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Overview of Natural Environment Intervention

This chapter provides an overview of the use of natural environment intervention (NEI) for young children with disabilities. Coverage of the topic includes NEI's legal foundations and a review of literature on the principles of effective practice when implementing NEI. An overview of autism spectrum disorder (ASD) is offered, together with a discussion of research specifically related to NEI for young children with ASD.

NATURAL ENVIRONMENT INTERVENTION

NEI is a federally mandated early intervention approach for young children with disabilities that systematically maximizes teaching and learning opportunities throughout the day by embedding interventions within naturally occurring routines. Caregivers spend many hours with their child throughout the day, and this time can and should be used for interventions that will enhance the child's development. In using NEI, caregivers are not required to set aside extra time in their day to provide "therapy." Instead, they receive training and support from professionals to provide evidence-based interventions within the context of their daily routines. Thus, NEI doesn't require extra time, but it does require a more systematic use of time spent with the child to optimize learning opportunities throughout the day.

According to federal special education law (Part C of the Individuals with Disabilities Education Improvement Act [IDEA]), natural environments are defined as home and community settings in which children without disabilities participate

(IDEIA, 2004). The law requires that early intervention services for infants and toddlers with disabilities be implemented in natural environments to the maximum extent appropriate. This stipulation reflects research indicating that everyday family and community routines and activities provide young children with an optimal variety of learning opportunities (Dunst, Hamby, Trivette, Raab, & Bruder, 2000). Natural environments include a variety of home-, school-, and community-based routines. Examples of home-based routines may include dressing, bathing, eating, cleaning the house, playing outdoors or inside, and reading books. Community-based routines may include going to the grocery store, beach, library, and park. School-based routines may include circle time, lunch, centers, recess, library, small-group instruction, and whole-group instruction. These everyday home, school, and community routines provide young children with many different learning opportunities. When children are actively engaged in everyday routines, they have multiple opportunities to apply their existing skills and acquire new ones.

The National Association for the Education of Young Children (NAEYC), the world's largest organization working on behalf of young children, uses the developmentally appropriate practice (DAP) framework as the foundation of all its work. The core principles of DAP in early childhood education are that knowledge must inform decision making, goals must be challenging and achievable, and teaching must be intentional to be effective (NAEYC, 2012). These guiding principles also provide the framework for NEI through all phases of intervention, including assessment, goal setting, designing and implementing instruction, and evaluating the effects of instruction. When applying DAP to NEI for young children with disabilities, caregivers are heavily involved in the assessment process to identify the child's strengths, interests, everyday routines, and present abilities and needs so that early intervention teams are equipped with knowledge about the child and family. The team works collaboratively with caregivers to set goals based on what the child can currently do and what the child can be challenged to achieve next. Finally, with NEI, instruction is carefully designed using research-supported strategies to intentionally utilize everyday routines to maximize learning by embedding effective instruction within natural contexts. NEI and DAP differ in that NEI focuses on providing specific strategies and suggestions for how to intervene with young children during their everyday routines, whereas DAP provides more general guidelines for interacting with young children (Pretti-Frontczak & Bricker, 2004).

RESEARCH ON NATURAL ENVIRONMENT INTERVENTION

Professionals must think of NEI as involving not only *where* but *how* services are provided (Shelden & Rush, 2001). NEI is often misinterpreted as solely focusing on inclusion with typically developing peers rather than on the benefits of inclusive environments for interventions with young children with disabilities (Chai, Zhang, & Bisberg, 2006). Thus, it is essential for caregivers and early intervention providers to understand that NEI is not just about including young children with disabilities in naturally occurring everyday routines and activities but also about planning and implementing purposeful interventions within those contexts.

Researchers have conceptualized the delivery of NEI in a variety of ways to guide early intervention providers in their service delivery. Dunst and colleagues (2001) describe NEI as contextually based, child-initiated, and adult-directed learning opportunities provided by caregivers and mediated by professionals. In other words, professionals should recognize the natural learning opportunities that occur in a child's daily life and use those opportunities to implement interventions. NEI strongly emphasizes tapping into children's interests to increase their active participation in everyday activities (Dunst, Trivette, & Masiello, 2011).

Robin McWilliam (2010) uses an NEI model that revolves around the use of routines-based interviews (RBIs). RBIs are semistructured interviews that early intervention providers conduct with caregivers to determine the main concerns of the family, the family's everyday routines, the extent of the child's participation in everyday routines, the family's satisfaction during each of the routines, and the family's desired outcomes related to child-level needs, child-related family needs, and family-level needs. In a study comparing individualized family service plan (IFSP) outcomes using the RBI versus the business-as-usual IFSP development process, the outcomes written as a result of the RBI were more functional than outcomes written as a result of the standard process (McWilliam, Casey, & Sims, 2009).

Diane Bricker (2001) suggests that naturalistic teaching approaches, such as activity-based interventions (ABI), can be used across a range of settings to address a child's goals and objectives by implementing interventions during daily routines and activities. The ABI approach capitalizes on the child's motivation and the use of daily activities to embed multiple, varied, and authentic learning opportunities. ABI focuses on the attainment of functional skills that can be used across environments and situations (Pretti-Frontczak & Bricker, 2004).

While there are a variety of approaches to NEI, these approaches share several features. Using a family-centered approach that is individualized, strength based, capacity building, and reflective of the family's culture and values is the foundation of all NEI approaches (Atkins-Burnett & Allen-Meares, 2000; Woods, Wilcox, Friedman, & Murch, 2011). Providing ongoing coaching to caregivers to deliver the level of support they need to effectively implement interventions in the natural environment is an essential component of NEI, regardless of the approach used (Rush, Shelden, & Hanft, 2003). Using evidence-based methods and strategies to promote the child's development during naturally occurring family and community routines and activities is also a common emphasis of the NEI approaches.

NATURAL ENVIRONMENT INTERVENTION FOR YOUNG CHILDREN WITH ASD

Before discussing how to apply NEI for young children with ASD and related disorders, an overview of ASD will be provided for the benefit of readers who may not be familiar with ASD. It is crucial for early intervention providers to understand the characteristics of young children with ASD so they can address the children's core impairments within the context of NEI.

Overview of Autism Spectrum Disorders

The term ASD often is used quite loosely. You may hear some people say that a child doesn't have autism but is definitely on the spectrum. If a child has some characteristics associated with autism, it does not necessarily mean the child is on the spectrum. A child who is on the autism spectrum either has autism, Asperger syndrome, or pervasive developmental disorder-not otherwise specified (PDD-NOS). These three disorders are the only autism spectrum disorders. They belong to the larger category of pervasive developmental disorders (PDD), which also includes Rett syndrome and childhood disintegrative disorder (CDD), according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; APA, 2000)*. For the purposes of this book, characteristics of children with ASD will be discussed without pinpointing the differences among these disorders.

Before discussing the impairments that children with ASD are likely to display, it is important to stress that children with ASD all possess unique strengths and talents. Because ASDs are neurological disorders, the brains of people with ASD are not necessarily "wired" the same way as in typically developing individuals. Thus, children with ASD may be able to do many things that most of their peers cannot do. Some children with ASD learn literacy skills such as letter and sound recognition and early sight word recognition well before their same-age typically developing peers. Some young children with ASD have extraordinary visual-spatial strengths that allow them to complete puzzles, use shape sorters, and engage in other constructive play activities that are designed for children who are much older. Children with ASD may also have special talents related to music and art. While not every young child with ASD will have a special talent, all children have strengths and interests that should be tapped into when planning interventions. Caregivers and early intervention providers should focus on and value these strengths rather than solely targeting children's impairments. With that said, the impairments of young children with ASD must be assessed and addressed to enable them to actively participate in home, school, and community routines and make developmental gains.

Impairments in Social Interaction Children with ASD all have impairments in social interaction. However, not all children will have the same types of difficulties. Some children may have impairments in the use of nonverbal behaviors such as eye contact, facial expressions, body posture, and social gestures. Children with ASD may not spontaneously seek opportunities to interact with other people. This does not necessarily mean that these children "prefer to be alone," which is a descriptive characteristic that may be seen on a variety of informational materials related to ASD. When children with ASD receive the supports they need to learn how to respond to the initiations of others, to initiate interactions with others, and to maintain interactions with others, they may prefer social interactions to being alone. These skills related to interacting with others are referred to as joint attention and social reciprocity skills, which are core impairments in children with ASD (Jones & Carr, 2004; MacDonald et al., 2006; Mundy, 1995).

Joint attention entails two or more individuals sharing attention with one another related to a specific object, activity, or idea. Joint attention can consist of coordinating attention between people and objects, attending to a social partner, shifting gaze between people and objects, sharing emotional states with another person, and being able to draw another person's attention to objects or events for the purpose of sharing experiences (Baldwin, 1995; Mundy, Sigman, & Kasari, 1990). This type of interaction can be as simple as a child pointing to a bird in the tree with the caregiver responding, "Oh, wow! It's a blue jay!" Joint attention skills are also needed to engage in more complex social interactions. A basic way to understand joint attention is to think of it as the feeling that you are "in it together" that you might get when interacting with someone. Even when you try hard to interact and connect with a child on the autism spectrum, you may not feel the same sense of connectedness that you experience with typically developing children.

Once a child with ASD is connected with someone by establishing joint attention, the child then needs to use social reciprocity skills to engage in "the dance of human interaction," which involves long chains of back-and-forth interactions related to the object, activity, or idea in which they are sharing attention. Social reciprocity entails being aware of the emotional and interpersonal cues of others, appropriately interpreting those cues, responding appropriately to what is interpreted, and being motivated to engage in social interactions with others (Constantino et al., 2003). Below is an example of social reciprocity being shared between a mother and her 2-year-old daughter, Rebecca.

Mother: It's time for breakfast, Rebecca.

(Rebecca walks over to the kitchen table and stands by her booster seat.)

Mother: Do you want to get in your chair?

Rebecca: Help me up.

(Mother picks up Rebecca and puts her in her chair.)

Rebecca: I want pancakes.

Mother: Okay. Do you want bananas with your pancakes?

Rebecca: Yes.

(Mother gives Rebecca pancakes and bananas.)

In this example Rebecca and her mother shared many back-and-forth exchanges. Notice that some exchanges were not verbal but were actions conducted in response to the initiation or response of the other person. That is still a reciprocal exchange. Exchanges can be verbal or can entail the use of facial expressions, gestures, or actions. Also, social reciprocity entails making initiations and responding to the initiations of others. In the example provided, Rebecca was able to respond to her mother's initiations (i.e., "It's time for breakfast"), and she also initiated an interaction ("I want

pancakes”). Although social reciprocity skills develop naturally in typically developing children, children with ASD often require intensive interventions to learn how to engage in reciprocal social interactions.

Impairments in Communication Children with ASD may have difficulty sending information and receiving information when interacting with communication partners. To engage in reciprocal social interactions, individuals need to use nonverbal and verbal receptive and expressive communication skills. Nonverbal communication can entail the use of eye contact, facial expressions, body posture, social gestures, actions, and the ability to interpret nonverbal behaviors displayed by others. Verbal communication skills can entail responding to or initiating interactions with others through the use of verbal responses, sign language, picture exchange, or augmentative communication devices. Expressive language skills consist of the use of language to share knowledge, thoughts, and ideas with others. When children have impairments in expressive communication, they may have difficulty expressing their wants and needs, commenting, answering and asking questions, and engaging in conversations. When children with ASD do use expressive language, their words may be difficult to understand due to poor articulation. They may have trouble using appropriate volume, or they may display irregular prosody that may result in sounding nasal or robotic. Receptive language skills consist of demonstrating understanding of language. When children have impairments in receptive communication, they may have difficulty responding to directions that require comprehension of language that is beyond their level of understanding.

Typically developing children supplement verbal communication with nonverbal communication by using gestures, eye contact, facial expressions, and body posture to send messages to others. Many children with disabilities who lack verbal communication skills often use even more of these nonverbal communication skills to compensate for their lack of verbal skills, but children with ASD often do not do this. In fact, many times their lack of nonverbal communication skills sends the wrong message to their communication partners. For example, many children with ASD do not use appropriate eye contact when speaking with others. That may send the message that they are not talking to someone in particular when in fact they are. Also, if they do not use facial expressions to communicate their thoughts and feelings, they may be misinterpreted as being disengaged or uninterested when that is not the case. When children engage with their peers, many times it is nonverbal communication such as eye contact, gestures, and facial expressions that help them connect with one another. Thus, children with ASD often miss out on opportunities to establish connections with peers due to their limited nonverbal communication skills.

Some children with ASD may display stereotyped and repetitive use of language, which encompasses a variety of idiosyncratic uses of language. This can include echolalia, or repeating what was heard previously in exactly the same way at a later time. Echolalia is often considered a nonfunctional use of language; however, a child with ASD may use echolalia as a means of communication. For example, a 3-year-old girl with autism engaged in echolalia at dismissal from preschool by repeatedly saying,

“Dirty. Take a bath.” The teacher and the parents were eager to get her to stop this “nonfunctional” use of language. However, the early interventionist hypothesized that the little girl was saying that phrase repeatedly because she always wore pretty dresses and didn’t want to sit on the sidewalk during dismissal time because it would mean getting her dress dirty. The early interventionist suggested that instead of asking the child to sit on the sidewalk with the other students, the teacher might provide a chair for her to sit in while she waited to be picked up. When this change was made, the child stopped saying, “Dirty. Take a bath.” This shows that her echolalia was actually serving a communicative function. She didn’t have the expressive language skills to say, “I don’t want to sit on the sidewalk because I don’t want my dress to get dirty,” so she used a phrase she often heard her mother say at home when she was dirty. Some children may use echolalia because they want to interact with others but do not have the social communication skills needed to initiate an interaction. Thus, they use echolalia to attempt to initiate interactions with others. Other children with ASD may have verbal self-stimulatory behaviors, or stims, in which they verbalize certain sounds, words, phrases, or sentences in a nonfunctional manner. Often children who use verbal stims do so when they are not engaged in a meaningful interaction or activity. Therefore, it is important to get children actively engaged when they do begin to use verbal stims as opposed to simply trying to stop the behavior from occurring.

Restricted Interests and Repetitive Behaviors According to the *DSM-IV-TR* (APA, 2000), an individual with ASD has at least one of the following characteristics:

- Restricted range of interests; intense fascination with a particular interest
- Need for sameness; repetitive routines
- Self-stimulatory motor movements
- Strong interest in objects or parts of objects

The first indicator refers to children with ASD who have a special interest in something that limits the individual’s capacity for a variety of interests. For example, a child may have a passion for trains and only want to play with trains and talk about trains. Some individuals with ASD will have a need for sameness in which they have a strong urge for certain things to be done a certain way each time. For example, a child may have a strong desire to follow a specific routine before bedtime by reading a specific book followed by singing a specific song, and even the slightest change in that routine may cause the child to engage in challenging behaviors. It is best to teach children who have these needs for sameness how to handle small changes as opposed to “walking on eggshells” to keep them from getting upset.

Stereotyped and repetitive movements can include behaviors such as rocking, hand flapping, spinning objects, lining things up, or any other movement that the child displays often without a functional purpose. Some children with ASD are inter-

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ested in parts of objects such as wheels on a toy car. Thus, when they pick up a toy car they do not necessarily play with it as other children might play, but instead they focus on spinning and examining the wheels and exploring how they work. These types of stereotyped behaviors usually occur when the child is disengaged from meaningful activities, as was discussed with verbal self-stimulatory behaviors. Thus, it is crucial to positively redirect children to engaging activities when these behaviors arise as opposed to simply trying to get children to stop doing them.

Other Characteristics of Young Children with ASD In addition to impairments in social interaction, impairments in communication, and the presence of stereotypic behaviors and/or restricted interests, some children with ASD may have a variety of other challenges. Some additional challenges that children with ASD and their families may face include extreme anxiety and fear, sensory sensitivities, food allergies, sleep disorders, gastrointestinal issues, attention difficulties, feeding disorders, severe challenging behaviors, seizures, cognitive impairments, fine motor difficulties, and gross motor difficulties. Because caregivers of young children with ASD may be dealing with a wide range of challenges, it is essential for early intervention providers to assess what challenges exist and develop interventions that caregivers can implement to address specific challenges.

Autism Variability

It is important for readers to understand that even though children with ASD share common characteristics, there is great variability in the profiles of these children. A profile is a pattern of characteristics along several dimensions that distinguishes one child with autism from another in important ways (Thompson, 2011). Travis Thompson (2011) discussed autism variability in great detail in his book *Individualized Autism Intervention for Young Children: Blending Discrete Trial and Naturalistic Strategies*. It is well documented that children with ASD have impairments in social interaction and communication skills and that they are likely to engage in nonfunctional repetitive behaviors or have a restricted range of interests. Thompson discussed factors that moderate or intensify the expression of these autism symptoms including the child's intellectual ability, language skills, attention deficit and hyperactivity symptoms, and anxiety challenges. Each child's profile should be thoroughly examined when planning early intervention services and supports to ensure appropriate individualization to address the unique needs of each child.

Rationale for Using Natural Environment Interaction with Young Children with ASD

Although young children with ASD and their families face many challenges, there is mounting evidence demonstrating the effectiveness of intensive early intervention for a substantial proportion of these children (National Research Council, 2001; Woods & Wetherby, 2003). In 2001, the National Research Council (NRC) conducted a review of research on educational interventions for children with ASD from birth

through age 8. Following a thorough literature review, the council identified the essential active ingredients of effective interventions for children with ASD. According to Wetherby and Woods (2006), the essential active ingredients suggested by the NRC (2001) that specifically support the effectiveness of NEI include the following:

1. Children must learn functional and meaningful skills.
2. Learning should occur within daily caregiving, play, and social interactions with caregivers that are repeated throughout the day.
3. Caregivers should mediate the teaching and learning process for the child as it occurs.

In the years following the NRC recommendations, researchers implemented studies examining the effects of NEI on young children with ASD. Today there is a growing body of evidence supporting caregiver-implemented interventions in the natural environment for young children with ASD. A study of five preschool children with autism showed that parents were able to demonstrate proficient use of evidence-based teaching strategies during their everyday routines (Kashinath, Woods, & Goldstein, 2006). A study of 17 children with ASD using a parent-implemented intervention that trained parents to embed naturalistic teaching strategies in their everyday routines showed that the children made significant gains in social communication skills as a result of the interventions (Wetherby & Woods, 2006). A study of preschoolers with autism showed that when children were engaged in interest-based activities during everyday family and community activities they made more progress in language, social, and motor development than children with autism who did not engage in interest-based activities (Dunst, Trivette, & Masiello, 2011). Project DATA (Developmentally Appropriate Treatment for Autism), an inclusive preschool program for children with ASD between 1 year and 3 years old, shows positive outcome data of teachers using evidence-based instructional strategies to embed instruction into the ongoing classroom routines and activities to improve social communication skills, cognitive development, and self-regulation skills (Boulware, Schwartz, Sandall, & McBride, 2006).

What Is Unique about Natural Environment Interaction for Young Children with ASD?

The use of NEI for young children with ASD is somewhat controversial because of the documented need for intensive interventions among this population of children. Since 1987, with Lovaas' landmark study of discrete trial training (DTT; see Chapter 2), there has been a push toward providing 40 hours per week of one-to-one DTT professionally driven therapy for children with ASD. There is a general belief among some caregivers and professionals that children with ASD cannot learn during naturally occurring home and community routines in the way typically developing children do. While it is true that children with ASD often do not learn in the same way that typically developing children do and require alternative instructional strategies, it

does not mean that children with ASD cannot learn during everyday routines. What it does mean is that children with ASD require specialized interventions to be implemented during their everyday routines to enable them to learn from those natural experiences.

In contrast with the 40-hours-of-DTT-per-week formula, the NRC (2001) recommended that children with ASD receive at least 25 hours each week of active engagement in intensive instructional programming. Many caregivers and professionals mistakenly interpret that recommendation to mean that the child should receive at least 25 hours of one-to-one instruction in therapeutic or clinical settings each week. To the contrary, with carefully designed NEI, young children can receive the intensity of interventions they need within their ongoing routines across home, school, and community settings. Of course, some children may require one-to-one ABA interventions in addition to NEI, depending on the profiles of the children. For example, if a child has moderate to severe cognitive impairments, severe language impairments, severe social impairments, severe attention-related difficulties, and/or severe anxiety issues, the child may need some therapeutic ABA interventions to address these difficulties and to enable the child to fully benefit from NEI.

So, what is unique about the way NEI must be designed for young children with ASD? First, using an interest-based approach to increasing the child's active participation in everyday routines is essential. At the same time, the skills that are targeted for intervention during those routines must address the child's core impairments. Specifically, joint attention, social reciprocity, and communication skills must continually be targeted during NEI for young children with ASD.

Second, the instructional strategies selected for use within everyday routines must have an evidence base specifically for children with ASD. Intervention approaches that utilize principles of applied behavior analysis (ABA) have a strong research base for their effectiveness with young children with ASD (Koegel, Koegel, Harrower, & Carter, 1999; Lovaas, 1987; McGee, Morrier, & Daly, 1999; Pierce & Schreibman, 1997). Contrary to some misconceptions of caregivers and professionals, ABA teaching strategies can and should be implemented within naturally occurring everyday routines as opposed to one-to-one settings that remove the child from the natural environment. Some of the drawbacks of one-to-one ABA therapy include difficulties with child motivation and with generalization of learned skills. In contrast, when young children are actively engaged in NEI, they have increased motivation due to the emphasis on the children's interests and participation in familiar and preferred routines; and generalization is less of a difficulty due to the fact that children are learning functional and meaningful skills in the very contexts where they are expected to use them.

Finally, planning for at least 25 hours each week of NEI is essential for young children with ASD. Children with mild developmental delays may not necessarily need the intensity of at least 25 hours of intervention each week. Because children with ASD need this intensity, however, early intervention teams must consider this requirement when conducting assessments and planning interventions.

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