having a repertoire of prosocial responses or strategies available (for the generating alternative responses component), and having sufficient language or motor skills (for the executing the desired response component). The selection of alternative responses in any interpersonal problem-solving sequence is a complex process in which many factors need to be considered (e.g., context, past history, friend/nonfriend). Accordingly, many aspects of metacognitive and EF organizational processes also are involved in socially focused tasks.

The vigor and persistence with which goals are addressed, and even the frequency and choice of the goals themselves, are closely linked to the fourth organizational process involving motivation and reward systems (Morgan, MacTurk, & Hrncir, 1995). The sometimes astounding level of focused and sustained attention that may be seen even in young children as they strive to master a particular toy or understand how objects in the world work suggests the power of this process (Piaget, 1952). The seemingly constant effort to acquire information through questioning provides another example of this motivational process (Frazier, Gelman, & Wellman, 2009) and serves as an important mechanism for transmitting cultural values. For children so

involved, these activities are clearly highly rewarding and appear to be intrinsically motivated. There also exists a tendency to engage in or master goals that are primarily social in nature and can be thought of as a form of social mastery motivation (Wachs & Combs, 1995), with a corresponding degree of socially rewarding features. Over time, successes and failures in social and nonsocial tasks influence motivational processes and contribute to the creation of a child's sense of self-efficacy. Ultimately, a set of beliefs, values, and goal structures emerge regarding a child's expectations for his or her own success and failure with respect to specific goals; in other words, the child's expectations for achievement (Pintrich, 2000; Ryan & Deci, 2000; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Accordingly, the organizational process of motivation has widespread implications for children's social and cognitive competence and, ultimately, the selection of goals to be attempted.

The fifth and final organizational process, emotion regulation, is conceptualized primarily as a process that can influence the outcomes of social or cognitive goals through its interactions with other organizational processes (see Cole, Martin, & Dennis, 2004; Eisenberg & Spinrad, 2004). Among other effects, the experience of an emotion influences attention and makes certain responses or strategies within a goal structure more probable. This involves appraisals of the emotion-generating situation that regulate tendencies to approach or avoid aspects of a task. Of importance, regulating these emotions is an effortful process (Rothbart & Rueda, 2005) that consists of strategies that alter the often highly charged and rapidly changing emotional experiences that can arise at any point during goal attainment activities (see Izard & Stark, 2008). If these emotion regulation strategies are successful, the result is an adaptive process that either facilitates or at least does not interfere with other organizational processes that are acting in concert to address a specific goal (Spinrad et al.,

2007). Of note, influences by developmental resources related to social-emotional development, particularly basic tendencies toward reactive control (e.g., impulsivity/low inhibition), are to be expected (Eisenberg et al., 2013).

Although organizational processes can be parsed into the constructs described herein and measured accordingly, one of the most striking characteristics of these organizational processes is their interdependence. In one sense, processes can be thought of as "borrowing" and utilizing well-developed components or series of components from one another and applying those components, when required to do so, by a given task, social or nonsocial (Beer & Ochsner, 2006; Kaplan & Berman, 2010). Inhibition and attention are components that are commonly utilized by various processes within specific goal structures. Moreover, reciprocal influences among these organizational processes are apparent, and many of the mechanisms of influence have been identified (Liew, 2012). The linkages among metacognition, social cognition, and EF are perhaps most apparent in tasks related to social competence goals (Guralnick, 1999; Yeates et al., 2007). Related linkages from these three processes to motivation and emotion regulation organizational processes exist as well, with perhaps the best example found in so-called "hot" EF that is engaged in tasks requiring emotion regulation (Blair, 2002; Zelazo & Carlson, 2012; Zelazo & Cunningham, 2007). Linkages between social cognition and emotion regulation (Bell & Wolfe, 2004; Dodge, 1991; Guralnick, 1999; Leerkes, Paradise, O'Brien, Calkins, & Lange, 2008; Yeates et al., 2007) and between EF and motivation (Borkowski & Burke, 1996) are particularly well established.

Similarly, as reflected in Figure 1.1 and noted previously, developmental resources and organizational processes depend on one another as goals are pursued. In addition, they mutually influence one another's development. The relationship between theory of mind and EF provides a good example

(Benson, Sabbagh, Carlson, & Zelazo, 2013), as does the association between attentional or information processing mechanisms and EF (Cuevas & Bell, 2014). Associations among early gesture, language, and EF have also been established (Kuhn et al., 2014). Clearly, an understanding of these interactions and relationships requires a systems framework.

As indicated earlier, substantial neurobiological evidence supports the integrated features and connectivity of neural systems along with regional specialization. This is most apparent with respect to the operation of organizational processes when engaged in a goal structure (Blair, 2006; Garon et al., 2008; Johnson, 2001; Karmiloff-Smith, 2009; Yeates et al., 2007). Accordingly, evidence at this level is compatible with the ways in which the five organizational processes identified within the DSA are presumed to function to support children's social and cognitive competence.

ORGANIZATION AND PURPOSE OF THIS BOOK

The DSA was introduced in this chapter as an overarching framework that will serve to guide understanding of existing accomplishments in the field of early intervention for vulnerable children and their families and to plan future directions. Details of this approach to early intervention as applied to different groups of vulnerable children will be presented in subsequent chapters of this volume. Of importance, central to the DSA is its consistency with and integration of the developmental science of normative development, a developmental focus on risk and disability, and intervention science. This first chapter provided background information on normative child development as conceptualized within the DSA, particularly the role of developmental resources and organizational processes as the foundation for children's emerging social and cognitive competence. Emphasized in the discussion was the hierarchical, mutually interactive,

and integrative nature of child development and the way it is organized to achieve increasingly complex goals selected by the child.

In the next chapter, specific environmental factors are discussed in the form of family patterns of interaction that are responsible for supporting and promoting children's developmental resources and organizational processes, and hence children's social and cognitive competence. Three family patterns of interaction are identified (parent-child transactions; family orchestrated child experiences; health and safety provided by the family) and are directly linked to numerous aspects of a child's development discussed in this chapter. Indeed, it is suggested that these family patterns of interaction apply to all children, irrespective of vulnerability. In anticipation of future discussions regarding early intervention for developmentally vulnerable children, it is these family patterns of interaction that can be stressed or perturbed by a child at risk for developmental problems or one with an established delay or disability, thereby further increasing children's vulnerability. The relationship between a family's resources and their influence on family patterns of interaction is also considered in the next chapter and serves as a framework for understanding the influences of environmental risk as well as protective factors from a systems perspective. Accordingly, as discussed in the second chapter, within the DSA framework, effective early interventions are those that develop comprehensive programs to establish, support, or enhance all three family patterns of interaction as means of fostering children's developmental resources and organizational processes as well as their integration to promote children's social and cognitive competence.

Early intervention in the context of the DSA is then considered more extensively in Chapter 3, the final introductory chapter. Emphasized in this chapter is the array of child risk and protective factors for vulnerable children that can create challenges to

family patterns of interaction and to family resources. This interactive pattern of complex developmental pathways among and within the three levels of the DSA (level of the child, level of family patterns of interaction, level of family resources) provides a framework for the design, implementation, and evaluation of early intervention programs.

This is followed by four sections with chapters applying the DSA framework to examine the developmental science and the effectiveness of early intervention for specific vulnerable groups: children at risk due to biological factors (preterm birth); children at risk due to environmental factors; children with established developmental (cognitive) delays; and children with or at risk for an ASD diagnosis. The first chapter in each section addresses developmental science. In particular, expected child developmental outcomes in terms of their social and cognitive competence that occurs in the absence of early intervention will be summarized. When possible, information will be related to children's developmental resources and organizational processes. Accordingly, a profile of children's characteristics will be established along with child-specific factors that should be considered in the provision of early intervention. Information will also be summarized with respect to children's influences (adjustments required and stressors) on each of the family patterns of interaction as well as on a family's resources that can inform early intervention program design. Possible developmental mechanisms as revealed by association studies connecting the various levels and components of the DSA will also be examined in this context.

Following this background and introductory information, the following chapter in each section consists of an analysis of the effectiveness of existing early intervention strategies and programs within the framework of the DSA based on the available literature. More specifically, how intervention science addresses the stressors identified for each risk and delay or disability group

and how effective these strategies are will be the key issues considered in those chapters. Consistency with the developmental pathways and reciprocal influences described in the DSA will also be discussed.

Findings from intervention science that have been published since 1997 will be the primary focus, moving forward from the research summarized since my last comprehensive review of the field in an edited volume (Guralnick, 1997b). Earlier investigations that are considered foundational studies or those that continue to follow children and examine longer-term outcomes will also be included. No attempt will be made to include every major study that bears on early intervention effectiveness for each group examined. Rather, studies will be selected because they provide new and useful information about effectiveness, are representative of a group of similar studies with similar findings, and provide sufficient information that can be understood within the DSA. Bias in the selection of studies is admittedly a concern. However, every effort was made to select studies that represent the knowledge base current at the time of this volume's publication, despite inconsistencies in findings common to all fields. Readers will have to judge for themselves the various weight to give to the studies selected and those that may have been omitted.

An important question revolves around whether sufficient consistency exists among the developmental framework, pathways of influence, and outcomes. If a reasonable level of consistency can be identified, there exists the potential for generating a unifying approach to early intervention. Studies that have been conducted did not, of course, attempt to conform to the DSA. However, every effort will be made to interpret and understand these studies within that framework, especially with respect to developmental mechanisms. In so doing, these analyses can be informative in evaluating the overall validity of the causal patterns discussed in more detail in Chapter 3 and illustrated in Figure 3.1 for the various groups

of vulnerable children, as well as determine the extent to which children benefit from these approaches to early intervention.

Detailed critiques of each investigation included in the analysis, both conceptual or methodological, as is common in analyses of this type, will not be the focus of each of the chapters. Certainly, these issues are relevant and will be discussed as appropriate, as that information is essential in order to identify those early intervention practices in which early intervention professionals can have the most confidence. In the end, it is hoped that this type of integrative analysis, one framed within a specific conceptual approach, will result in the identification of practices likely to produce the most effective early intervention outcomes. Moreover, this analysis and corresponding overall framework should be capable of identifying tasks that remain to be accomplished in the early intervention field and perhaps even suggest principles that have broad systems and practice relevance.

It is important to point out that this volume does not seek to address children with all risk and disability conditions. This reflects both limits to the author's expertise as well as limitations in the existing research literature to contribute to an understanding within the DSA. In particular, children with primary sensory or motor disorders will not be considered. Similarly, no separate chapter addresses children who exhibit language and communication disorders that are not associated with the vulnerable groups specifically considered in this volume. However, language and communication issues are obviously critical and are discussed and integrated within the other chapters. Nevertheless, the four vulnerable groups selected for consideration in this volume are highly prevalent, each with a well-defined and well-organized literature. Moreover, although many children in each of the four groups discussed display an increased incidence of behavior problems, that important issue is not directly considered here. Although separate analyses will be required to address children's behavior

problems, recent approaches suggest that the DSA can contribute to understanding of relevant developmental mechanisms in this complex area (Crnic, Neece, McIntyre, Blacher, & Baker, 2017).

Despite these limitations, in the final chapter I will attempt to identify general principles and practices that apply across all groups examined within a systems perspective. These principles and practices will then provide the foundation and vision for a proposal that applies the DSA to the design and implementation of comprehensive and inclusive community-based systems of early intervention.

REFERENCES

Adolph, K. E., & Berger, S. E. (2005). Physical and motor development. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science: An advanced textbook* (5th ed., pp. 223–281). Hillsdale, NJ: Erlbaum.

Anderson, P. (2002). Assessment and development of executive function (EF) during childhood. *Child Neuropsychology*, *8*, 71–82. Retrieved from http://offcampus.lib.washington.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=9382714&site=ehost-live

Bailey, D. B., Jr. (1997). Evaluating the effectiveness of curriculum alternatives for infants and preschoolers at high risk. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 227–247). Baltimore, MD: Paul H. Brookes Publishing Co.

Banich, M. T. (2009). Executive function: The search for an integrated account. *Current Directions in Psychological Science*, *18*, 89–94. http://dx.doi.org/10.1111/j.1467-8721.2009.01615.x

Baron-Cohen, S., Tager-Flusberg, H., & Lombardo, M. V. (Eds.). (2013). *Understanding other minds: Perspectives from autism and developmental cognitive neuroscience* (3rd ed.). Oxford, United Kingdom: University Press.

Barr, R. (2006). Developing social understanding in a social context. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 188–207). Malden, MA: Blackwell.

Beauchamp, M. H., & Anderson, V. (2010). SOCIAL: An integrative framework for the development of social skills. *Psychological Bulletin*, *136*, 39–64. http://dx.doi.org/10.1037/a0017768

Beer, J. S., & Ochsner, K. N. (2006). Social cognition: A multi level analysis. *Brain Research*, *1079*, 98–105. http://dx.doi.org/10.1016/j.brainres.2006.01.002

Bell, M. A., & Wolfe, C. D. (2004). Emotion and cognition: An intricately bound developmental process. *Child Development*, *75*, 366–370. http://dx.doi.org/10.1111/j.1467-8624.2004.00679.x

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, *55*, 83–96. http://dx.doi.org/10.2307/1129836

Benson, J. E., Sabbagh, M. A., Carlson, S. M., & Zelazo, P. D. (2013). Individual differences in executive functioning predict preschoolers' improvement from theory-of-mind training. *Developmental Psychology*, *49*, 1615–1627. http://dx.doi.org/10.1037/a0031056

Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child Development*, *81*, 1641–1660. http://dx.doi.org/10.1111/j.1467-8624.2010.01499.x

Birney, D. P., Citron-Pousty, J. H., Lutz, D. J., & Sternberg, R. J. (2005). The development of cognitive and intellectual abilities. In M. E. Lamb & M. H. Bornstein (Eds.), *Developmental science: An advanced textbook* (5th ed., pp. 327–358). Mahwah, NJ: Lawrence Erlbaum Associates.

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist*, *57*, 111–127. http://dx.doi.org/10.1037//0003-066X.57.2.111

Blair, C. (2006). How similar are fluid cognition and general intelligence? A developmental neuroscience perspective on fluid cognition as an aspect of human cognitive ability. *Behavioral and Brain Sciences*, *29*, 109–160. http://dx.doi.org/10.1017/S0140525X06009034

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, *78*, 647–663. http://dx.doi.org/10.1111/j.1467-8624.2007.01019.x

Blakey, E., Visser, I., & Carroll, D. J. (2016). Different executive functions support different kinds of cognitive flexibility: Evidence from 2-, 3-, and 4-year olds. *Child Development*, *87*, 513–526. http://dx.doi.org/10.1111/cdev.12468

Borkowski, J. G., & Burke, J. E. (1996). Theories, models, and measurements of executive functioning. In G. R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory, and executive function* (pp. 235–261). Baltimore, MD: Paul H. Brookes Publishing Co.

Bornstein, M. H., Hahn, C.-S., & Suwalsky, J. T. D. (2013). Physically developed and exploratory young infants contribute to their own long-term academic achievement. *Psychological Science*, *24*, 1906–1917. http://dx.doi.org/10.1177/0956797613479974

Bornstein, M. H., Hahn, C.-S., & Wolke, D. (2013). Systems and cascades in cognitive development and academic achievement. *Child Development*, *84*, 154–162. http://dx.doi.org/10.1111/j.1467-8624.2012.01849.x

Bronfenbrenner, U. (2001). Bioecological theory of human development. In N. J. Smelser & B. P. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (Vol. 10, pp. 6963–6970). New York, NY: Elsevier.

Bronfenbrenner, U., & Morris, P. (1998). The ecology of developmental processes. In W. C. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol 1. Theoretical models of human development* (5th ed., pp. 993–1028). New York, NY: John Wiley & Sons.

Brownell, C. A., Lemerise, E. A., Pelphrey, K. A., & Roisman, G. I. (2015). Measuring socioemotional development. In R. M. Lerner & M. E. Lamb (Eds.), *Handbook of child psychology and developmental science* (7th ed., Vol. 3, pp. 11–56). Hoboken, NJ: John Wiley & Sons.

Bruder, M. B. (1997). The effectiveness of specific educational/developmental curricula for children with established disabilities. In M. J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 523–548). Baltimore, MD: Paul H. Brookes Publishing Co.

Bruder, M. B. (2010). Early childhood intervention: A promise to children and families for their future. *Exceptional Children*, *76*, 339–355. http://dx.doi.org/10.1177/001440291007600306

Bruder, M. B., & Guralnick, M. J. (2012). From the editor. *Infants and Young Children*, *25*, 267–269. http://dx.doi.org/10.1097/IYC.0b013e31826d8242

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology*, *28*, 595–616. http://dx.doi.org/10.1207/s15326942dn2802_3

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.

Cicchetti, D., & Tucker, D. (1994). Development and self-regulatory structures of the mind. *Development and Psychopathology*, *6*, 533–549. http://dx.doi.org/10.1017/S0954579400004673

Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development*, *75*, 317–333. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=15056186

Cox, M. J., Mills-Koonce, R., Propper, C., & Gariépy, J.-L. (2010). Systems theory and cascades in developmental psychopathology. *Development and Psychopathology*, *22*, 497–506. http://dx.doi.org/10.1017/S0954579410000234

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74–101. http://dx.doi.org/10.1037/0033-2909.115.1.74

Crnic, K. A., Neece, C. L., McIntyre, L. L., Blacher, J., & Baker, B. L. (2017). Intellectual disability and developmental risk: Promoting intervention to improve child and family well-being. *Child Development*, *88*, 436–445. http://dx.doi.org/10.1111/cdev.12740

Cuevas, K., & Bell, M. A. (2014). Infant attention and early childhood executive function. *Child Development*, *85*, 397–404. http://dx.doi.org/10.1111/cdev.12126

Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science*, *318*, 1387–1388. http://dx.doi.org/10.1126/science.1151148

Dodge, K. A. (1991). Emotion and social information processing. In J. Garber & K. A. Dodge (Eds.), *The development of emotion regulation and dysregulation* (pp. 159–181). Cambridge, United Kingdom: Cambridge University Press.

Dodge, K. A., Pettit, G. S., McClaskey, C. L., Brown, M. M., & Gottman, J. (1986). Social competence in children. *Monographs of the Society for Research in Child Development*, *51*, i–85. http://dx.doi.org/10.2307/1165906

Education for All Handicapped Children Act of 1975, PL 94-142, 20 U.S.C. §§ 1400 *et seq.*

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

Eisenberg, N., Edwards, A., Spinrad, T. L., Sallquist, J., Eggum, N. D., & Reiser, M. (2013). Are effortful and reactive control unique constructs in young children? *Developmental Psychology*, *49*, 2082–2094. http://dx.doi.org/10.1037/a0031745

Eisenberg, N., & Spinrad, T. L. (2004). Emotion-related regulation: Sharpening the definition. *Child Development*, *75*, 334–339. http://dx.doi.org/10.1111/j.1467-8624.2004.00674.x

Espy, K. A. (Ed.). (2016). *The changing nature of executive control in preschool* (Vol. 81). Boston, MA: John Wiley and Sons.

Feldman, D. H. (2013). Cognitive development in childhood: A contemporary perspective. In R. M. Lerner, M. A. Easterbrooks, & J. Mistry (Eds.), *Handbook of psychology* (Vol. 6, pp. 197–213). New York, NY: John Wiley & Sons.

Feldman, R., & Masalha, S. (2010). Parent-child and triadic antecedents of children's social competence: Cultural specificity, shared process. *Developmental Psychology*, *46*, 455–467. http://dx.doi.org/10.1037/a0017415

Ford, D. H., & Lerner, R. M. (1992). *Developmental systems theory: An integrative approach*. Thousand Oaks, CA: Sage.

Frazier, B. N., Gelman, S. A., & Wellman, H. M. (2009). Preschoolers' search for explanatory information within adult and child conversation. *Child Development*, *80*, 1592–1611. http://dx.doi.org/10.1111/j.1467-8624.2009.01356.x

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin*, *134*, 31–60. http://dx.doi.org/10.1037/0033-2909.134.1.31

Garon, N., Smith, I. M., & Bryson, S. E. (2014). A novel executive function battery for preschoolers: Sensitivity to age differences. *Child Neuropsychology*, *20*, 713–736. http://dx.doi.org/10.1080/09297049.2013.857650

Gelman, S. A. (2006). Early conceptual development. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 149–166). Malden, MA: Blackwell.

Geurten, M., & Willems, S. (2016). Metacognition in early childhood: Fertile ground to understand memory development? *Child Development Perspectives*, *10*, 263–268. http://dx.doi.org/10.1111/cdep.12201

Gilliam, W. S. (2008). Head Start's evolving model of collaboration, early education, and family support: Comments from the guest editor. *Infants and Young Children*, *21*, 2–3. http://dx.doi.org/10.1097/01.IYC.0000306368.94672.ad

Gopnik, A., & Wellman, H. M. (2012). Reconstructing constructivism: Causal models, Bayesian learning mechanisms, and the theory. *Psychological Bulletin*, *138*, 1085–1108. http://dx.doi.org/10.1037/a0028044

Gottlieb, G., Wahlstein, D., & Lickliter, R. (1998). The significance of biology for human development: A developmental psychobiological systems view. In W. Damon & R. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (5th ed., pp. 233–274). New York, NY: John Wiley & Sons.

Grossman, T. (2015). The development of social brain functions in infancy. *Psychological Bulletin*, *141*, 1266–1287. http://dx.doi.org/10.1037/bul0000002

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: Paul H. Brookes Publishing Co.

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

Guralnick, M. J. (1999). Family and child influences on the peer-related social competence of young children with developmental delays. *Mental Retardation and Developmental Disabilities Research Reviews*, *5*, 21–29. http://dx.doi.org/10.1002/(SICI)1098-2779(1999)5:1<21::AID-MRDD3>3.0.CO;2-O

Guralnick, M. J. (2001). Connections between developmental science and intervention science. *Zero to Three*, *21*, 24–29.

Guralnick, M. J. (Ed.). (2005a). *The developmental systems approach to early intervention.* Baltimore, MD: Paul H. Brookes Publishing Co.

Guralnick, M. J. (2005b). Early intervention for children with intellectual disabilities: Current knowledge and future prospects. *Journal of Applied Research in Intellectual Disabilities*, *18*, 313–324. http://dx.doi.org/10.1111/j.1468-3148.2005.00270.x

Guralnick, M. J. (2006). Family influences on early development: Integrating the science of normative development, risk and disability, and intervention. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 44–61). Malden, MA: Blackwell.

Guralnick, M. J. (2008). International perspectives on early intervention: A search for common ground. *Journal of Early Intervention*, *30*, 90–101. http://dx.doi.org/10.1177/1053815107313483

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

Guralnick, M. J. (2012). Preventive interventions for preterm children: Effectiveness and developmental mechanisms. *Journal of Developmental and Behavioral Pediatrics*, *33*, 352–364. http://dx.doi.org/10.1097/DBP.0b013e31824eaa3c

Guralnick, M. J. (2013). Developmental science and preventive interventions for children at environmental risk. *Infants and Young Children*, *26*, 270–285. http://dx.doi.org/10.1097/IYC.0b013e3182a6832f

Guralnick, M. J. (2017). Early intervention for children with intellectual disabilities: An update. *Journal of Applied Research in Intellectual Disabilities*, *30*, 211–229. http://dx.doi.org/10.1111/jar.12233

Guralnick, M. J., & Conlon, C. (2007). Early intervention. In M. L. Batshaw, L. Pelligrino, & N. Roizen (Eds.), *Children with disabilities* (6th ed., pp. 511–521). Baltimore, MD: Paul H. Brookes Publishing Co.

Halford, G. S., & Andrews, G. (2006). Reasoning and problem solving. In D. Kuhn & R. Siegler (Eds.), *Handbook of child psychology: Vol. 2. Language and perceptual development* (6th ed., pp. 557–608). Hoboken, NJ: John Wiley & Sons.

Handicapped Children's Early Education Act of 1968, PL 90-538, 20 U.S.C. §§ 621 *et seq.*

Hauser-Cram, P., & Warfield, M. E. (2009). Early intervention services. In W. B. Carey, A. C. Crocker, W. L. Coleman, E. R. Elias, & H. M. Feldman (Eds.), *Developmental-behavioral pediatrics* (4th ed., pp. 923–932). Philadelphia, PA: Elsevier.

Hill, J. L., Brooks-Gunn, J., & Waldfogel, J. (2003). Sustained effects of high participation in an early intervention for low-birth-weight premature infants. *Developmental Psychology*, *39*, 730–744. http://dx.doi.org/10.1037/0012-1649.39.4.730

Hutchins, V. L. (1994). Maternal and Child Health Bureau: Roots. *Pediatrics*, *94*, 695–699. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=7936898

Individuals with Disabilities Education Improvement Act (IDEA) of 2004, PL 108-446, 20 U.S.C. §§ 1400 *et seq.*

Ireys, H. T., & Nelson, R. P. (1992). New federal policy for children with special health care needs: Implications for pediatricians. *Pediatrics*, *90*, 321–327. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=1387706

Izard, C. E., & Stark, K. (2008). Beyond emotion regulation: Emotion utilization and adaptive functioning. *Child Development Perspectives*, *2*, 156–163. http://dx.doi.org/http://dx.doi.org/10.1111/j.1750-8606.2008.00058.x

Johnson, M. (2000). Functional brain development in infants: Elements of an interactive specialization framework. *Child Development*, *71*, 75–81. http://dx.doi.org/10.1111/1467-8624.00120

Johnson, M. H. (2001). Functional brain development in humans. *Nature Reviews Neuroscience*, *2*, 475–483. http://dx.doi.org/10.1038/3508150935081509

Kaplan, S., & Berman, M. G. (2010). Directed attention as a common resource for executive functioning and self-regulation. *Perspectives on Psychological Science*, *5*, 43–57. http://dx.doi.org/10.1177/1745691609356784

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

Kellman, P. J., & Arterberry, M. A. (2006). Infant visual perception. In D. Kuhn & R. Siegler

(Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (6th ed., pp. 109–160). Hoboken, NJ: Wiley.

Kristen, S., Sodian, B., Thoermer, C., & Perst, H. (2011). Infants' joint attention skills predict toddlers' emerging mental state language. *Developmental Psychology*, *47*, 1207–1219. http://dx.doi.org/10.1037/a0024808

Kuhn, D. (2000). Metacognitive development. *Current Directions in Psychological Science*, *9*, 178–181. http://dx.doi.org/10.1111/1467-8721.00088

Kuhn, D. (2001). Why development does (and does not) occur: Evidence from the domain of inductive reasoning. In J. L. McClelland & A. S. Siegler (Eds.), *Mechanisms of cognitive development: Behavioral and neural perspectives* (pp. 221–249). Mahwah, NJ: Lawrence Erlbaum.

Kuhn, L., Willoughby, M. T., Wilbourn, M. P., Vernon-Feagans, L., Blair, C. B., & The Family Life Project Key Investigators. (2014). Early communicative gestures prospectively predict language development and executive function in early childhood. *Child Development*, *85*, 1898–1914. http://dx.doi.org/10.1111/cdev.12249

Leerkes, E. M., Paradise, M., O'Brien, M., Calkins, S. D., & Lange, G. (2008). Emotion and cognition processes in preschool children. *Merrill-Palmer Quarterly*, *54*, 102–124. Retrieved from http://www.jstor.org/stable/23096081

Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development*, *71*, 107–118. http://dx.doi.org/10.1111/1467-8624.00124

Lerner, R. M., Theokas, C., & Bobek, D. L. (2005). Concepts and theories of human development: Historical and contemporary dimensions. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science* (5th ed., pp. 3–44). Mahwah, NJ: Lawrence Erlbaum.

Lesser, A. J. (1985). The origin and development of maternal and child health programs in the United States. *American Journal of Public Health*, *75*, 590–595. http://dx.doi.org/10.2105/AJPH.75.6.590

Lewis, M. (2000). The emergency of human emotions. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 265–280). New York, NY: Guilford Press.

Liew, J. (2012). Effortful control, executive functions, and education: Bringing self-regulatory and social-emotional competencies to the table. *Child Development Perspectives*, *6*, 105–111. http://dx.doi.org/10.1111/j.1750-8606.2011.00196.x

Long, T. (2013). Early intervention. In M. L. Batshaw, N. J. Roizen, & G. R. Lotrecchiano (Eds.), *Children with disabilities* (7th ed., pp. 547–557). Baltimore, MD: Paul H. Brookes Publishing Co.

McClelland, M. M., & Cameron, C. E. (2012). Self-regulation in early childhood: Improving conceptual clarity and developing ecologically valid measures. *Child Development Perspectives*, *6*, 136–142. http://dx.doi.org/10.1111/j.1750-8606.2011.00191.x

Meisels, S. J., & Shonkoff, J. P. (2000). Early childhood intervention: A continuing evolution. In J. Shonkoff & S. J. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 3–31). New York, NY: Cambridge University Press.

Meltzoff, A. N. (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology*, *31*, 838–850. http://dx.doi.org/10.1037/0012-1649.31.5.838

Meltzoff, A. N., Waismeyer, A., & Gopnik, A. (2012). Learning about causes from people: Observational causal learning in 24-month-old infants. *Developmental Psychology*, *48*, 1215–1228. http://dx.doi.org/10.1037/a0027440

Mercado, E., III. (2008). Neural and cognitive plasticity: From maps to minds. *Psychological Bulletin*, *134*, 109–137. http://dx.doi.org/10.1037/0033-2909.134.1.109

Miller, S. E., & Marcovitch, S. (2015). Examining executive function in the second year of life: Coherence, stability, and relations to joint attention and language. *Developmental Psychology*, *51*, 101–114. http://dx.doi.org/10.1037/a0038359

Morgan, G. A., MacTurk, R. H., & Hrncir, E. J. (1995). Mastery motivation: Overview, definitions and conceptual issues. In R. H. MacTurk & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations, and applications* (pp. 1–18). Norwood, NJ: Ablex.

Piaget, J. (1952). *The origins of intelligence in children.* New York, NY: International Universities Press.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451–502). San Diego, CA: Academic Press.

Riggs, N. R., Jahromi, L. B., Razza, R. P., Dilworth-Bart, J. E., & Mueller, U. (2006). Executive function and the promotion of social-emotional competence. *Journal of Applied Developmental Psychology*, *27*, 300–309. http://dx.doi.org/10.1016/j.appdev.2006.04.002

Rogers, S. J., & Talbott, M. R. (2016). Early identification and early treatment of autism spectrum disorder. *International Review of Research in Developmental Disabilities*, *50*, 233–275. http://dx.doi.org/10.1016/bs.irrdd.2016.05.004

Rose, S. A., Feldman, J. F., & Jankowski, J. J. (2009). Information processing in toddlers: Continuity from infancy and persistence of preterm deficits. *Intelligence*, *37*, 311–320. http://dx.doi.org/10.1016/j.intell.2009.02.002

Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, *6*, 111–135. http://dx.doi.org/10.1111/j.1467-9507.1997.tb00097.x

Rothbart, M. K., & Rueda, M. R. (2005). The development of effortful control. In U. Mayr, E. Awh, & S. W. Keele (Eds.), *Developing individuality in the human brain: A tribute to Michael I. Posner* (pp. 167–188). Washington, DC: American Psychological Association.

Rutter, M., & Sroufe, L. A. (2000). Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*, *12*, 265–296. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=11014739

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78. http://dx.doi.org/10.1037/0003-066X.55.1.68

Saffran, J. R., Werker, J. F., & Werner, L. A. (2006). The infant's auditory world: Hearing, speech, and the beginnings of language. In D. Kuhn & R. Siegler (Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (6th ed., pp. 58–108). Hoboken, NJ: Wiley.

Sameroff, A. J. (2009). The transactional model. In A. J. Sameroff (Ed.), *The transactional model of development* (pp. 3–21). Washington, DC: American Psychological Association

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

Schneider, W., & Ornstein, P. A. (2015). The development of children's memory. *Child Development Perspectives*, *9*, 190–195. http://dx.doi.org/10.1111/cdep.12129

Smith, B. J., & McKenna, P. (1994). Early intervention public policy: Past, present, and future. In L. J. Johnson, R. J. Gallagher, M. J. LaMontagne, J. B. Jordan, J. J. Gallagher, P. L. Hutinger, & M. B. Karnes (Eds.), *Meeting early intervention challenges* (pp. 251–264). Baltimore, MD: Paul H. Brookes Publishing Co.

Social Security Act of 1935, PL 74-271, 42 U.S.C. §§ 301 *et seq.*

Spinrad, T. L., Eisenberg, N., Gaertner, B., Popp, T., Smith, C. L., Kupfer, A., . . . Hofer, C. (2007). Relations of maternal socialization and toddlers' effortful control to children's adjustment and social competence. *Developmental Psychology*, *43*, 1170–1186. http://dx.doi.org/10.1037/0012-1649.43.5.1170

Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational Researcher*, *27*, 11–20. http://dx.doi.org/10.3102/0013189X027003011

Thelen, E., & Smith, L. B. (1998). Dynamic systems theories. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Volume 1. Theoretical models of human development* (5th ed., pp. 563–634). Hoboken, NJ: John Wiley & Sons.

Thompson, R. A., & Lagattuta, K. H. (2006). Feeling and understanding: Early emotional development. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 317–337). Malden, MA: Blackwell.

Trohanis, P. L. (2008). Progress in providing services to young children with special needs and their families: An overview to and update on the implementation of the Individuals with Disabilities Education Act (IDEA). *Journal of Early Intervention*, *30*, 140–151. http://dx.doi.org/10.1177/1053815107312050

Votruba-Drzal, E., & Dearing, E. (Eds.). (2017). *The Wiley handbook of early childhood development programs, practices, and policies.* West Sussex, United Kingdom: John Wiley & Sons.

Wachs, T. D., & Combs, T. T. (1995). The domains of infant mastery motivation. In R. H. MacTurk & G. A. Morgan (Eds.), *Mastery motivation: Origins, conceptualizations, and applications* (pp. 147–164). Westport, CT: Ablex.

Wagner, L., & Hoff, E. (2012). Language development. In R. M. Lerner, M. A. Easterbrooks, & J. Mistry (Eds.), *Handbook of psychology* (Vol. 6, pp. 173–196). New York, NY: Wiley.

Walker, C. M., & Gopnik, A. (2014). Toddlers infer higher-order relational principles in causal learning. *Psychological Science*, *25*, 161–169. http://dx.doi.org/10.1177/0956797613502983

Waxman, S. R., & Lidz, J. L. (2006). Early word learning. In D. Kuhn, R. S. Siegler, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Vol 2. Cognition, perception, and language* (6 ed., pp. 299–335). Hoboken, NJ: John Wiley & Sons.

Welsh, M. C., Friedman, S. L., & Spieker, S. J. (2006). Executive functions in developing children: Current conceptualizations and questions for the future. In K. McCartney & D. Phillips (Eds.), *Handbook of early childhood development* (pp. 167–187). Malden, MA: Blackwell.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R. W., & Davis-Kean, P. (2006). Development of achievement motivation. In N. Eisenberg (Ed.), *Handbook of child psychology* (6th ed., Vol. 3, pp. 933–1002). New York, NY: John Wiley.

Wise, P. H., & Richmond, J. B. (2008). The history of child developmental-behavioral health policy in the United States. In M. L. Wolraich, D. D. Drotar, P. H. Dworkin, & E. C. Perrin (Eds.), *Developmental-behavior pediatrics: Evidence and practice* (pp. 1–12). Philadelphia, PA: Mosby.

Woodward, A. L. (2009). Infants' grasp of others' intentions. *Current Directions in Psychological Science*, *18*, 53–57. http://dx.doi.org/10.1111/j.1467-8721.2009.01605.x

Xu, F., & Kushnir, T. (2013). Infants are rational constructivist learners. *Current Directions in Psychological Science*, *22*, 28–32. http://dx.doi.org/10.1177/0963721412469396

Yeates, K. O., Bigler, E. D., Dennis, M., Gerhardt, C. A., Rubin, K. H., Stancin, T., . . . Vannatta, K. (2007). Social outcomes in childhood brain disorder: A heuristic integration of social neuroscience and developmental psychology. *Psychological Bulletin*, *133*, 535–556. http://dx.doi.org/10.1037/0033-2909.133.3.535

Zelazo, P. D., & Carlson, S. M. (2012). Hot and cool executive function in childhood and adolescence: Development and plasticity. *Child Development Perspectives*, *6*, 354–360. http://dx.doi.org/10.1111/j.1750-8606.2012.00246.x

Zelazo, P. D., & Cunningham, W. (2007). Executive function: Mechanisms underlying emotion regulation. In J. Gross (Ed.), *Handbook of emotion regulation* (pp. 135–158). New York, NY: Guilford.

Zigler, E., & Valentine, J. (Eds.). (1979). *Project Head Start: A legacy of the War on Poverty*. New York, NY: Free Press.

Effective Early Intervention
The Developmental Systems Approach
By Michael J. Guralnick, Ph.D.

After decades of rapid evolution and groundbreaking research, the field of early intervention can be understood within a common framework: the Developmental Systems Approach (DSA). Created by a highly influential leader in the field, Dr. Michael Guralnick, this evidence-based, relationship-oriented, family-centered framework focuses on strengthening the quality of key family patterns of interaction that influence a child's development.

In this important text, Dr. Guralnick organizes and analyzes the most current research in early intervention through the lens of the DSA. Starting with a clear explanation of the foundations of early intervention, the book then applies the DSA to four vulnerable populations: Children at risk due to biological factors, specifically preterm birth; children at environmental risk; children with developmental delays; and children with autism spectrum disorder. Readers will

- Understand the developmental science that applies to all children

- Learn how child development is influenced by three family patterns of interaction—parent-child transactions, family-orchestrated child experiences, and parent support for child health and safety

- Explore the influence of family resources as well as child-specific risk and protective factors on a child's development in the context of early intervention

- Discover what early interventions are effective, as supported by intervention science

- Learn the fundamentals of applying the DSA framework to designing inclusive community-based systems of early intervention

An invaluable reference for early childhood researchers, faculty, and policy makers, this visionary book is the key to establishing inclusive community-based early intervention systems that nurture each family's strengths and promote child development.

ABOUT THE AUTHOR: **Michael J. Guralnick, Ph.D.,** is Director of the Center on Human Development and Disability and Professor of Psychology and Pediatrics at the University of Washington.