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# Evidence-based Practices for Young Children with Autism Spectrum Disorders: Guidelines and Recommendations from the National Resource Council and National Professional Development Center on Autism Spectrum Disorders

## *Abstract*

*The National Research Council has identified goals, areas of need, and basic recommendations for educational programs serving children with autism spectrum disorders. The National Professional Development Center on Autism Spectrum Disorders has identified evidence-based practices for early childhood and elementary programming. Highlighting the work produced by these two organizations, this article provides professionals with guidance in setting up educational programs that use effective, research-based interventions for young children with autism spectrum disorders in early childhood special education.*

*Key words: Autism spectrum disorders, evidence-based practices, National Research Council, National Professional Development Center on Autism Spectrum Disorders.*

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In recent years there has been a tremendous increase in the number of children diagnosed with autism spectrum disorders. Children with autism spectrum disorders have a range of challenges in social interaction, verbal and nonverbal communication, and restricted patterns of interests or behaviors (DSM-IV-TR, 2000). Autism spectrum disorder is a life-long disability with no known cause, cure, or universally accepted intervention approach. What is commonly accepted is that early intervention is critical to improve long-term outcomes (Dawson & Osterling, 1997; Eikeseth, Smith, Jahr, & Eldevik, 2007; Harris & Handleman 2000; Lord, 1995; McEachin et al. 1993; Rogers, 1998; Smith-Myles, Grossman, Aspy, & Henry, 2009). Autism spectrum disorders can be reliably diagnosed in 2-year-olds by experienced professionals (Webb & Jones, 2009). With this in mind, early intervention practitioners across the nation are faced with the challenge of identifying and providing appropriate educational services for young children with autism spectrum disorders. As the number of children identified with autism spectrum disorders increases, so do the number of intervention options. Many of these options do not have research supporting their use as effective practices. This combined with the widely diverse range of needs of individuals with autism spectrum disorders can makes decisions about what services to implement overwhelming and confusing.

Although the importance of early intervention is well documented in the literature, the effectiveness of specific strategies with individuals with autism spectrum disorders is often debated (Hume, Bellini & Pratt, 2005; Woods & Wetherby, 2003). Furthermore, how interventions are implemented can vary greatly across service providers. This is because interventions often differ in their approach and methodology and professionals may face difficulty in not only selecting which strategies are most appropriate for individuals with autism spectrum disorders (Levy, Kim & Olive, 2006; NRC, 2001; Simpson, 2005; Wood & Wetherby, 2003), but also in implementing them to fidelity (i.e., as demonstrated in the research literature), due in part to the rarity of finding practices that are described in enough detail to be replicable in the research literature (Odom, et al., in press).

While parents are held to no particular standards when selecting treatments, professional ethics and federal laws in countries like the United States require educators to adopt effective practices supported by scientifically based research (U.S. Department of Education, 2008). The successful identification and implementation of practices is best made at the local level by informed professionals, working with families, as they have the most knowledge and information about the needs of individual children with autism spectrum disorders (Simpson, 2008). These professionals run the risk, however, of not being successful in their pursuit without guidance on how to choose and implement effective intervention methods. In the past, it was difficult to locate autism spectrum disorder efficacy information but improvements have and continue to be made on this front (Simpson, 2008). Far-reaching changes have occurred recently including the identification of intervention methods that result in positive gains for young children

with autism spectrum disorders (Smith-Myles, Grossman, Aspy, & Henry, 2009). Currently, education of learners, as well as of parents and teachers, is the primary form of treatment for autism spectrum disorders (NRC, 2001).

The purpose of this article is to provide sound guidance on creating effective early childhood programs by presenting the recommendations of the National Research Council in concert with information on evidence-based practice from the National Professional Development Center on Autism Spectrum Disorders. In 2001, the National Research Council identified basic elements for educational programs serving young children with autism spectrum disorders. More recently, the National Professional Development Center on Autism Spectrum Disorders (2009) identified a list of evidence-based practices for early childhood programming and is developing materials aimed at promoting accurate and effective implementation of the practices. In the remainder of this paper we will review information from these two entities and highlight ways that educators may utilize it to improve early childhood education and outcomes.

#### *The National Research Council (NRC)*

The National Research Council was organized to bring together the communities of science and technology. The Council is administered jointly by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The National Research Council formed the Committee on Educational Interventions for Children with Autism upon the request of the United States Department of Education's Office of Special Education Programs.

The committee's purpose was to (a) integrate the scientific, theoretical, and policy literature and (b) create a framework for evaluating the scientific evidence concerning the effectiveness of educational interventions for young children with autism spectrum disorder (NRC, 2001). The primary focus was early intervention, preschool, and school programs designed for children with autism from birth to age eight. The committee produced a report that offers a comprehensive assessment of the science base regarding educational interventions for young children with autism spectrum disorders. Although this research was conducted in the United States, the results identify key features of early intervention programs that may be beneficial to professionals worldwide when designing, choosing, and evaluating programs. According to the National Research Council, there is strong consensus concerning what a program should look like for young children with autism spectrum disorders. The committee has identified goals, prioritized areas for intervention planning, and developed basic recommendations to provide educators a framework for developing educational programs serving children with autism spectrum disorders.

The National Research Council suggests appropriate goals for educational services for children with autism spectrum disorder should be the same as those for typically developing children and include personal independence and social responsibility. Goals in the areas of personal independence and social responsibility imply progress in social

and cognitive abilities, verbal and nonverbal communication skills, and adaptive skills; reduction of behavioral difficulties; and generalization of abilities across multiple environments.

Along with these goals, the National Research Council's research suggests interventions target six specific priority areas of need for students with autism spectrum disorders, including: functional spontaneous communication, social skills, play skills, cognitive development, proactive approaches to behavior problems, and functional academic skills. The following information highlights the National Research Council's specific priority areas of need for autism spectrum disorder programming.

1. Functional spontaneous communication

Functional, spontaneous communication should be the primary focus of early education. For very young children, programming should be based on the assumption that most children can learn to speak. Effective teaching techniques for both verbal language and alternative modes of functional communication, drawn from the empirical and theoretical literature, should be vigorously applied across settings.

2. Social instruction

Social instruction should be delivered throughout the day in various settings, using specific activities and interventions planned to meet age-appropriate, individualized social goals (e.g., with very young children, response to maternal imitation; with preschool children, cooperative activities with peers).

3. Play skills

The teaching of play skills should focus on play with peers, with additional instruction in appropriate use of toys and other materials.

4. Cognitive development

Other instruction aimed at goals for cognitive development should also be carried out in the context in which the skills are expected to be used with generalization and maintenance in natural contexts as important as the acquisition of new skills. Because new skills have to be learned before they can be generalized, the documentation of rates of acquisition is an important first step. Methods of introduction of new skills may differ from teaching strategies to support generalization and maintenance.

5. Proactive approaches to behavior problems

Intervention strategies that address problem behaviors should incorporate information about the contexts in which the behaviors occur; positive, proactive approaches; and the range of techniques that have empirical support (e.g., functional assessment, functional communication training, reinforcement of alternative behaviors).

6. Functional academic skills

Functional academic skills should be taught when appropriate to the skills and needs of a child.

In addition to goals and priority areas, the committee put forth six recommendations for educational programming.

1. Intervention should begin as soon as a child is suspected of having autism spectrum disorder.
2. Intervention should include a child's active engagement in systematically planned, age and developmentally appropriate activity toward identified objectives. It is recommended that intervention occur a minimum of a full school day, at least 5 days a week (25 hours) with year round programming.
3. Intervention should include teaching that is planned and organized around repeated short intervals. These intervals should be individualized daily and include one to-one as well as very small group instructions. All intervention should focus on meeting individualized goals.
4. Intervention should include the inclusion of a family component, including parent training.
5. Intervention should include mechanisms for ongoing evaluation of program and child's progress, with adjustments made accordingly.
6. Intervention should include inclusive opportunities. For example, to the extent that it leads to the acquisition of a child's educational goals, specialized instruction should occur in a setting in which ongoing interactions occur with typically developing children.

#### *National Professional Development Center (NPDC)*

With increasing prevalence in autism spectrum disorders, research related to effective interventions is active and recommendations and guidelines for program implementation and best practice are bountiful. The difficulty for practitioners is in finding practices that have been demonstrated in research to be effective and that can be replicated in practice. In 2007, the National Professional Development Center on Autism Spectrum Disorders (NPDC) was funded by the Office of Special Education Programs in the United States Department of Education. A major focus of the National Professional Development Center is to promote the use of evidence-based practices that produce optimal outcomes for infants, children, and youth with autism spectrum disorder. In its aim to promote evidence-based practices, the center has focused efforts on identification of such practices, as well as development of instructional modules to teach the most efficacious use of practices to practitioners and other consumers.

The National Professional Development Center has limited its purvey to focused interventions. Focused interventions are those that include one or a few instructional strategies (Odom, Boyd, Hall, & Hume, 2009). Examples of focused interventions include prompting and reinforcement as well as clusters of strategies used in a singular manner, such as Picture Exchange Communication Systems (PECS), naturalistic interventions, and social narratives. Focused interventions are distinct from comprehensive treatment models, which are systematically organized packages of practices that are intended to address broad educational settings serving learners with

autism spectrum disorders. Some examples of comprehensive treatment models include the Denver Model (Rogers, Hayden, Hepburn, Charlifue-Smith, Hall, & Hayes, 2006), Learning Experiences and Alternative Programs for Preschoolers and Their Parents (LEAP) (Hoyson, Jamieson, & Strain, 1984), and Treatment and Education of Autistic and related Communication-handicapped CHildren (TEACHH) (Schopler, Mesibov, & Harsey, 1995).

Focused interventions are practices that can be used individually or with other practices to teach and support individual outcomes for learners with autism spectrum disorders (Odom, Collet-Klingenberg, Rogers, & Hatton, in press). These practices may be used in multiple settings (as reflected in the literature) and by a variety of professionals, as well as family members. Focused interventions lend themselves more easily than comprehensive treatment models to use with individual education goals, generally at a lower cost, as they do not require adoption of a model for intervention that requires intensive staff training or purchase of school-wide materials.

In identifying evidence-based practices for use by the National Professional Development Center, the criteria proposed by Nathan and Gorman (2007), Rogers and Vismara (2007), Odom, Brantlinger, Gersten, Horner, Thompson, & Harris, (2004), and Horner, Carr, Halle, McGee, Odom, & Wolery, (2005) were adopted. To be considered as evidence, a research study must have been conducted with participants having autism spectrum disorders who were between birth and 22 years, have outcomes for those participants as dependent measures, met the experimental criteria that would suggest internal validity (Gersten, Fuchs, Compton, Coyne, Greenwood & Innocenti, 2005; Horner et al., 2005), and been conducted by multiple research groups. When a study met these criteria, it qualified as evidence. For a focused intervention to qualify as being evidence-based, that practice had to have evidence from a) at least two experimental or quasi-experimental group design studies, b) at least five single case design studies, or c) a combination of at least one experimental/quasi-experimental study and three single case design studies. The research also had to have been conducted across at least three research groups.

Using the above described criteria a multi-phase literature review was conducted. The evidence-based practices that met the criteria as having a solid research base were reviewed and confirmed by multiple project staff. Table 1 shows the evidence-based practices by domain matrix for early childhood (birth to 5 years) and elementary (5 to 11 years) populations. This matrix displays the outcome/domain areas in which the research studies making up the evidence-base for particular practices have been identified for young learners with autism spectrum disorders.

Table 1. Evidence-Based Practices for Early Childhood and Elementary Learners

Evidence-Based Practices	Academics & Cognition		Behavior		Communication		Play		Social		Transition	
	E C	E L	E C	E L	E C	E L	E C	E L	E C	E L	E C	E L
1. Antecedent-based Interventions												
2. Computer Assisted Instruction												
3. Differential Reinforcement												
4. Discrete Trial Training												
5. Extinction												
6. Functional Behavioral Assessment												
7. Functional Communication Training												
8. Naturalistic Interventions												
9. Parent Implemented Interventions												
10. Peer Mediated Instruction/Intervention												
11. Picture Exchange Com. System												
12. Pivotal Response Training												
13. Prompting												
14. Reinforcement												
15. Response Interruption & Redirection												
16. Self-Management												
17. Social Narratives												
18. Social Skills Groups												
19. Speech Generating Devices (VOCA)												
20. Structured Work Systems												
21. Task analysis												
22. Time delay												
23. Video Modeling												
24. Visual Supports												

Note. Shaded areas represent research studies making up the evidence base that used specific practices and targeted skills in related domains.

The domains of targeted skills established by the National Professional Development Center on Autism Spectrum Disorders align very neatly with the goals and priority areas identified by the National Research Council (see Table 2). Evidence-based practices associated with the domains of skills can thus be directly related to the six priority areas stipulated by the National Research Council.

Using Tables 1 and 2 in concert, it is possible to identify an area of need specified by the NRC along with the related domain as identified by the NPDC and then identify a list of potential evidence-base practices for consideration. For example, in the area/domain of play skills, there are eight practices with an evidence base for early childhood age learners. These include discrete trial training, parent-implemented interventions, pivotal response training, self-management, social narratives, structured work systems, video modeling, and visual supports.

Table 2. NRC Priority Areas and NPDC Skill Domains

<b>National Research Council</b> Priority Areas of Need	<b>National Professional Development Center</b> Skill Domains
Functional Spontaneous Communication	Communication Skills
Social Skills	Social Skills
Play Skills	Play Skills
Cognitive Development Functional Academic Skills	Academics & Cognition
Proactive Approaches to Behavior Problems	Behavior

The recommendations of the National Research Council regarding the design and implementation of programs for young learners with ASD provide a framework within which evidence-based practices may be selected and practiced. The recommendations, outlined earlier in this paper include the importance of early intervention (recommendation 1) and the importance of family involvement, specifically parent training (recommendation 4). It should be noted that the National Professional Development Center currently has a brief on parent training and will soon have one on early intervention. Another recommendation of the National Research Council has to do with ongoing learner and program evaluation to guide intervention efforts and monitor progress. The National Professional Development Center has as part of its practice briefs an emphasis on the use of data collection to monitor student progress. Furthermore, many of the briefs on evidence-based practices include sample data sheets that practitioners may adopt and individualize for the learners with whom they work.

Having identified 24 evidence-based practices for use with learners with ASD, 23 of which have an evidence base for the youngest learners (birth to 5 years), and determining which of the priority areas of need that they may be utilized to address, the problem then becomes how to best avail information on selection and use of practices to professionals. Conventional wisdom and literature on best practice with instructional technologies suggests that professional expertise must be taken into consideration (Buisse & Wesley, 2006). With that in mind, specific steps for identification of appropriate evidence-based practices for learners with ASD have been proposed by the National Professional Development Center on Autism Spectrum Disorders (NPDC-ASD) and include the following:

1. Begin with measurable goals taken from the learner's individualized education program.
2. Identify intervention options (e.g., using the information in Table 2 regarding domains of instruction and evidence on specific practices).
3. Consider the history of the learner in terms of what has been tried before, what motivates the learner, supports in place, and preferences of the family.
4. Select an evidence-based practice, and use materials from the National Professional Development Center on Autism Spectrum Disorders to train those who will be implementing the practice.
5. Implement the practice and collect data on its effectiveness to inform on-going decision-making and track learner progress.

### Conclusion

The National Research Council Committee on Educational Interventions for Children with Autism has identified goals, prioritized areas for intervention and developed recommendations for educational programming for children with autism spectrum disorder. The National Research Council suggests that goals for children with autism spectrum disorder include personal independence and social responsibility. In addition, The National Research Council research proposes interventions be prioritized around six specific areas of needs which include functional spontaneous communication, social skills, play skills, cognitive development, proactive approaches to behavior problems, and functional academic skills. The domains of targeted skills established by the National Professional Development Center on Autism Spectrum Disorder align with the goals and priority areas identified by the National Research Council.

The National Research Council recommendations for educational programming state that as soon as a child is recognized as having an autism spectrum disorder, they should receive intensive intervention. At a minimum, services should be provided for 25 hours every week year-round. Intervention should be systematically planned, tailored to the needs and strengths of the individual child and their families and regularly evaluated. Family involvement should be encouraged and supported and the child with autism spectrum disorder should have opportunities to interact with typically developing peers.

The National Research Council's suggestions for goals, intervention priorities and recommendations for educational programming, when combined with specific evidence-based practices, such as those identified by the National Professional Development Center on Autism Spectrum Disorders, provide a virtual blueprint for effective early intervention programming for children with autism spectrum disorder. Furthermore, the National Professional Development Center on Autism Spectrum Disorders has developed materials for training implementation of evidence-based practices to fidelity. These materials are free of charge and available to the public at <http://autismpdc.fpg.unc.edu/>.

In conclusion, early childhood special education professionals will likely find greater

success in organizing and implementing programs for learner with autism spectrum disorders, when using evidence-based practices, such as those identified by the National Professional Development Center on Autism Spectrum Disorders within early intervention programs designed according to the guidelines and recommendations of the National Research Council. Together, these two organizing structures may serve to improve outcomes for young learners with autism spectrum disorders.

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