

AUTISM INTERVENTION AWARENESS IN EASTERN NORTH CAROLINA

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Abstract

Autism is a disorder caused by differences in the brain that lead to difficulties in communication, social interactions, restricted or repetitive behaviors, and differences in learning methods (*What is autism spectrum disorder?* 2022). Eastern North Carolina (ENC), along with the majority of the east coast of the United States, has a higher prevalence of autism spectrum disorder (ASD) as compared to the rest of the nation. This information provided an opportunity to further educate our region and community on autism intervention resources for greater awareness. Through this secondary research study the intention of guiding families to local interventions and informing them on differences in each type of available intervention was focused on. To educate on resources for families of children with ASD, it was necessary to know what interventions are currently available in ENC and what interventions are highly supported and effective. To conduct the research both quantitative and qualitative data from previous studies was compiled and analyzed. The data found was from scholarly and reliable sources that provided in-depth explanations of the interventions' backgrounds and effectiveness. From the compiled results it was clear that rural counties of ENC are lacking in autism interventions compared to those in urban counties such as Greenville, N.C. and other central North Carolina counties. Of the interventions studied it was evident that Applied Behavioral Analysis (ABA) is most widely used, with many other types of interventions stemming from this therapy. Overall a mix of interventions was recommended to best support children with Autism. The study also discusses interventions that have been effective in areas outside of ENC that would be beneficial to bring into our rural communities. This research could allow more families to give their children the support that they may need in order to succeed and live healthy lives.

Introduction

As students of public health and birth-kindergarten education the health, growth, and stability of children are quite important to our fields. In the aspect of public health, Autism Spectrum Disorder (ASD) is a concern that is growing with the children in our nation. ASD is coupled with higher health risk factors and health disparities that not only affect people on an individual level but on a systematic level as well (World Health Organization [WHO], 2023). In the aspect of education, it is very common no matter

where you teach, to have at least one child in your classroom with ASD. Knowing the interventions and resources that are available will help to make sure that every child is getting the education and help that they need in order to succeed. Early interventions in ASD can be an extremely beneficial way to give families support to best aid their child(ren). Knowledge of and access to effective interventions are key for families in eastern North Carolina.

Background

Autism Spectrum Disorder is defined by the Centers for Disease Control and Prevention (CDC) as “a developmental disability caused by differences in the brain” that leads to difficulties in communication, social interactions, restricted or repetitive behaviors, and differences in learning methods (*What is autism spectrum disorder?* 2022). According to the CDC, 1 in every 36 children in the United States have autism (Maenner, et al., 2023). The CDC also states that data from The Autism and Developmental Disabilities Monitoring (ADDM) Network, shows a higher prevalence of ASD among eight year olds compared to other ages. From this information it is clear that there is a need for intervention especially among younger children. A study in the Journal of Autism and Developmental Disorders provides clear evidence that eastern North Carolina (ENC), along with the majority of east coast states has a much higher prevalence of ASD compared to the rest of the United States (Bradshaw, et. al., 2023). This information further expresses the need for awareness of available resources in the ENC region.

Purpose of Study

Through this research, the hope was to provide awareness of resources to parents and families of children who have ASD in order to increase the number of children receiving effective interventions. Early interventions lay the foundation for a child’s education and for children with ASD. These interventions will help them in all domains of development. Oftentimes when families first get a diagnosis, it can be overwhelming. This research can provide in depth information about various interventions throughout ENC. The project also looked into effective interventions in other parts of the country, to investigate if they are worth adopting in North Carolina.

Methodology

To gather information throughout this secondary research project it was important to look at both quantitative and qualitative data from previous studies. Our quantitative data came from looking at the different demographics in eastern North Carolina as well as throughout the rest of the country. It also came from looking at the effectiveness and data of different interventions for ASD. Our qualitative data was found by researching different interventions, the details in which they are effective, and the motivations behind them. Data was found through scholarly and reliable sources.

Results

Interventions in Eastern North Carolina

The interventions found for children with ASD in ENC were Speech therapy, Physical therapy (PT), Occupational therapy (OT), Cognitive behavioral therapy (CBT), Applied Behavioral Analysis (ABA), Sensory integration therapy, Social skills groups, Dialectical behavioral therapy (DBT), Mindfulness, and Interactive Metronome (IM):

The first intervention for children with ASD found in ENC, is speech therapy. Speech therapy is used to aid in verbal and nonverbal children's communication skills (*Speech Therapy*). Though this therapy does work to improve language skills, it also focuses on conversational and social skills. These social skills can include matching emotions, understanding body language, and responding to questions. The physical communication skills worked on are strengthening muscles of the mouth, making clear sounds, and modulating tone of voice. Alternative augmentative communication (AAC) is used often for children with delayed communication skills. AAC's can include sign language, picture exchange communication systems (PECS), iPads, and speech output devices. Speech therapy can occur in a clinical setting, at school through an IEP, or at home (*Speech Therapy*).

Many children with ASD show delayed and atypical motor skills that can be targeted by using physical therapy and occupational therapy interventions. Physical therapists can aid in the development of gross motor and basic movement skills for children to be able to play games, sports, etc. with their peers (*GUIDE: Physical therapy guide to autism spectrum disorder 2024*). Occupational therapists help

children work on cognitive, physical, social, and motor skills with their main goal being to improve everyday skills for greater independence (*Occupational Therapy*). These two therapies are quite similar but do play very important and specific roles in the lives of children with ASD.

Cognitive Behavioral therapy (CBT) is an intervention for children with ASD who may have other mental health conditions and/or are older children/teens (*Cognitive behavioral therapy and autism spectrum disorders*). This therapy is seen less in early childhood intervention strategies. The focus of CBT is to distinguish thoughts, feelings, and behaviors and to alter thoughts to avoid negative emotions. The two main parts of CBT are the cognitive component, which helps children think about a situation, and the behavioral component which helps children change how they react to a situation (*Cognitive behavioral therapy for autism spectrum disorder in children*).

Applied Behavioral Analysis (ABA) is a flexible learning and behavior based therapy that focuses on behavior influences, behavior processes, and learning processes (*Applied Behavior Analysis*). Many children learn in different ways, therefore it is important to learn how. Children's behaviors are affected by environments and understanding how behavior works can better aid in the response of these environmental changes. The main goal of this intervention is to decrease behaviors that are harmful or affect learning. ABA therapists use antecedent, behavior, and consequence steps to learn behaviors (*Applied Behavior Analysis*). Many therapies, interventions, and coaching's are ABA based.

Sensory integration therapy is typically used in occupational therapy and can be used for children with ASD (*Sensory integration therapy*, 2022). An occupational therapist will use this technique by exposing the child to sensory stimulation in an organized way. The goal of this intervention is to help the child adapt their nervous system to process the sensory inputs in a better way. A child with ASD may be better able to repeat challenging behaviors when using sensory integration therapy. This can be done at home as well with parents. Some examples can be playing in dirt, water, or finger paint, using sensory toys, listening to music, or using noise canceling headphones.

As touched upon through several other interventions, social emotional skills are more difficult for children with ASD to perform (*Social Skills and Autism*). This means that it is difficult to understand the

actions of others and how to respond to them in various social settings, despite wanting to interact. Social skill groups are an intervention in which children with autism can come together, learn, and practice social skills. Social skill groups can be based in and target many different types of therapies. A few key focuses during this intervention time are teachable moments in a realistic setting, growth of communication skills, timing and attention skills, and behaviors that predict social outcomes like friendships (*Social Skills and Autism*).

Dialectical behavioral therapy is a practice that “uses the skills and strategies in terms of acceptance and change” (Carolina Therapy Connection, 2023). This intervention includes two sets of skills modules called acceptance-oriented skills and change oriented skills. The first set of skills focuses on mindfulness and distress tolerance; these ensure awareness of emotions and the ability to overcome difficult situations and pain. The second set of skills focuses on interpersonal effectiveness and emotional regulation; these teach how to voice needs while maintaining self-respect and relationships, as well as decrease vulnerability to painful emotions (Carolina Therapy Connection, 2023).

Mindfulness therapy is an intervention that focuses on being able to recognize thoughts, emotions, feelings, surroundings, and situations in everyday life (Carolina Therapy Connection, 2023). The main goal is to aid those with ASD to have increased awareness of their surroundings. By doing this they can avoid behaviors and responses that may be unsafe or unhealthy (Carolina Therapy Connection, 2023). Mindfulness therapy is offered in organizational settings and through individually certified therapists.

The last intervention found in ENC was Interactive Metronome (IM) (*Autism spectrum disorder*; 2018). IM is an assessment and training tool that challenges thinking and simultaneous movements. Unlike all the other interventions we have seen, this one uses a computer screen, headphones, and a rhythmic beat. Children perform activities while trying to stay on the beat. The goal of this intervention is to help children’s brains be able to function in cooperation. For clarification, our brains have many different regions that need to communicate with each other to perform daily tasks, which is what must

occur when performing IM activities (*Autism spectrum disorder*, 2018). This intervention can be a fun way to train the brain for children with ASD.

Effectiveness of Interventions in Eastern North Carolina

Regarding the effectiveness of interventions found in ENC, many studies were found for the various interventions showing increasing rates of effectiveness. A study on communication interventions for children with autism stated that “one can conclude that substantial evidence exists to claim that effective interventions exist to teach communication skills to children with autism.” (Goldstein, 2002). In this review the effects of speech therapy were studied and deemed successful in increasing communication skills. Occupational therapy is proven to support the quality of life of those with ASD by impacting engagement in everyday activities and mental health status (Kirby, 2023). Physical therapy has shown benefits in defining motor skills in children with ASD (*Physical therapy for autism*).

Research suggests that Cognitive Behavioral therapy is effective in helping individuals with ASD deal with anxiety and cope in social situations (*Cognitive behavior therapy for autism*). This article discussed CBT’s ability to effectively target the strengths and weaknesses in treatments for individuals with ASD. A recent study on mindfulness-based programs for children with ASD showed evidence that mindfulness was beneficial in the end for both children and their parents (Ridderinkhof, 2018). While children did not show specific changes in awareness of these emotions, feelings, surroundings etc., they did improve in social communication problems. The study also showed that emotional and behavioral function showed improvement among these children (Ridderinkhof, 2018).

Many studies have concluded that “intensive and long-term therapy using ABA principles improves outcomes” among children with autism; intensive and long-term meaning 25 to 40 hours for 1 to 3 years (*Applied Behavior Analysis*). In a study on the effectiveness of early intervention ABA for children with ASD, it was concluded that when looking at IQ and adaptive behaviors that early intervention behavioral interventions (EIBI), based on ABA, was more effective than other methods (A meta-analytic study on the effectiveness of comprehensive ABA-based). Many other studies support this idea of effectiveness, hence why it is the most widely used.

When looking into the effectiveness of sensory integration therapy a study done in 2014 in the Journal of Autism and Developmental Disorders was found (Schaaf, et al., 2014). This study showed that sensory interventions were effective in improving reaching goals in self-care and social activities among children with ASD. A study on “The Effectiveness of Social Skills Training Groups for Individuals with Autism Spectrum disorder” highlighted the potential of social skills training groups as an effective intervention for improving social skills of adolescents with ASD (Hotton, 2016). Improvements in mental health outcomes as well as social skills that impact quality of life were shown.

Dialectical behavioral therapy (DBT) was shown to be effective through a study done at the UNC School of Medicine (Igor, 2022). Individuals with ASD experienced decreases in negative mental health issues, ASD symptoms, and harmful behaviors after being exposed to DBT. More research through various age groups was suggested after this study. Interactive Metronome (IM) has been shown to improve motor skills, cognitive abilities, self-regulation, and communication skills among children with ASD (*Breaking barriers: Interactive metronome therapy redefines autism treatment!* 2023). Each aspect of intervention throughout IM can be targeted toward intervention for ASD, though it was not created solely for ASD, similarly to many other therapies.

Interventions Outside of Eastern North Carolina

The interventions found for children with ASD outside of ENC were Early Start Denver Model (ESDM), Pivotal Response Training (PRT), floortime, Relationship Development Intervention (RDI), and Discrete Trial Training (DTT):

The Early Start Denver Model (ESDM) is an intervention that uses a developmental, play-based, relationship-based approach mixed with ABA techniques to create a personalized intervention for each child (*ESDM*). This intervention is classified as a behavioral intervention, which is aiming to boost language, social and cognitive skills through personalized techniques and activities. Most teaching methods are done through natural play and every-day activities. Parent involvement is also important in this intervention as therapists should model strategies that parents can use at-home on top of receiving them in the clinical setting.

Pivotal response treatment (PRT) is a behavioral treatment that is usually initiated by the child causing it to be play based (*Pivotal response treatment*). This intervention is based in ABA as most we have seen have been associated or in correlation with. The goal of PRT is to develop communication and language skills to increase positive social behaviors. This intervention also relieves children with autism from disruptive self-stimulatory behaviors. PRT focuses on targeting ‘pivotal’ areas rather than specific behaviors in order to produce improvements in many different areas of development. Some pivotal areas that are focused on are motivation, response to cues, self-management, initiations, and social interactions. Motivational strategies are an important part of PRT as it encourages natural reinforcement.

Floortime is one intervention that can be integrated in many facilities but has not been exclusively mentioned in any researched organizations or facilities in the surrounding area/region. Floortime is a relationship-based therapy in which parents or therapists get on the same level as children by getting on the floor to interact with the child at their level (*Floortime*). The goal of this intervention is to allow adults to help children increase ways of communication. This therapy is an alternative to ABA, but is sometimes used in conjunction with ABA, and is child led. Floortime aims to reach six key milestones: self-regulation and interest in the world, intimacy, two-way communication, complex communication, emotional ideas, and emotional thinking. Therapists can teach parents how to communicate with more complex interactions called “opening and closing circles communication”. Through these strategies, therapists and families are able to facilitate play and focus on the child’s emotional development.

Relationship Development Intervention (RDI) focuses on the core symptoms of autism by using a family based behavioral treatment approach (*Relationship development intervention*). This is done by focusing on building social and emotional skills through dynamic intelligence or the ability to think flexibly. This intervention has six objectives to focus on which are emotional referencing, social coordination, declarative language, flexible thinking, relational information processing, and foresight and hindsight. Achieving dynamic flexibility can help children understand different perspectives, cope with change, and integrate information from sources like sounds and sights. Children are guided to build a relationship with their parents and then be able to go through developmental goals within the family . The

goal of this is to improve brain function or “neural connectivity” (*Relationship development intervention*). Much like other interventions, adults in the child’s life are encouraged to continue these principles throughout the child’s daily life.

Discrete Trial Training (DTT) is an intervention that also falls under the umbrella of ABA (Elder). This therapy breaks down skills into discrete or smaller components to make the goal more attainable for children. Therapists are teaching these smaller components one by one making it more attainable for children with ASD. While skills are being taught, tangible reinforcements are used to encourage the desired behavior. One limit to DTT is that it requires continual practice, it requires many hours to see results, and works better in combination with other therapy techniques (Elder).

Effectiveness of Interventions Outside of Eastern North Carolina

A meta-analysis across 12-studies on the effectiveness of Early Start Denver Model (ESDM) concluded that this intervention showed promise in early ASD (Fuller, E. A., 2020). It showed improvement with language and cognitive domains but showed little effects observed for improving restrictive or repetitive behaviors. When looking at the effectiveness for pivotal response treatment (PRT), it was said that “more than 20 studies suggest that PRT improves communication skills in many (though not all) children who have autism” (*Pivotal response treatment*). Most of these studies were done in one-on-one therapy sessions and group sessions. Some were also done by school teachers and by parents that were trained in PRT. In 2017, imaging of the brain was done and it was said that scans “showed evidence that RPT improves brain activity associated with sociability and communication” (*Pivotal response treatment*).

To give evidence showing effectiveness of floortime, Autism Speaks mentioned that the 2003 and 2007 studies both showed improvements after using floortime (*Floortime*). In the 2007 study it was said that floortime as “significantly improving emotional development and reducing autism’s core symptoms” (*Floortime*). There has not been much research done on the effectiveness of RDI except for a 2007 study done by the technique’s developer, Dr. Steven Gutstein. In his research it was found that positive results were found for children with ASD in the domains of flexibility and educational placement (Gutstein,

2007). More independent research should be done to truly understand the effectiveness of this intervention. Many studies have shown discrete trial training (DTT) has been effective in specifically teaching skills to children with autism (Elder). A researcher explained that DTT can be useful in teaching new behaviors such as speech sounds or motor movements or new discriminations like responding correctly to different requests (Applied ABC, 2023).

Discussion

Throughout the research it was concluded that many interventions for ASD found within and outside of ENC were increasingly effective. Several of the interventions and therapies found were based in ABA. Most of the therapies that targeted behaviors and responses were aimed at emotional regulation and finding the root of the issue at hand. It was found that a combination of many of these interventions and therapies would create the best outcome for children with ASD. These intervention and treatment mixes could include things such as occupational therapy, speech therapy, ABA, and others to target many goals in a child's life. Greenville, N.C. was the epicenter for ASD intervention in ENC; for more rural areas, awareness and accessibility is still an issue in reaching these key services.

Summary

Effective interventions are shown to be at our fingertips. These resources are available and effective in improving the health and wellbeing of children and families with ASD. Sharing this research can be a resource to guide parents to interventions that are best for their child's needs. Though more studies were suggested to be done on some interventions, each was successful in targeting and decreasing at least one negative symptom of ASD. Education of these resources can reduce the prevalence of ASD along our eastern regions and enhance the status of our societies.

References

A meta-analytic study on the effectiveness of comprehensive ABA-based ... (n.d.).

<https://www.ncbi.nlm.nih.gov/books/NBK81385/>

Autism spectrum disorder. Interactive Metronome. (2018, March 19).

<https://www.interactivemetronome.com/clients-landing-page/autism>

Applied ABC. (2023, March 3). *What is discrete trial training (DTT) in ABA*

therapy?<https://www.appliedabc.com/blog/what-is-discrete-trial-training-in-aba-therapy>

Applied Behavior Analysis (ABA). Autism Speaks. (n.d.-a).

<https://www.autismspeaks.org/applied-behavior-analysis>

Bradshaw, J., Eberth, J. M., Zgodic, A., Federico, A., Flory, K., & McLain, A. C. (2023). County-Level Prevalence Estimates of Autism Spectrum Disorder in Children in the United States. *Journal of autism and developmental disorders*, 10.1007/s10803-023-05920-z. Advance online publication.

<https://doi.org/10.1007/s10803-023-05920-z>

Breaking barriers: Interactive metronome therapy redefines autism treatment!. *Functional Neurology Vestibular Rehabilitation Clinic*. (2023, August 16).

<https://www.neurorehabclinics.ca/breaking-barriers-interactive-metronome-therapy-redefines-autism-treatment/#:~:text=Improving%20Motor%20Skills%3A%20Many%20individuals,improved%20motor%20control%20and%20dexterity.>

Carolina Therapy Connection. (2023, October 4). *Mental Wellness and Counseling*.

<https://www.carolinatherapyconnection.com/our-new-mental-wellness-and-counseling-services/>

Centers for Disease Control and Prevention. (2022, December 9). What is autism spectrum disorder?.

Centers for Disease Control and Prevention. <https://www.cdc.gov/ncbddd/autism/facts.html>

Cognitive behavioral therapy and autism spectrum disorders. Kennedy Krieger Institute. (n.d.).

https://www.kennedykrieger.org/stories/interactive-autism-network-ian/cognitive_behavioral_therapy

Cognitive behavioral therapy for autism spectrum disorder in children. Patient Care at NYU Langone Health. (n.d.).

<https://nyulangone.org/conditions/autism-spectrum-disorder-in-children/treatments/cognitive-behavioral-therapy-for-autism-spectrum-disorder-in-children#:~:text=It%20teaches%20children%20to%20alter,they%20react%20to%20a%20situation.>

Early start Denver Model (ESDM). Autism Speaks. (n.d.).

<https://www.autismspeaks.org/early-start-denver-model-esdm>

Elder, L. (n.d.). *What is discrete trial training?*. Autism Speaks.

<https://www.autismspeaks.org/expert-opinion/what-discrete-trial-training>

Floortime. Autism Speaks. (n.d.-a). <https://www.autismspeaks.org/floortime-0>

Fuller, E. A., Oliver, K., Vejnaska, S. F., & Rogers, S. J. (2020, June 12). The effects of the early start Denver model for children with autism spectrum disorder: A meta-analysis. *Brain sciences*. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7349854/>

Goldstein, H. Communication Intervention for Children with Autism: A Review of Treatment Efficacy. *J Autism Dev Disord* 32, 373–396 (2002). <https://doi.org/10.1023/A:1020589821992>

GUIDE: Physical therapy guide to autism spectrum disorder. Choose PT. (2024, January 16). <https://www.choosept.com/guide/physical-therapy-guide-autism-spectrum-disorder>

Gutstein, S. E., Burgess, A. F., & Montfort, K. (2007). Evaluation of the relationship development intervention program. *Autism : the international journal of research and practice*, 11(5), 397–411. <https://doi.org/10.1177/1362361307079603>

Hotton, M., Coles, S. The Effectiveness of Social Skills Training Groups for Individuals with Autism Spectrum Disorder. *Rev J Autism Dev Disord* 3, 68–81 (2016). <https://doi.org/10.1007/s40489-015-0066-5>

Igor. (2022, November 17). Can DBT be useful for managing autism?. Nevada Autism Center.

<https://nevadaautism.com/can-dbt-be-useful-for-managing-autism/>

Kirby, A. V., Morgan, L., & Hilton, C. (2023, March 1). Autism and mental health: The role of occupational therapy. *The American journal of occupational therapy : official publication of the American Occupational Therapy Association*.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10162488/>

Maenner, M., Warren, Z., & Williams, A. (2023, March 24). Prevalence and characteristics of autism spectrum disorder among children aged 8 years - autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2020. Centers for Disease Control and Prevention.

<https://www.cdc.gov/mmwr/volumes/72/ss/ss7202a1.htm>

Occupational therapy. Autism Speaks. (n.d.-a). <https://www.autismspeaks.org/occupational-therapy>

Pivotal response treatment (PRT). Autism Speaks. (n.d.).

<https://www.autismspeaks.org/pivotal-response-treatment-prt-0>

Relationship development intervention (RDI). Autism Speaks. (n.d.-b).

<https://www.autismspeaks.org/relationship-development-intervention-rdi>

Ridderinkhof, A., de Bruin, E. I., Blom, R., & Bögels, S. M. (2018). Mindfulness-Based Program for Children with Autism Spectrum Disorder and Their Parents: Direct and Long-Term Improvements. *Mindfulness*, 9(3), 773–791. <https://doi.org/10.1007/s12671-017-0815-x>

Schaaf, R.C., Benevides, T., Mailloux, Z. et al. An Intervention for Sensory Difficulties in Children with Autism: A Randomized Trial. *J Autism Dev Disord* 44, 1493–1506 (2014).

<https://doi.org/10.1007/s10803-013-1983-8>

Sensory integration therapy. Raising Children Network. (2022, May 24).

<https://raisingchildren.net.au/autism/therapies-guide/sensory-integration#:~:text=Sensory%20integration%20therapy%20is%20used,difficulties%20with%20processing%20sensory%20information.>

Social Skills and autism. Autism Speaks. (n.d.-b). <https://www.autismspeaks.org/social-skills-and-autism>

Speech therapy. Autism Speaks. (n.d.-c). <https://www.autismspeaks.org/speech-therapy>

U.S. Department of Health and Human Services. (n.d.). *Physical therapy for autism*. Eunice Kennedy

Shriver National Institute of Child Health and Human Development.

<https://www.nichd.nih.gov/health/topics/autism/conditioninfo/treatments/physical-therapy>

World Health Organization. (n.d.). Autism. World Health Organization.

<https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders>