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Autism Spectrum Disorder: Comparing the use of Behavior Therapy to Medication Therapy

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Running head: ASD THERAPY EFFECTIVENESS

Autism Spectrum Disorder:
Comparing the use of Behavior Therapy to Medication Therapy

A Senior Honors Thesis

By:

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Abstract

Autism Spectrum Disorder is a neurodevelopmental lifelong disorder that significantly affects everyday functioning. The most abundant issues associated with autism include social and language dysfunction. With sharply increasing rates treatment options need to be recognized and studied in order to provide the community with the necessary information. Evidence-based practice needs to be identified through individual studies as well as studies comparing treatment types to classify the best and most current treatment options. Currently there are two main types of treatment available for individuals with autism: behavioral and pharmacological. There is limited research comparing different options in each treatment type, therefore I would like to focus my project on a comprehensive comparison of all types of behavioral and pharmacological treatments available for children with autism.

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder over which large amounts of speculation has occurred over the past 50 years. Autism is a poorly understood disorder despite the large amounts of research dedicated to it. ASD is characterized by three main symptoms: poor communication, poor social interaction, and repetitive behaviors (Harnois, 2016). Although these three symptoms are similar in all those diagnosed with ASD, it is considered a very diverse disorder (Harnois, 2016). Manifestations of ASD are individualized, and may include: limited attachment to others, avoiding eye contact, and the need to maintain a routine (Harnois, 2016). The presence of stereotypy, or repetitive odd behaviors, is also common of children with autism (Cauffield, 2013). Stereotypy behavior examples include: perseveration, rocking, hand flapping, finger movements, or hair twirling (Cauffield, 2013). The hallmark symptom of ASD is considered to be a delay in speech, since this would be the earliest abnormality noticed by the parents (Cauffield, 2013). Therefore, the average diagnosis of ASD is made around two years old, when a lack of speech is assessed (Harnois, 2016). As the child progresses, the most noticeable behavior will be the absence of joint attention between an object the child is playing with, and an individual that is also playing with the object (Cauffield, 2013). In essence, the child is in their own universe, and will not pay much attention to others.

The rates of ASD have been sharply increasing with limited gains in knowledge on the disorder. Due to the alarming rates of autism there has been a large increase in attention for the disorder starting in 1995 from the US Department of Health and Human Services (Park, Lin, Harwood, Yu, & Kavanagh, 2012). The increased focus continued on into the 2000's when the Combating Autism Act of 2006 was passed. This act instituted more research, screenings, interventions, and education to be done, and a large focus on increasing autism awareness (Park

et al., 2012). Additionally, there was a large focus on decreasing the obstacles of screening and diagnosing ASD (Park et al., 2012).

ASD is a very complex disorder, which leads to an increased difficulty for treatment options. Today there are two main treatment types available to individuals with autism: behavioral and pharmacological. Behavioral interventions have been in place for over 50 years, and are the most common treatment available to the community today. Medication has been the subject of increased research and is slowly growing in its popularity. These interventions have different roles and are indicated in different situations. Through this project, the writer would like to exam the effectiveness of behavioral and pharmacological therapies, compare them, and understand the indications for each.

Epidemiology

Autism Spectrum Disorder rates are climbing astonishingly fast, with rates from 2000 to 2010 increasing at 120% (Shannon, 2015). Today the prevalence of autism is 1 in 68 births, which is about 1-2.5% of the general population, and still rising (Shannon, 2015; Virués-Ortega, Julio, & Pastor-Barriuso, 2013). The prevalence is much higher in the male population, and it is estimated to be five times more prevalent in males compared to females (Cauffield, 2013). Today there is a large disagreement within the research community on the cause of these increasing rates. With the new DSM-5 diagnostic criteria some argue that there is an expanding classification of ASD, therefore it is easier for those to be diagnosed. Also, there are additional programs in place today to help increase awareness and improve detection. Opposing views believe that this does not account for the severe increase of rates, but instead there are unknown genetic and environmental risk factors that contribute to the diagnosis (Neggers, 2014).

Pathophysiology

Researchers have yet to find any anatomical abnormalities or biomarkers specific to ASD, even after extensive research focused towards the brain (DeRamus & Kana, 2015). Although there is a lack of a distinct answer to the pathophysiology, the vast amount of research done in recent years has uncovered new evidence. There is a definite genetic link to developing autism, which is reflected by the twins study. If one identical twin acquires ASD then the other twin has over an 88% chance of also acquiring autism, but with fraternal twins there is only about a 30% chance (Frazier et al., 2014). There is some heritability associated with autism, and there are now multiple genes that may predispose an individual to developing autism (Cauffield, 2013). Relatives of those diagnosed with autism are more likely to share characteristics such as social and communication issues (McPartland, Law, & Dawson, 2016).

Furthermore, researchers believe that these genes are activated by a specific environmental factor (Cauffield, 2013). It is estimated that genetic factors account for 40-87% of diagnosis while environmental factors account for 0-32% (Frazier et al., 2014). Some of the most common environmental areas of concern are increased parental age, neonatal complications, and various exposures (Frazier et al., 2014). There is also speculation that exposure to teratogens during the first and second trimester of pregnancy may play a role (Cauffield, 2013). During the first two trimesters brain development is occurring, and the brain abnormalities associated with ASD may be due to abnormal growth during this period (Cauffield, 2013). There has also been a vast amount of speculation done on the type of environmental factors that may trigger this disorder, but researchers have only been able to rule out factors that do not cause autism (Cauffield, 2013).

Screening and Diagnosis

The American Academy of Pediatrics recommends that every child should be screened for autism between 18 and 24 months of age (“Modified Checklist”, n.d.). There is a screening tool available to the public called the Modified Checklist for Autism in Toddlers Revised (M-CHAT-R) that can assess the risk of ASD for children between the ages of 16 and 30 months old (“Modified Checklist”, n.d.). There is no concrete diagnosis for autism, but providers use DSM-5 criteria to reach the diagnosis (“DSM-5 Diagnostic Criteria”, n.d.). Providers are not able to have a specific diagnosis method due to the lack of physiological abnormalities found within individuals with ASD (Frith & Happé, 2005). Instead, through the DSM-5, a child is diagnosed with ASD if they have characteristics of all of the following: issues with social communication or interaction, restrictive and repetitive behaviors, symptoms present from early developmental periods, symptoms impair social, occupational, or other areas of functioning, and the symptoms cannot be a result of intellectual disability (“DSM-5 Diagnostic Criteria”, n.d.). In addition, the DSM-5 has a scale to label the intensity of the disorder, from Level one through Level three, which is the least severe to the most severe, respectively (“DSM-5 Diagnostic Criteria”, n.d.).

Behavioral Interventions

Applied Behavior Analysis

Although there are a multitude of behavioral treatment options, one of the most common and oldest behavioral therapies used is Applied Behavioral Analysis (ABA). It is endorsed by both the U.S. Surgeon General and the New York State Department of Health (“Applied Behavior Analysis”, n.d.). ABA has been used specifically for the treatment of Autism since 1960 (“Applied Behavior Analysis”, n.d.). It is not a concrete type of therapy, but instead considered a science, and its overall goal is to increase the adaptive ability of the individual

(“Applied Behavior Analysis”, n.d.). The main focus of the founder of this therapy, Lovaas, is increasing intensive treatment while the individual is a child in order to allow for the most functional life and less invasive treatment as the child ages (Lovaas, 1987).

ABA is a unique intervention for each child that undergoes the process, but in all uses it contains the same core characteristics: treatment should be started around three to four years old, daily life situations are converted into teaching scenarios when applicable, the skills that are being learned are specific to each child and their long-term goals, the skills under focus are decided in order to allow the most typical development of the child, treatment is best in a one-to-one ratio, and parents are expected to become trained in order to allow consistent training at both home and school (Virus-Ortega, 2010).

The main concept of this therapy is positive reinforcement, which is claimed to lead to increased repetition of the desired behavior (“Applied Behavior Analysis”, n.d.). ABA intervention is loosely based on the concept of operant conditioning, specifically the idea that positive reinforcement will bring out desired behaviors (Love, Carr, Almason, & Petursdorrir, 2008). When doing ABA with a child with autism, if the desired action is completed independently the strongest positive reinforcement is given (an object or action the child is most fond of, etc.) and a less substantial positive reinforcement is given if the desired action is completed after prompting (Love et al., 2008). It is imperative for the behavior analyst to stress the positive reinforcement following the desired behavior in order for progress to be made (“Applied Behavior Analysis”, n.d.). Over time it is expected that the therapist will wane the frequency of rewards given, and the desired behavior will occur without the expectation of a reward (Love et al., 2008). Eventually, the goal is for the repetitive behavior to be applied by the individual into realistic situations. This transformation from practice to life is done through a

major breakdown of each task. Every task becomes a series of smaller goals. With each goal that is met, the task is closer to being applied by the child (Jensen & Sinclair, 2002). It can be helpful if the ABA professional adds planned situations in the child's naturally occurring day to see if ABA training can convert into real-life situations ("Applied Behavior Analysis, n.d.).

Examples of specific tasks that can be learned or improved by ABA include: looking, listening, imitating, reading, conversing, and understanding others' perspectives ("Applied Behavior Analysis", n.d.). A trained facilitator decides the type of skill learned by each child, and the goals are picked specifically to match their age and cognitive status (Jensen & Sinclair, 2002). This therapy can be used in any age range, but has the most success when started as young as possible (Jensen & Sinclair, 2002). The therapy is most commonly used one on one in the classroom setting, but can also be successful at home or in a group ("Applied Behavior Analysis", n.d.).

The positive features of ABA are the high improvement rates, allows for the time needed to complete the therapy, and the fact that it is noninvasive as well as emotionally and physically safe for the children ("Applied Behavior Analysis", n.d.). Also, since this therapy is less invasive than others, there has been a marked decrease in stress levels of the parents of children undergoing ABA ("Applied Behavior Analysis", n.d.). There is some disagreement between experienced care providers about the effectiveness of this type of therapy, but in general it is accepted by researchers as the most successful treatments available for autism ("Applied Behavior Analysis", n.d.). Lovaas stated that with two to three years of ABA 47% of children will have a significant increase in their skills and cognition (Lovaas, 1987). Furthermore, there is a decrease in the prevalence of autistic symptoms (Lovaas, 1987). Lovaas even goes as far as to say that with early and intensive treatment children can become indistinguishable from peers

within a few years from the onset of treatment (Lovaas, 1987). The time needed to complete this therapy is not as intensive as other behavioral interventions, and is most commonly done during school hours (“Applied Behavior Analysis, n.d.). This decreases the risk of poor compliance, and therefore may yield better outcomes in the long-term.

A meta-analysis done including all applicable ABA intervention studies has shown that ABA is proven to increase a child’s general IQ score in all 18 studies assessed (Virués-Ortega, 2010). In nine of ten studies evaluated by Virués-Ortega (2010) in the same meta-analysis mentioned prior, the non-verbal IQ score was also proven to increase throughout ABA intervention. The greatest increase in IQ was experienced with an increased number of hours per week of therapy, showing that the intensity of the program had the most significance, and duration had minimal significance (Virués-Ortega, 2010). In both instances of an increased IQ, even higher results were attained when the ABA intervention was done through a clinical program in comparison to parental-based ABA intervention (Virués-Ortega, 2010). In regard to language, the Virués-Ortega (2010) meta-analysis unanimously agreed that receptive (comprehension of others) and expressive (communicating ideas to others) language had positive benefits from the use of ABA intervention. The highest success rates with language were found with children who had a longer duration of ABA therapy, and intensity had a minimal affect on the success of the child (Virués-Ortega, 2010). Adaptability was the final area of interventions that was appraised, and included four sub classifications: communication, daily living skills, motor skills, and socialization (Virués-Ortega, 2010). By merging these four areas of learning Virués-Ortega (2010) created an adaptive behavior composite measure. ABA interventions were confirmed to increase the adaptability of a child with autism in 13 of the 15 studies assessed. The largest success within adaptability was found when the intensity of the ABA interventions

was increased, but duration did not have any affect on the skill of adaptability (Virués-Ortega, 2010).

Some negative aspects of ABA include the accreditation of facilitators as well as the entire ABA program put in place throughout school systems. A behavior analyst is considered either a psychologist with specific ABA training, or an individual that is board certified with ABA, which includes detailed documentation of past experiences and supervised training (“Applied Behavior Analysis”, n.d.). The issue of obtaining properly qualified behavior analyst stems from the small amount of professional programs that exist (Jensen & Sinclair, 2002). Most programs are not run through professionals, which leads to an increased risk in the training and concerns that the therapy is being done incorrectly (Jensen & Sinclair, 2002). The lack of professional programs is due to the high costs associated with learning the proper training (Jensen & Sinclair, 2002). Although Jensen and Sinclair (2002) firmly states that the increased cost is worth learning ABA from professionals. An additional drawback to ABA is the slow progress rate seen from the students. Although each student is unique in their ABA intervention process, it is generally accepted that the progress will be slowly achieved through modest steps (“Applied Behavior Analysis”, n.d.). Another possible downfall of ABA is the inconsistent results between different children with autism. Studies have shown that a small percentage of children do not respond successfully throughout the ABA intervention process, and researchers are unsure of the cause (“Applied Behavior Analysis”, n.d.). Another negative aspect of ABA some consider is that the goal of ABA is to “fix” autism and change children into a “normal” individual (Dalmayne, 2016). Some believe autism is a unique and creative way of thinking which does not need to be fixed, and instead we should work with these kids. This concept

questions the basis of ABA, and if this therapy has the correct goals in mind when creating a child's treatment plan (Dalmayne, 2016).

Early and Intensive Behavioral Intervention

Another common type of behavioral therapy includes Early and Intensive Behavioral Intervention (EIBI), which is a derivative of ABA (Lovaas, 1987). The main difference between these two therapies is that EIBI focuses specifically on children under four years old (Lovaas, 1987). In addition, there are even more success rates with this type of therapy partially due to its almost extreme intensity (Lovaas, 1987). The main skills focused on include: imitation, language, motor skills, play, and decreased behavioral issues such as aggression or self-injurious behaviors (MacDonald, Parry-Cruwys, Dupere, & Ahearn, 2014). Lovaas (1987) stated that children should be treated “during most of their waking hours for many years”, for maximal functional gains to be made. A study done by Lovaas (1987) had 38 participants, and half went through EIBI for 40 hours a week for two years, and the other half (control group) received less than 10 hours per week. The experimental group resulted in 47% achieving normal range IQ scores, 40% achieving an IQ in the mild intellectual disability range requiring special education, and 10% still in the severely intellectually disabled IQ range and requiring specific classes for autism (Lovaas, 1987). The control group resulted in 2% achieving normal-range IQ, 45% achieving an IQ in the mild intellectual disability range requiring special education, and 53% in the severely intellectually disabled IQ range requiring specific classes for autism (Lovaas, 1987). Another more recent study of EIBI for 3-12 months showed improvement of 43 out of 48 participants (Matson, Tureck, Turygin, Beighley, & Reiske, 2012). EIBI is similar to ABA in its performance of skills, and the major breakdown of learning into steps (Love et al., 2008). Children with ASD will learn desired behaviors in accordance with typically developing skills

through an excessive breakdown of steps into manageable short-term goals (Love et al., 2008). Also like ABA, EIBI is considered a broad classification of intervention types, and under this classification there are many more specific types of interventions, such as the Early Start Denver Model (Shannon, 2015).

The major drawback to this program is the time commitment associated with it. EIBI is found to be so effective due to its intensity. One study showed that about 49% of children undergoing EIBI spend 21-40 hours a week in sessions (Love et al., 2008). Another negative aspect to this therapy is the gap between when EIBI ends, and when schooling begins, which is about two years. Within this time frame Matson et al. (2012) questions the reappearance of symptoms, and if any studies have been dedicated to this issue. One study showed that as the children age, the amount the child responds to the treatment decreases (MacDonald et al., 2014). During their study children ages 18-23 months had 91% of their experimental group respond positively to treatment, while children ages 36-48 months only had 30% respond positively (MacDonald et al., 2014). Also, EIBI has the same issue as ABA in regards to the issue of obtaining properly trained professionals to deliver the therapy. Love et al. (2008) stated that there are many individuals instructing EIBI who are not properly trained due to the lack of professional training opportunities, and the high demand of individuals that wish to become trained. A survey done by Love et al. (2008) was given to 211 parents of children that were receiving EIBI as an intervention to autism, and 62% of the parents reported that none of the EIBI therapists that worked with their children were certified.

Early Start Denver Model. The Early Start Denver Model (ESDM) is one specific type of EIBI for children with autism spectrum disorder, and is recommended to start at 12-48 months of age (Shannon, 2015). ESDM is considered one of the most prominent and more common

types of EIBI used on children with autism (Shannon, 2015). This individual model is unique due to the vast options of delivery settings that one can choose. Parents can choose between: therapy teams, parents delivering the intervention in a group setting, individual sessions delivered at a clinic, or individual settings in the child's home ("The Early Start Denver Model (ESDM)", 2012). ESDM can be provided by a psychologist, behaviorist, occupational therapist, speech pathologist, early intervention specialist, pediatrician, or the child's parents ("ESDM", 2012). Certification of providing ESDM therapy is done through professional training centers, and then the providers must submit videotapes of them giving ESDM therapy to ensure proficiency ("ESDM", 2012). Parents who wish to learn how to deliver ESDM do not need to go through the extensive certification process, but instead learn through their child's instructor and will receive informative literature on the subject ("ESDM", 2012).

Since ESDM falls under the category of Early and Intensive Behavioral Interventions, it is also considered a derivative of ABA. ESDM slightly differs from ABA in many ways which include: higher focus on naturalistic ABA teaching, more extensive parental involvement, and a higher focus on interpersonal skills and shared engagement between others ("ESDM", 2012). The framework of ESDM is constructed by utilizing the time of rapid growth associated with their young age to foster the best responses (Rogers, 2016). There is an emphasis on the development of social skills and typical cognitive development as a result of undergoing ESDM, most commonly through imitation, sharing, joint attention, and play (Rogers, 2016). By incorporating extensive parental involvement it allows the child to learn through a more natural way, during everyday life (Shannon, 2015). As a result of these variations, studies have shown that children who underwent ESDM were found to have increased cognition, increased adaptive behavior, and decreased ASD symptom severity compared to other interventions for autism

(Shannon, 2015). In addition, a study from 2010 uncovered that the ESDM transformed the thinking of children with ASD (Shannon, 2015). It was proven through electroencephalograph activity that children who experienced ESDM reacted closer to a typically developing child when presented with pictures of toys and faces (Shannon, 2015).

TEACCH Program

The Treatment and Education of Autistic and Related Communication of Handicapped Children (TEACCH) is a program that is currently used by an estimated 30% of families with children with autism (Virués-Ortega et al., 2013). The underlying features of the TEACCH program include an open relationship between parents and their child's practitioners, and the program is received by the child in a structured teaching environment (Bourgondien & Schopler, 1996). The underlying principle of TEACCH is providing a proper structured environment (Bourgondien & Schopler, 1996). The characteristics of TEACCH are motivated to fit the general strengths and weaknesses found in children with autism ("TEACCH Autism Program", n.d.). For example, a common advantage of individuals with ASD is visual acuity, and through TEACCH there is an emphasis on learning through visual means, and enhancing verbal communication with visual aides (Bourgondien & Schopler, 1996). TEACCH also attempts to provide the best learning environment for the child by minimizing distractions, using a predictable schedule for the child to follow, and setting up activities to promote independence of the child (Bourgondien & Schopler, 1996). Examples of materials that are common throughout the TEACCH program include visual schedules of the day's activities in order to assist adaptability, dividers set up between the children's working stations to decrease distractions, and working stations that are physically separated in ways to promote independence (Bourgondien & Schopler, 1996; Virués-Ortega et al., 2013).

To become certified there is a TEACCH Professional Certification Program, which teaches evidence-based practices and allows for correct practices to be used (“TEACCH”, n.d.). An individual can either become a Practitioner, who administers the program, or an Advanced Consultant, who is more knowledgeable and able to give lectures and train others (“TEACCH”, n.d.). Although there is a formal certification needed to administer this program, there are a large amount of educators who use materials created from this program without formal certification. For instance, the use of daily schedules, and dividers used for children with autism is a common occurrence in classrooms, and is not unique to the TEACCH program (Virués-Ortega et al., 2013).

A meta-analysis completed by Virués-Ortega et al. (2013) uncovered the strengths and weaknesses associated with the TEACCH program. The domain’s that had large growth throughout the studies were social skills and adaptability (Virués-Ortega et al., 2013). Mild advancements were made in the areas of communication, activities of daily living, and motor functioning (Virués-Ortega et al., 2013). Furthermore, the TEACCH program was proven to be more successful as age increases (Virués-Ortega et al., 2013).

Pharmacological Interventions

Today, the role of medications in treating ASD is strictly assistive to the behavioral interventions, and is only indicated if the child exhibits drastic behaviors, life-threatening behaviors, or severe issues with functioning (Myers & Johnson, 2007). There is no current practice guideline in regards to pharmacological interventions (Murray et al., 2014). The medications will not cure any symptoms of autism, and there is no current medication that will decrease any of the three central symptoms of autism (Cauffield, 2013). The function of the medications is to decrease the severity of symptoms, which would indirectly allow for increased

learning and quality of life (Cauffield, 2013). Although there is the promise of better behaviors as a result of medications, there needs to be an intensive risk benefit analysis for each individual before starting since children with ASD are at a higher risk for developing side effects (Cauffield, 2013). All possible causes should be assessed before medication therapy begins, such as medical or environmental causes (Myers & Johnson, 2007). A study uncovered that 56% children six to eleven years old diagnosed with ASD were prescribed a psychotropic medication to treat symptoms similar to attention deficit hyperactivity disorder (ADHD), bipolar, obsessive compulsive disorder (OCD), anxiety, or depression (Cauffield, 2013; Murray et al., 2014). In addition, the same study assessed children 18 to 21 years old and found that 73% were prescribed a psychotropic drug, revealing that as age increases, so does the use of pharmacological interventions (Murray et al., 2014).

Antipsychotics

Currently there are two types of antipsychotics that are specifically indicated for ASD treatment: risperidone and aripiprazole (Cauffield, 2013). The desired effects of these atypical antipsychotics are to decrease aggression, irritability, and self-injurious behavior (LeClerc & Easley, 2015). By decreasing irritability these drugs indirectly improve social skills of children with ASD. If these children are able to control their emotions better, then they are less likely to lash out in public settings. In addition, antipsychotics can be used to decrease stereotypies, social withdrawal, inappropriate speech, and hyperactivity (LeClerc & Easley, 2015). There is vast research supporting the use of atypical antipsychotics, most noticeably a randomized control trial done by the Research Units on Pediatric Psychopharmacology (McCraken et al., 2002). Through this study they found 69% of children who were receiving risperidone respond successfully to the medication compared to 12% of the placebo group (McCraken et al., 2002).

Although atypical antipsychotics are helpful to some, there needs to be careful assessments done on any child receiving this medication due to the high risk of side effects. Possible side effects include: increased appetite, constipation, fatigue, drowsiness, drooling, vomiting, diarrhea, headache, and anxiety (McCracken et al., 2002). In addition, atypical antipsychotics have an increased risk in causing extrapyramidal symptoms, which can be life-threatening (Cauffield, 2013).

Selective Serotonin Reuptake Inhibitors

Another common medication prescribed to individuals with autism is selective serotonin reuptake inhibitors (SSRIs). This class of medications is aimed at controlling the repetitive behaviors exhibited as a result of ASD (LeClerc & Easley, 2015). This is considered an “off-label” use, because it is intended to be used for symptoms of ASD that are very similar to obsessive-compulsive disorder (OCD) (Cauffield, 2013). There is currently a large focus of research to determine the true effectiveness of sertraline and fluoxetine, because they have had the most success thus far (LeClerc & Easley, 2015). One study of 37 individuals with ASD that were administered fluoxetine for 12 weeks. Repetitive behaviors were shown to decrease by 50% in the experimental group compared to 8% in the placebo group (Hollander et al., 2012). Side effects from SSRIs were minor compared to other medications studied and include: sedation, decreased appetite, mild insomnia, vivid dreams, nausea, dry mouth, and headaches (Hollander et al., 2012).

Stimulants

Individuals with ASD have similarities with the symptoms of ADHD, such as hyperactivity, difficulty concentrating, and excitability (Cauffield, 2013). As a result, the prescribing rate of stimulants is 12 times higher than compared to the typical population (Murray

et al., 2014). Methylphenidate is the preferred ADHD-like medication used for those with ASD, because it is the stimulant with the most research in the autistic population thus far (LeClerc & Easley, 2015). One study was done by the Research Units on Pediatric Psychopharmacology Autism Network with 72 children diagnosed with autism found 49% of these children to respond in the desired manner to methylphenidate (Research Units on Pediatric Psychopharmacology (RUPP) Autism Network, 2005). There is a lot of positive research supporting this medication use on the autistic population, but it is also found that it can cause a multitude of side effects. From the same study by the Research Units on Pediatric Psychopharmacology Autism Network 13 of the 72 participants had to discontinue the medication due to adverse effects (RUPP Autism Network, 2005). Most commonly, stimulants can cause irritability, lethargy, depression, abdominal discomfort, increased emotionality, and further social withdrawal (RUPP Autism Network, 2005). The benefits of this drug must be carefully considered due to the risk of increased social withdrawal and increased irritability, since these are major symptoms of ASD (Murray et al., 2014).

Comparing the Effectiveness

Comparison of Behavioral Interventions

There is more support and increased rates of success with behavioral interventions, compared to medication therapy, especially when they are individualized and administered at a young age (MacDonald et al., 2014). In addition, ABA has been proven to be the most superior intervention at this time since they have success in cognitive functioning, language development, and adaptability (Virués-Ortega, 2010). The specific skills ABA is most likely to help enhance include: IQ advancements, expressive language, receptive language, and communication skills (Virués-Ortega, 2010). The vast success associated with ABA interventions among the

communication and language areas are significant when assessing intervention types, since one of the largest issues associated with ASD is the impairment in communication (Virués-Ortega, 2010). In addition, the meta-analysis done by Virués-Ortega (2010) proved the superiority of ABA over other behavioral interventions since each control group in the studies were using some other various type of behavioral interventions (ex. TEACCH, etc.) and success was proven compared to these other therapies.

Another major consideration is how early each intervention can begin, because most success is found in social and communication skills when behavioral interventions have been started from an early age (“Study: Autism Therapy”, 2014). Starting at an early age is imperative due to the high plasticity of the child’s brain throughout early development (Shannon, 2015). When considering this, any type of Early and Intensive Behavioral Intervention such as ESDM would prove superior solely due to the early age of 12 months during which the intervention can start (“ESDM”, 2012). A randomized control study uncovered that children who experienced ESDM for only 20 hours per week showed a greater improvement in cognitive skills, language skills, and adaptability compared to other commonly used interventions (“ESDM”, 2012). In regards to the TEACCH program it was proven that it is most useful as the child’s age increases, therefore this intervention is not the most effective for young children with autism (Virués-Ortega et al., 2013). Although the TEACCH program altogether may not be the best intervention, certain concepts such as dividers, daily schedules, and decreasing environmental stimuli, are commonly used in classrooms of children of all ages (Virués-Ortega et al., 2013). These interventions are basic ideas teaching children with autism, and prove to be successful when implemented correctly (Virués-Ortega et al., 2013).

Comparison of Behavioral and Pharmacological Interventions

It is agreed upon in the research community that medications should only be used when needed, and are not a standard of care for those with autism (Cauffield, 2013). This is mostly due to the fact that there is little evidence on which to base their medication suggestions, and the large amount of side effects they can cause specific to the autistic population (Cauffield, 2013). In addition, there is a difficulty keeping medication administration consistent with children. This is largely in part due to the lack of communication and decreased cognitive abilities of the child. They do not understand what they are ingesting, and it is a common problem for children to refuse medication administration.

Medication therapy can be advantageous to children with ASD, but is only indicated when behaviors are severe/life-threatening, or the medications allow for better success with behavioral interventions (Cauffield, 2013). As more testing is done, medications may hold a more central role in the treatment of autism, but the evidence has not shown a better effectiveness over behavioral interventions currently (“Applied Behavior Analysis”, n.d.).

Technical Expert Panel

A technical expert panel (TEP) was created and consisted of pediatricians, child psychologists, researchers, and parents with the goal of understanding the best interventions available for children with autism (Maglione, Gans, Das, Timbie, & Kasari, 2012). The TEP was organized by the Office of the National Coordinator for Health Information Technology and the Substance Abuse and Mental Health Services Administration (Mitre Corporation, 2012). During the time the TEP met together there was an assortment of topics discussed including: alcohol use, autism, depression, drug use, suicide, and trauma (Mitre Corporation, 2012). The TEP met for 24 weeks in total, and only three of which were dedicated to autism (Mitre Corporation, 2012). Various research conclusions were brought to the board where they utilized

the information provided and drafted guidelines to be put in place (Maglione et al., 2012). The final guideline was put to a vote where the TEP panel agreed that a minimum of 25 hours per week of an all-inclusive intervention is needed to best treat children with autism (Maglione et al., 2012). In addition, they have found sufficient evidence to determine that as the intensity (hours per week) and duration of interventions increase, the effectiveness of the interventions will increase (Maglione et al., 2012). Evidence for ABA therapy is favorable in the domains of language, adaptability, and IQ (Maglione et al., 2012). In respect to intensive programs such as the ESDM, the TEP concluded that the current evidence supports this intervention for improving fundamental issues (Maglione et al., 2012). Evidence found for environmental programs, such as TEACCH, the evidence was lower than the others (Maglione et al., 2012). In recent literature, there is promise associated with the use of parent involvement in interventions since the intervention can be in place at all hours of the day, and the children will not regress during their time at home (Maglione et al., 2012). Although each intervention was closely studied, Maglione et al. (2012) reported inadequate evidence to name the best intervention available. Maglione et al. (2012) put all the new information uncovered into a guideline format and published in the journal, *Pediatrics* for the community to have access to this knowledge.

Autism Treatment Network

A network named Autism Treatment Network (ATN) was created by the prestigious Autism Speaks organization in 2005, and by 2012 there were 17 care centers across the United States (Lajonchere, Jones, Coury, & Perrin, 2012). ATN is federally funded by Autism Intervention Research Network on Physical Health (“Autism Treatment Guidelines”, 2014). The goals of ATN include increased available healthcare for children with ASD, and increased research leading to more evidenced-based practice use in interventions with children with ASD

(Lajonchere et al., 2012). This organization provides a nationwide network consisting of providers, researchers, and other personnel dedicated to creating better interventions for children with autism (Lajonchere et al., 2012). Through this network parents are able to get individual treatment for their children, and will have comprehensive care throughout the treatment process (Lajonchere et al., 2012). Providers will assess each child on a regular basis, compare the effectiveness of multiple treatments for each child, and measure the child's quality of life on each treatment option (Lajonchere et al., 2012). Through the ATN there is a patient registry of all children nationwide diagnosed with autism from age two through seventeen that receive treatment through the organization (Lajonchere et al., 2012). The registry of patients is a major advancement for researchers to try to understand etiology better, and allows for longitudinal studies (Lajonchere et al., 2012). From each child, samples are taken, such as blood, urine, and plasma, which is a great resource for researchers, and has minimal impact on the children (Lajonchere et al., 2012). Lastly, ATN is a great source of information for parents. They provide family tool kits, pamphlets, information comparing types of interventions, and material to help prepare children with autism for difficult experiences such as doctor appointments, dentist appointments, etc. (Lajonchere et al., 2012).

The work of the ATN is directly responsible for the updated treatment guideline for ASD. The ATN was the first program that began to treat children with autism comprehensively and look at other physical or mental health issues to help improve the child's quality of life ("Autism Treatment Guidelines", 2014). The new guideline created by the American Academy of Child and Adolescent Psychiatry was based off of previous models from the ATN and providers as well as the public will have easier access to this information ("Autism Treatment Guidelines", 2014).

Use in Healthcare

Comorbidities

Individuals with ASD have a high occurrence of comorbidities. Most commonly, sleep issues, gastrointestinal issues, and ADHD will occur (Cauffield, 2013). About one third of the population with autism will experience seizures by their adolescence, and about two thirds report having moderate sleep difficulties (Cauffield, 2013; Murray et al., 2014). In addition, mental retardation, anxiety, conduct disorder, self-injurious behavior (such as head banging), schizophrenia, delusions, and tic disorders are commonly associated with ASD (Cauffield, 2013; Murray et al., 2014). The most common comorbidity according to Murray et al. (2014) is anxiety and phobias, with a rate estimated at 41.9%, followed by conduct disorders estimated at 30%.

Healthcare Knowledge

As a result of the presence of comorbidities, and the typical symptoms of autism, these children may be subjected to many medications from a young age. These medications need to be closely monitored due to the young age it is administered, and because there is an increased sensitivity to the medication for children with autism (Cauffield, 2013). The increased reactions to medications are suspected to be due to an increased sensitivity in their nervous system (Kapp, 2013). Therefore, there are many reasons why a child with autism may require additional medical attention, on top of the typical healthcare provided. It is estimated that a child diagnosed with ASD will spend twice as much time with a provider compared to other typically developing children (Myers & Johnson, 2007). With the high occurrence of healthcare visits, it is imperative

for healthcare professionals to understand the interventions that are proven to be successful. In a healthcare setting a child with autism is more likely to be anxious and agitated, therefore health care professionals need to be competent in using effective interventions.

When a child with autism is in a healthcare setting as a result of increasing dysfunctional behaviors it is recommended that the child should be assessed for emotional or physical causes before the issues are attributed to autism (Myers & Johnson, 2007). Possible causes of escalating behavior may include: depression, anxiety, otitis media, urinary tract infections, or any other causes of pain (Cauffield, 2013). When physical issues are ruled out, there are various interventions and materials that are now available for healthcare workers to use that were created in 2005 by the Safe and Sound Initiative by The Autism Society (McGonigle et al., 2013). Although information to help children with autism exists, 90% of emergency healthcare workers report no prior training on ASD, and therefore, families of children with autism continue to be unsatisfied when visiting emergency rooms (McGonigle et al., 2013). Due to this lack of understanding of autism spectrum disorder, healthcare professionals report having low confidence in treating and working with any child with autism (McGonigle et al., 2013). In the future more knowledge needs to be distributed to healthcare settings in order to best work with patients with autism, especially in times of crisis.

Medicaid

About one third of American children with autism rely on Medicaid for primary health insurance, and about half of American children with autism receive some benefits from Medicaid (“Medicaid & Autism”, n.d.). All interventions that are deemed medically necessary will be provided through Medicaid to any child with a disability, including children with autism, until they are 21-years old (“Medicaid & Autism”, n.d.). The major issue with Medicaid coverage is

that there are no specific treatments that need to be provided. Medicaid guidelines simply state that ASD needs to be treated (“Medicaid & Autism”, n.d.). For instance, some physicians who help determine what is medically necessary for each child, may state that an intervention is not needed for the child’s medical treatment, and thus there is no Medicaid coverage for it (“Medicaid & Autism”, n.d.). With autism there is a large gray area concerning behavioral interventions, and if they can be proven as medically necessary for the specific child in question, or just helpful for their development. For example, with a seizure disorder antiseizure medications are medically necessary to control the condition, but with autism there is no direct medical treatment. Due to this gray area some families have a difficult time proving that therapies such as ABA or speech therapy are medically necessary instead of advantageous for the child. Therefore the availability of interventions via Medicaid is largely discretionary through each state’s guidelines on how they define medically necessary. Although when any intervention is deemed medically necessary is must be covered by the Early and Periodic Screening, Diagnostic, and Treatment benefit (EPSDT) (“Medicaid & Autism”, n.d.). Medicaid is more reliable when covering pharmacological interventions since it is easier to prove they are medically necessary, compared to behavioral interventions. It is simpler to track the therapeutic effect of medications and progress can be seen in a shorter time period, therefore Medicaid is more likely to cover it.

Methods

Besides four years of experience working as an aide at the Board of Cooperative Educational Services (BOCES) in a suburban area local to Western New York the writer also shadowed a BOCES registered nurse (RN) for 20 hours. During this time the practical applications of both behavioral and pharmacological interventions were seen. This shadowing

experience allowed this writer to be able to view the application process directly allowed for the writer to have a better and more comprehensive evaluation of all interventions in place. Finding an organization to shadow was a difficult process because children with autism are considered a vulnerable population due to their age as well as disabilities. Requests to shadow at Golisano Children's Hospital were denied. However, the BOCES program was receptive to this experience. BOCES is a local organization that provides resources for a variety of children with many different types of disabilities. Examples of children they work with include those with autism, Down syndrome, oppositional defiant disorders, intellectual disabilities, physical disabilities, limited English proficiency, gifted children, and general behavior issues. BOCES is eligible to work for these kids in the special education area from ages 3 to 21-years-old. BOCES treats children with all levels of severity of autism: nonverbal children, low functioning children, and some above average functioning.

Behavioral Interventions

The most abundant behavioral intervention witnessed at BOCES was general ABA. EIBI is not used due to the age of the children and occasionally aspects from the TEACCH program are intertwined throughout the child's day. ABA is usually delivered through an ABA-trained aide employed through BOCES. The aides who work at BOCES have all been trained in-house so the same high level of competence is shared amongst staff. Every day each child is slotted approximately 30 to 60 minutes to complete their ABA intervention for the day. During this time the aide and child go to an area with decreased risk of distractibility, such as a separate room or there may be dividers to separate the rest of the classroom. The child and the aide sit across from each other and the aide follows a unique guideline created by an autism specialist for each student. The aide performs the tasks that are required, and most often looking and listening

stressed during these sessions. When a correct response is given by the child encouragement is stressed and the child is told he or she did a good job. When the incorrect response is given the aide would correct the action and move on. ABA can work very well in a controlled environment, but with some environments, and depending on the child, it can be very hard to get even 30 minutes of focused attention. He or she can easily get distracted, fixate on another activity, ignore the training completely, and even start to become aggressive.

The best ABA witnessed by the writer was when it was planned carefully during the day. Strategies that led to successful ABA sessions included performing ABA with the child immediately after medication was given (if prescribed), performing AB in an environment with very little or no distractions, having ABA performed by an aide who knows the child well, and having ABA performed by the same aide each day. If a child is already having a bad day, with multiple episodes of aggression or noncompliance, then it may be best for everyone involved to skip the ABA for that day. When the child has long sessions of work it can interfere with the child's ability to learn. The child will likely make little to no progress, and there is the risk of putting both the aide and the child in a difficult and possible dangerous situation.

Strategies from the TEACCH program were consistently used with children with autism, although it is unclear if the aides using the TEACCH method had been certified in that method. For example, in the majority of all pervasive developmental disorder (PDD) rooms there are dividers in place to separate each child's work area, schedules changed daily at each child's area, and the use of stations. Dividers are a necessity with any child that had moderate to severe autism. It makes it much easier for the child to focus on what is in front of him or her, and even better results are seen when the child's desk faces a wall, and dividers are on either side. Schedules are used with almost all children with autism. The need for schedules depends on

each child. Some children were witnessed following others throughout the day without remaining steadfast to their own schedules, while other children were irritated to the point of crying, screaming, and becoming unable to participate in activities if any change to their schedule was made. One child even needed to be restrained because his reaction to the change in his schedule was so severe. For children with more severe autism, details of the day, even bathroom breaks, should be scheduled for the day. Work stations can also work very well for PDD rooms. Each station represents a different area of learning, and the physical separation of the different tasks leads to increased understanding in these children's minds. The writer could see that children with autism think concretely when the writer noticed that just the act of walking from a one station to the next station helps them make that mental transition between different work tasks. Although with any activity it can be difficult for these children to transition away from the activity he or she enjoys. Most commonly timers are used and continually stressed to avoid this issue. Children will be told before they start how much time they will have, and they will get multiple reminders of how much time is remaining. In addition, transitions will be much easier if the next task is not something they dislike. For example, you could have a drink break, lunch, or physical education planned directly following playing on the playground to have the smoothest transition possible.

Pharmacological Interventions

The RN that was shadowed has been a nurse for over 20 years and has been a BOCES nurse for the past 8 years. The nurse was responsible for the health of about 50 students at her site. The nurse stated that this was an abnormally low number of students to have, and it is usually double or triple that number. The number of children assigned to a nurse is dependent on the health needs of the students. For example, some students need a nurse one-one-one, others

may need a nurse present in the building at all times due to seizures, or others may need a nurse for medication administration.

The most common medications witnessed being administered to children with autism are stimulants, and antipsychotics have only been witnessed given to those with major aggression issues. With stimulants, it is very noticeable if the child has gotten his or her dose. Each child is affected differently by the medication, but usually the child will be running, pacing, constantly making noises or mumbling, and unable to focus on one object. After a child is medicated he or she is much more focused, and their entire body seems more in control. Some children come to school after being medicated and act extremely lethargic, it all depends on the child's reaction to the drug. The writer has observed children having to go home because they were not medicated prior to arrival, and the staff was not able to care for him due to his extraordinary state of hyperactivity.

During my time shadowing a BOCES nurse there was a large amount learned about practical issues with medication use in the autistic population. Many children associate their medications with the negative effects he or she feels after he or she takes the medicine, such as nausea, lethargy, or any other unwanted side effects. The writer witnessed children getting medications hidden in food to trick them to taking it. Children with higher cognition can be at an increased risk for issues with medication administration. One child observed with was nonverbal but had a higher cognition than many other nonverbal children. The child was prescribed a stimulant, and did not like the physical effect it had. Over time the child understood the role of the nurse, and realized that any food given by the nurse would contain the medication. The child would pick through foods until the pill was found, the child would then throw the pill, and eat the food. Due to laws, the only person eligible to give this pill was the nurse, so there was very little

we could do to help medicate the child. Medication compliance is the biggest issue witnessed with the autistic population. He or she may not like the taste of the pill, the feeling that he or she gets afterwards from it, or may not like to listen to staff in all situations. In addition, many of these children are nonverbal, have low cognition, or both, and the need for taking the pill cannot be justified to the child in a way they can understand it. On the other end nonverbal or children with lower cognition may not be able to effectively communicate why they do not like the medication. Also, it is very hard to experiment and find the right medication as well as titrate to the right dosage for these children because there is less feedback available to the providers.

Implications for Future Research

In order to create better behavioral or pharmacological approaches to treating ASD, there must first be more information uncovered about the cause. Without understanding the pathophysiology behind the disorder, there cannot be specific treatments aimed at correcting the abnormality. The research in the upcoming years should focus solely on the underlying cause of autism, and the physiological effect it has on the body. Once the physiological aspect is uncovered then researching the treatment for autism will be more successful and based specifically on ASD. As we continue to wait for researchers to uncover more information about ASD more clinical trials and case studies should be done on the pharmacological approaches and their success rates. For the behavioral interventions, the writer suggests that new research be done on interdisciplinary interventions and meta-analyses be done to bring together the works of many researchers, and see what the underlying results show. There is a large disagreement about the strength of the effectiveness of these therapies, and further meta-analyses would be the best way to determine results.

There should be a direct comparison between types of behavior or pharmacological interventions, but there are many limitations to this idea. To allow these comparisons there must be set control groups, with no other interventions in place. This is not attainable because a child without any interventions in place is not ethical, and would prove detrimental to the control groups' development. In the future, researchers should try to find ways to directly compare these options without hurting the child's development. This could be attained through the comparison of two interventions side by side, without the use of any other interventions on top of the one being studied. In addition, a future study should match the intensity as well as duration of the interventions being assessed, so that the effectiveness is not influenced by different lengths of time used (Virués-Ortega, 2010). Another recommendation for future research should focus on the differences between individual children with autism. Past research has uncovered that not all children respond to behavioral or pharmacological treatment as expected. Many of the previous research trials done have grouped all children with autism together, and this will not uncover the reasoning why some children respond to treatment and others do not.

There needs to be more research on the long-term effects of psychotropic medication for individuals with autism. Currently there is a small amount of information available about the safety of long-term medication (Murray et al., 2014). These medications have a high incidence of side effects amongst adults who do not have comorbidities. The risk of side effects increases when giving the medications to children, and increases more when giving to children with comorbidities. More information needs to be uncovered about the impact of long-term pharmacological therapy and the effects on the body of an individual with ASD.

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