Affordable ABA

Treatment Options for Individuals with Autism Spectrum Disorder

Introduction

There are a variety of medical and therapeutic needs of individuals with autism spectrum disorder (ASD). Interdisciplinary teams can have a significant impact on assessment, diagnosis, treatment planning, and implementation. There are different evidence-based treatments that can be developed and implemented for the treatment of an individual's symptoms of ASD. Evidence-based treatments have been shown to improve deficits within individuals with ASD and in different areas which include adaptive, cognitive, and social functioning. These treatment options gain information and evidence regarding their effectiveness through their testability and are designed for a specific population or disorder. Additionally, there are various wide-ranging effects of ASD as well as challenges that individuals and their family members face when seeking treatment.

In this course, participants will learn to (1) discuss processes for developing evidence-based treatments for the treatment of an individual's symptoms of ASD, (2) identify treatment options for individuals diagnosed with ASD, and (3) discuss vocational interventions that can be used to help an individual gain and maintain employment.

Section 1: Processes for Development of Evidence-based Treatment Practices

ASD has been recognized as a neurodevelopmental disorder that impacts an individual's social skill development as well as demonstrates marked impairments in both verbal and nonverbal communication. Furthermore, ASD is characterized by the presence of stereotypical patterns of behavior and interests (American Psychiatric Association, 2013). It is often noted as being a lifelong disability that requires high medical care. Furthermore, an increase in mental health problems

are often exhibited within caregivers of individuals diagnosed with ASD. Outcomes are more significantly impacted when an individual is able to receive early intervention services upon diagnosis and during the first three years of their life (Vivanti, 2015).

When an individual is able to receive early intervention services, these services have been associated with marked improvement in one's verbal and nonverbal skills, adaptive skills, and the quality of life maintained by caregivers (Koegel et al., 2014). There have been a variety of intervention methods that have been developed and evaluated since the early work of Lovaas during the 1960s (Lovaas, 1981). There are three main models in which evidence-based early intervention models are classified. These intervention models are based on the principles of behavioral analysis (Koegel et al., 2014), developmental and relationship models (Wetherby et al., 2014), or a combination of behavioral strategies and relationship-focused developmental models (Rogers et al., 2012). Regardless of the specific intervention that is selected and implemented, it has been recommended that an individual receive at least an intervention intensity of 25 hours per week that is implemented as early as possible and as soon as the diagnosis has been confirmed (National Research Council, 2001).

As a result of the aforementioned information, it is imperative that children and their families are able to access evidence-based treatment interventions. It is important that processes are followed for the development of evidence-based treatment interventions as well as evaluating where interventions stand within the field of treatment options for ASD. Therefore, forthcoming information will work to describe some of the main treatment intervention options that are available as well as provide useful information for selecting an evidence-based treatment intervention for children diagnosed with ASD.

Theoretical Influences on Treatment Interventions for ASD

Treatment intervention options for individuals with ASD are based on theories of treatment. These theories are used to guide the development, implementation, and evaluation of various interventions by delineating the hypothesized factors that lead to the challenging behavior that is being targeted as well as the hypothesized mechanisms that are used within the intervention to change the challenging behavior that is targeted (Kazdin, 1999; Rapport, 2001). Furthermore, these theories are then translated into hypotheses that can be tested that are then, in turn, used to inform the design and evaluation of the treatment that is selected. Knowledge is also generated that is relevant to practice and relates back to theory. This process allows principles and practices that are used within interventions to be refined. Ultimately, the overarching goal is to understand whether or not the intervention achieves the outcomes that it sets out to achieve as well as the processes that are used to promote beneficial effects.

There are a multitude of theoretical frameworks on human learning and development that treatments are derived from within the field of ASD. This is a beneficial framework to have as it does not rely on a unitary framework or derive interventions from a limited knowledge base regarding certain mechanisms that are associated with ASD symptoms or features that are targeted by treatment interventions. There are several main theoretical frameworks that have helped to inform early ASD treatment interventions.

Psychodynamic Theory

The first theoretical framework that was used to inform treatment interventions in ASD is known as psychodynamic theory. Psychodynamic theories of ASD hold the view that symptoms of ASD are caused by inadequate parenting (Bettelheim, 1967). This is consistent with the idea that mother-child dynamics significantly impact outcomes within psychopathology (Freud, 1911). Treatment interventions

that were developed based on this approach ranged from psychodynamic psychotherapy to the child and mother to having the child removed from their home and placed in a psychiatric residential institution. This approach was later discredited by scientific evidence in the 1950s and 1960s; however, variations of this theory were still proposed in the 1990s (Earnshaw, 1994) and continued to influence practices and policies in different countries (Feinstein, 2010).

Behavioral Theory and Applied Behavior Analysis (ABA)

Behavioral theory and applied behavior analysis (ABA; Baer et al., 1968) were then referenced within ASD treatment intervention options. Operant conditioning was welcomed into the field by different pioneers (Ferster, 1964; Lovaas, 1968). Behavioral theory and associated practices are based on the idea that the behaviors of humans obey universal laws of learning in which behaviors that are followed by a positive consequence are strengthened and will be more likely to occur again in the presence of the stimulus that triggered the exhibition of the behavior. On the other hand, behaviors that are followed by a negative consequence will have the opposite results. As a result, antecedents and consequences can then be manipulated so that different behaviors can be encouraged or discouraged.

The main theoretical concepts that were introduced into the early work conducted in ABA consisted of the idea that behaviors that were atypical in children with ASD were a direct result of the same laws of learning that also shape typically occurring behaviors (Ferster & DeMyer, 1961) through manipulation of the antecedents and consequences. These ideas formed the general framework for a structured approach known as discrete trial teaching (Lovaas, 1981). It also helped to form other other applications of ABA and has continued to be viewed as a central focus of most treatment options for ASD.

Developmental Theory

Developmental theory is designed to focus on various changes and stages in which a child passes through within their cognitive development. As it stands, different theories of development do exist. However, a key element within developmental theories that has helped to shape treatment in ASD is constructivism (Bruner, 1978). According to this concept, a child's skill acquisition within their early developmental phases is based on their active engagement with an environment that is stimulating both physically and socially. Knowledge is then gained at each stage so that it is able to provide the foundational basis for advancement to the next developmental stage. This, in turn, enables acquisition and learning of knowledge that is more sophisticated. Within this framework, adults are able to facilitate skill acquisition through scaffolding (Bruner, 1978) and engaging the child in joint activities that are developmentally appropriate. This allows the child to engage in routines and activities that build upon skills that they have already learned in an effort to generate new knowledge. For example, when engaging in storybook reading routines, an adult may engage a child in a joint focus activity (i.e., looking at pictures in the book) and also help the child to understand the context surrounding the words, pictures, and emotions that are being depicted within the story. The adult can also elicit reactions from the child, both verbal and nonverbal, through questions and feedback that they are able to provide to the child. This may involve the adult asking for clarification on something the child has stated (Ninio & Bruner, 1978). Key skills that are able to be learned during these joint activities within the areas of communication, joint attention, and imitation will then allow the child to be able to engage in social exchanges with others that are more complex. This will then allow the child to acquire further knowledge as these skills continue to progress.

A major source of influence for interventions in ASD was derived from developmental science. This is due to research having documented various

developmental sequences that are found within typical children to also be observed in children with ASD. For example, it has been noted that joint attention is a predictor of subsequent development of language in children with ASD and those that are typical. Interventions that are designed to target joint attention also have resulted in improvements within language (Whalen et al., 2006). Furthermore, improvements that are made within an individual's prerequisite skills are able to facilitate acquisition of skills that are more advanced. Intervention options and practices that are based on developmental theories stress the importance of the use of treatment targets that are developmentally appropriate. For example, this would infer that developmental prerequisites are taught in an effort to facilitate the acquisition of skills that are more complex. Additionally, scaffolding is prioritized over didactic teaching as a method for promoting skill acquisition in children with ASD that are younger (Rogers, 1999).

Social Neuroscience

Social neuroscience is a newer discipline that focuses on how an individual's brain is able to process social information and how social experiences affect the development of the brain (Lieberman, 2007). The main idea that has been developed within this field is the idea of the "experience-expectant" nature of the social brain (Brownell, 2013). This perspective maintains that hardwired specialized neural circuits cause children to be biased toward seeking out opportunities for social engagement. When a child experiences repeated engagement in species-typical social experiences, the input that is needed for the brain to be able to become specialized in social information processing is provided. This allows for advancements to be made in social interaction with more sophisticated forms of social interaction taking place. The main components that are found within this cyclical process involve the subcortical and cortical that aid in rapid processing of social cues (Frith & Frith, 2010), the social reward

system that is the basis of pleasure that is associated with the social interaction (Dolen et al., 2013), and the mirror neuron system (Rizzolatti & Sinigaglia, 2008). The mirror neuron system responds similarly during action execution and the observation of the same action. This is a process that is thought to allow the observer to understand the actions of others as if they would perform a similar action and generate knowledge of the correspondence between their own experience and the experience of others. Those treatment practices and interventions for ASD that are influenced by social neuroscience perspectives stress the importance of engaging the child in normal social routines early in their development when there are critical periods of brain plasticity. This will further enhance the reward value that is associated with social exchanges and facilitate the appreciation of correspondences between the actions of the child and others during joint routines (Rogers & Dawson, 2010).

Implementation Science

Implementation science contains theories that formulate predictions on the factors that encourage adoption and successful implementation of interventions in the naturalistic environment or real world (Eccles et al., 2009). Theories from this realm of science focus on the features of the context that the intervention takes place in. For example, some of these features can include different organizational systems, processes and cultures, and the "buy-in" of various professionals that are involved with the intervention. There are several different theoretical methods that align with implementation science. However, one main idea that is formed from all of these methods is that there is a commitment to adopt a certain intervention and implement this intervention as it was intended as this will depend on the perceived compatibility that exists between the features of the intervention and the features of the contexts where the intervention is being implemented. The intervention's initial uptake, maintenance that exists over a

period of time, and the degree of fidelity in which the intervention is delivered are all based on the interventionists' and administrators' attitudes (i.e., whether they think the implementation of the intervention is the correct thing to do), norms (i.e., the extent in which one feels that they are to use the intervention or that their peers are to use the intervention), self-efficacy, and the perception of the cost-benefit of integrating a new program into one's practice. As a result, this will have an affect on the outcomes of the intervention. Some of the early intervention practices involved in ASD treatment have been informed by implementation science and use participatory research methods that take into account the resources and preferences of both administrators and practitioners when they are in the early stages of developing a new intervention program (Dingfelder & Mandell, 2011; Locke et al,, 2016).

It is important to understand that theories are necessary as a method for guiding hypothesis-driven development and evaluation of early intervention as well as the usefulness and usability of an intervention and the mechanisms that help encourage change. Early interventions that have been used with individuals diagnosed with ASD have been greatly influenced by various theoretical views on human development and learning that were important during different periods of time and in different cultural contexts. While animosity has been existent within the field due to historical divergences in theoretical orientations, the important part that theories play is to generate empirically testable predictions on how useful different approaches and mechanisms of change are so that advancements in knowledge can be obtained regarding the factors that promote positive change for those children diagnosed with ASD. It is vital that a theory-driven agenda of early intervention development and evaluation is used when integrating and changing the intervention so that it is applicable to various individuals and contexts while maintaining the components of the intervention that are responsible for outcomes that are successful (Odom, 2016).

Evidence-based Intervention Development

There are four phases that are used in the development of an evidence-based intervention (Smith et al., 2007). These four phases include the formulation and implementation of the new intervention, the development of a manual and method for cross-site evaluation of the intervention, control trials that are randomized, and effectiveness studies that are conducted in the communities.

Within the formulation and implementation phase, the goal of this phase is to show that the new intervention that has been selected is effective. These designs contain a baseline phase where data that are related to the target behavior are gathered as well as in at least one or more of the intervention phases. If the data indicates that the target behavior has improved during the intervention phase when compared to the baseline phase, it is a possibility that the intervention was effective. A main advantage of implementing a single-subject design is that few resources are needed. On the other hand, there is a small sample size which hinders the generalizability of the results. When a between-group design is utilized, one group within the study is assigned to the treatment condition and another group is assigned to the control condition. Some of the advantages that are associated with between-group designs are that there is random assignment of participants to the different conditions, a large number of participants are able to be included, and there is increased generalizability of the results when this is compared to that of single-subject results. There are disadvantages as well, though. Limited resources may not allow enough participants to be enrolled in the study so that statistical power can be achieved. When this occurs, a lack of differences that occur between the groups may be because the intervention is not effective or the statistical power is inappropriate.

The next phase that is used within the development of evidence-based interventions is the assembly of manuals and the development of a research plan.

The manuals that are used should include a clear and specific explanation of the procedures that will be used as well as the fidelity measures that will be implemented in order to allow both researchers and practitioners the ability to implement the treatment intervention. A small number of participants should be used in order to test the feasibility of the design of the study and methods that will be employed. This type of testing will allow researchers to understand if the practitioners and patients will accept the treatment intervention that has been selected. This phase within the development of evidence-based interventions also includes the planning of a randomized clinical trial (RCT) as a method for determining the efficacy of the treatment intervention. The main components of planning a RCT involve the identification of both primary and secondary measures as well as consultation with a biostatistician to determine the sample size that will be needed within the study in order to obtain statistical power.

Multisite RCTs are used to test the efficacy of the selected intervention through random assignment of a large number of participants to both the experimental and control conditions of the study. RCTs that are high quality should use a representative sample of participants, inclusion and exclusion criteria that are clear, and outcome measures that are able to assess the core symptoms of ASD. Lastly, effectiveness studies evaluate whether or not an intervention is effective when it is implemented within community settings without the rigorous oversight that is in place during research. These types of studies also determine whether or not an intervention is helpful within clinical practice and if it should be disseminated to the masses.

The majority of evidence that provides support to the positive impact that is associated with early intervention services for children diagnosed with ASD is derived mostly from studies that have been conducted within university-based efficacy studies that have contained high levels of training of staff, supervision, and service delivery (Vivanti et al., 2014). Studies that are methodologically

rigorous that evaluate effectiveness of an intervention often utilize the randomization of participants into both the experimental and control groups, and also use a blind evaluation of the outcomes that have occurred as a result of treatment (Bowen et al., 2009). Furthermore, it is often difficult to conduct randomization in community-based interventions as there are often policies in place that oversee service delivery and ethical concerns. Blind evaluations are typically not used in clinical practice outside of their use in RCTs.

Those efficacy studies that use RCTs often test whether a specific intervention is effective under controlled conditions (Smith et al., 2007). Studies that look at generalizability within community practice are often limited as it can be difficult to select participants and clinicians to be involved in the study. Community effectiveness studies evaluate whether or not an intervention is effective without the rigorous oversight that is provided during research (Smith et al., 2007). In these types of studies, it is not possible or warranted to provide the level of experimental control that is found within RCTs, such as the use of participant randomization and strict criteria for inclusion and exclusion, as the goal of these types of studies is to evaluate whether or not the intervention would be effective for implementation by community clinicians. As good quality studies that evaluate effectiveness of an intervention are often complex, very few of these studies that evaluate ASD-specialized early interventions have been conducted through community studies (Divan et al., 2015).

One of the main focuses within the field of ASD is to determine whether or not specialized interventions are able to be proven to be effective within University RCTs and are also shown to be effective when they are implemented within various communities throughout the world. Most communities do not have the resources available that are required for the implementation of rigorous efficacy studies. Additionally, challenges for individuals and communities that do not speak English is that a majority of evidence-based early intervention models that

have been developed for young children diagnosed with ASD have been developed within countries that are English speaking. When an intervention is being used that has been developed in another country, it is important that the intervention manual has been translated as well as any adaptations of procedures that will be needed due to differences that exist within languages and cultural contexts.

Interventions that are efficacious should be both accessible and effective within real world settings. Individuals that have potential confounds are often not included within intervention studies. Therefore, we know little about the efficacy and effectiveness of interventions as they pertain to children that are from low income families, migrant status situations, or that reside in a developing country.

Even though evidence-based early interventions have been both developed and tested within high-income countries, most of the children within the world live in a low-income country (Divan, 2017). Children that reside within a low-income country often do not have access to high-quality evidence-based interventions. Several barriers exist when trying to access these services. Some barriers include a lack of resources that are readily available to provide these high-intensity interventions as well as specialized professionals that are able to implement these interventions (Patel et al., 2013). Some research has evaluated the effects of a randomized trial on the adaptation of a well-supported evidence-based intervention (Divan et al., 2015). A main component that allowed the implementation of an intervention to occur within a low-resource region was due to the delivery of the intervention being parent-mediated through the use of providers that were not specialized. It may not be realistic to provide high-intensity interventions that are led by specialized professionals within various underserved areas of the world to a majority of children diagnosed with ASD. However, all children do deserve to receive interventions that are high quality and evidence-based that are also adapted to and evaluated within their own

communities. As research continues to unfold, it is the hope that it will be possible to conduct other research in low-income countries so that more interventions can be developed and evaluated as well as serve more children and result in outcomes that are positive.

Exclusion and Inclusion Criteria

Response to selected interventions can be variable even though early intervention services for preschoolers diagnosed with ASD have an overall positive impact that has been documented within the literature. Some of the outcomes that have been documented for preschoolers that were able to receive early intervention services ranged from a loss of diagnosis to a lack of improvement in the core ASD symptoms as well as significant gains in language, cognitive, and adaptive skills to minimal improvements (Howlin et al., 2009).

It has been noted that there are at least two possible reasons as to why there is so much variability in the outcomes that are associated with early intervention services. First of all, studies often do not describe the characteristics of the sample in great detail. Furthermore, even less information is provided about the social and demographic factors that may contribute to the outcomes that are demonstrated. Secondly, the clinical heterogeneity of autism is noted (Vivanti et al., 2014). Although conceptualizing autism as a spectrum disorder is the current custom since the publication of the DSM-5, it is still most probable that there are subtypes that exist within the realm of autism spectrum (Rutter, 2014). Additionally, there are also various medical and behavioral conditions that coexist with ASD. There are approximately 75% of individuals that have been diagnosed with ASD that also present with various medical conditions, genetic syndromes, or mental health disorders (Nazeer & Ghaziuddin, 2012). In an attempt to ascertain homogeneous samples of populations with individuals that have “pure” ASD,

those children that have other conditions, such as epilepsy, intellectual disorders, or genetic abnormalities, are often left out of these intervention studies (Dawson et al., 2010). As a result of not including children with ASD who also have various medical and behavioral disorders and who also make up a majority of the general ASD population, this strict inclusion and exclusion criteria greatly impacts and reduces the ability of the results to generalize as well as be useful within the real world. However, in studies where all children with ASD are allowed to participate, and comorbid conditions are not considered as moderators within the statistical analysis, it is impossible to determine if the associated medical conditions have an effect on the outcomes that are demonstrated.

Measurement of Outcomes within ASD Treatment

Since there are a variety of needs of individuals diagnosed with ASD, there are also a number of treatment targets and measures that have been used to measure outcomes within ASD treatment trials. The determination as to how outcomes are measured should be based on a precise delineation of change that the treatment is intended to produce and how this is shown in both proximal and distal outcomes that are measurable. Proximal outcomes are behaviors that are able to be directly targeted by a treatment. Distal outcomes are behaviors that are not able to be directly targeted by a treatment but are intended to change as a consequence of the treatment. Furthermore, other things to consider when selecting outcome measures are the availability of the instruments that will provide a reliable, valid, and change-sensitive measurement, and the individualization of treatment targets that have been determined to be meaningful by professionals as well as by the families and individuals that are receiving the treatment. When measuring treatment outcomes that are associated with ASD, there are challenges that exist as they relate to each of these items.

First of all, most treatments for ASD hope to change several areas of functioning that are manifested heterogeneously and are difficult to measure. This is quite the opposite of treatments that are used to target a dimension that is specific and easily quantifiable and have normative parameters that are already established (i.e., measuring change in an individual's blood pressure after receiving hypertension treatment). Most treatments associated with ASD seek to address the core social symptoms that align with ASD; however, difficulties in quantifying social reciprocity have been noted as a challenge since the early years as well as how social reciprocity changes after treatment has been delivered. Difficulties within one's social abilities can develop and present differently among individuals diagnosed with ASD. For example, some individuals may display a lack of spontaneous social initiations with others while some may engage in excessively frequent and inappropriate social approaches. These can include a lack of eye contact as a toddler or difficulty in developing and maintaining friendships as someone is a teenager. Additionally, social difficulties are also affected by an individual's intellectual functioning, which can be vastly different among individuals diagnosed with ASD.

Furthermore, repetitive behaviors that are demonstrated by individuals diagnosed with ASD also range from various motor mannerisms (i.e., hand flapping, rocking of one's body) to excessive focus regarding a particular topic. These individuals may also demonstrate behaviors that are often found in young typically developing children (Leekam et al., 2011). Further challenges can be added as one realizes that changes that occur within the core symptoms of ASD in an individual after they have received treatment are typically subtle. As a result, it is often unsuccessful to use certain diagnostic measures (i.e., ADOS) that are used to capture the presence of ASD symptoms in an individual in the same way to determine treatment-related progress. It is usually not as much of a challenge to quantify changes that occur across other dimensions, such as cognitive

functioning and adaptive behavior, as normative data and standardized instruments with solid psychometric properties are available to be used across the wide range of functioning that is demonstrated within individuals diagnosed with ASD (Sparrow et al., 2005). However, it is important to note that challenges do still present themselves when using instruments that have been standardized on typically developing individuals are implemented with individuals diagnosed with ASD. This also includes both the social and language demands that are placed on individuals within testing situations (i.e., understanding instructions with multiple steps or high in complexity).

Challenges are bound to exist within the measurement of change in individuals diagnosed with ASD as these challenges are demonstrated in the vast heterogeneity of measurement strategies used to evaluate outcomes in ASD treatment trials. Researchers have documented that out of 200 intervention trials for ASD, just as many unique measurement tools were also utilized (Bolte & Diehl, 2013). One-fifth of these measurement tools were designed by the investigators. Out of these measurement tools, only 60% of them were used one time, and three of the tools were utilized in more than 2% of the studies. Furthermore, researchers have noted that the methods that researchers use to operationally define and measure treatment targets regarding social communication can determine whether treatment effects are able to be documented or not (Yoder et al., 2013). More specifically, treatment changes are more likely to be demonstrated and noted when proximal measures are utilized when compared to distal outcome measures.

In an effort to address the various challenges that are present as they relate to outcome measurement within ASD intervention, a multitude of expert panels and stakeholder groups have come together to discuss and set forth guidelines that can be used for appropriate outcome measurement within the ASD field (Anagnostou et al., 2015). There are several tools that have been identified as

appropriate for outcome measurement within social communication skills (Anagnostou et al., 2015). Some of these tools include the Communication and Symbolic Behavior Scales (CSBS; Wetherby & Prizant, 2002), the Early Social Communication Scales (ESCS; Mundy et al., 2007), the Vineland Adaptive Behavior Scales-II Communication Domain and Socialization Doman (Sparrow et al., 2005), and the Social Skills Improvement System (SSIS; Gresham & Elliott, 2008). Measures that were noted as being potentially appropriate were the Social Responsiveness Scale (SRS; Constantino & Gruber, 2012) and the Pervasive Developmental Disorder-Behavior Inventory (PDD-BI; Cohen et al., 2003). However, there were limitations that were delineated for each of these measures. Some of these limitations included limited data on how these measures were applied with individuals with intellectual disability. Furthermore, after the Anagnostou et al. (2015) report, researchers developed the Brief Observation of Social Communication Change (BOSCC) in an effort to measure treatment response for behaviors associated with social communication (Grzadzinski et al., 2016). Initial indications suggest that there are strong psychometric properties as well as strong responsivity to change when these results are compared to those associated with the ADOS.

In reference to restricted and repetitive behaviors, researchers have identified several measures that have been noted as appropriate (Scahill et al., 2015). These measures include the Children's Yale-Brown Obsessive Compulsive Scales for pervasive developmental disorder (CYBOCS-PDD; Scahill et al., 2006), the Repetitive Behavior Scale-Revised (RBS-R; Bodfish, 2003), the Aberrant Behavior Checklist Social Stereotypic Behavior subscale (Aman et al., 1985), and the Stereotyped Behavior Scale (SBS; Rojahn et al., 2000). There were limitations that were associated with each of these identified measures. One of these limitations included an unclear ability to notate the range and subtypes of repetitive behaviors that were demonstrated in individuals diagnosed with ASD.

Lastly, additional experts discussed the potential utility of a multitude of standardized instruments to capture the change that occurs after treatment in nondiagnostic features that are found in individuals diagnosed with ASD (McConachie et al., 2015). These nondiagnostic features include features such as cognitive functioning and adaptive behavior. There were challenges that were delineated regarding the validity of standardized cognitive tests when these types of tests are being used to evaluate individuals that are diagnosed with ASD. Often, these types of tests necessitate a set of skills that are often impaired in individuals with ASD, especially individuals that are minimally verbal. These sets of skills include following various verbal instructions and even interacting with tasks that are not familiar and assessors. The limitations that are noted have been associated with at least three risks that are significant. The risks that have been identified are that the changes associated with treatment implementation within this population may tend to be underestimated, achievement that occurs within minimum test-taking skills in this population may occur as a result of artificially inflated improvements that have been demonstrated in test scores, and the test scores that were exhibited at post-treatment for individuals that have poorer outcomes associated with treatment and did not obtain sufficient test-taking skills may bias the data toward a demonstration of more positive outcomes than what actually took place.

As a result, there is further research that should be conducted in order to increase accuracy, flexibility, and usability within outcome measurements that are used with treatments associated with ASD. Some efforts that are currently taking place to increase precision within the field include the use of new technologies that are associated with eye-tracking and neuroimaging methodologies that are used to complement traditional observational as well as parent-reported measures (Voos et al., 2013).

Lastly, researchers have noted the various views that have been held by stakeholders regarding the different outcomes that should be measured in an effort to capture the success of treatments (McConachie et al., 2015). Some of the outcomes that have been considered as being relevant from professionals include the changes that occur that are associated with core symptoms in ASD, language, adaptive behavior, and cognitive functioning. On the other hand, parents and individuals with ASD have noted that happiness, well-being of their family, anxiety, and sensory overload are some of the more important changes to be noted. As a result, it has been an important and challenging journey to address this discrepancy in an effort to determine what matters in outcomes associated with ASD intervention.

Analytic Approaches Used in Interdisciplinary Early Intervention Research

There are two main research designs that have been utilized within the ASD behavioral treatment paradigms. These two designs include that of single-subject designs and group designs. Single-subject designs have been predominantly utilized within the field of ABA. Previously, controlled group designs have included the use of comparison groups and have employed different measures to evaluate treatment results. Treatment effects are often analyzed by means of ANOVA and multiple t-tests prior to and after treatment has been implemented. However, more recently, research designs that are used within group studies have changed drastically as a result of the influence of the guidelines and practices that have been delineated by the CONSORT group (Schultz et al., 2010). More of an emphasis is now being placed on various practices. These practices include the utilization of controlled trials that are randomized with an intent-to-treat analysis, adhering to practices outlined by CONSORT, collecting data at different points instead of just at pre and post intervention points only, the use of growth curve

analyses as a method for evaluating data, and the importance of implementing studies to evaluate effectiveness as well as efficacy studies to analyze the effects of a treatment when it is able to be implemented within a community setting. These particular emphases are affecting the manner in which scientists design and implement group studies of early intervention efficacy.

Consolidated Standards of Reporting Trials (CONSORT; 1996)

An increase in RCTs were noted during the 1990s, and authors were not reporting complete, clear, and transparent reports of either their trials or their analyses. As a result of inadequate reporting as well as design of studies, there have been difficulties with evaluating the results of health-related RCTs and the creation of standards relating to care. In an effort to address these concerns, the CONSORT standards were created. These standards of practice have been supported throughout the world, and high-impact journals are now requiring that any RCT that is submitted will need to also be registered as a clinical trial and follow the CONSORT guidelines within the report. There are several of the CONSORT requirements that have had an impact on treatment studies regarding ASD. These requirements are listed below.

Intent-to-Treat Analysis

The CONSORT group emphasizes that a heavy importance is placed on using randomized designs as well as an intent-to-treat analysis. An intent-to-treat analysis is a method that includes the use of all subjects that have been randomized as a result of the data analysis, despite concerns with noncompliance, deviations that are made with a protocol, withdrawal from treatment that may need to occur, or any other issues that may occur after the subject has been enrolled in the study. Data that are collected from subjects that are not able to follow the protocol (i.e., dropped out of the study, unable to attend sessions,

implementation of treatment not as intended), are to be included within the analysis of the trial. Furthermore, the progress of each subject that is enrolled in the study is required to be tracked and reported using a specific format.

Pre-specification of Primary Analysis

Prior to the start of a trial, researchers are required to document within the clinical trials registry how the experimental treatment will be evaluated as it is based on prespecified primary and secondary measurement of outcomes that are defined which includes both how and when outcomes will be assessed (Schulz et al., 2010). By outlining predefined specific outcomes that are expected within a trial, this allows for protection to exist against biased reporting. Prior to this, several outcome measures were implemented, data were evaluated, and the variables that demonstrated the most significant differences were published within the literature as evidence that the treatment was successful. Furthermore, the guidelines that are outlined delineate that the results that are demonstrated for each pre-specified primary and secondary measures for each treatment group are expected to be published. This also includes the publication of the estimated effect sizes. In addition to this, researchers are also expected to report pre-specified analyses independent of the clearly labeled post hoc or exploratory analyses.

It is easier to conceptualize the requirement to specify the variable and analysis that will be used prior to the start of the study that will be used to define the success of a treatment when there is a targeted treatment in mind when compared to that of comprehensive treatments. A targeted treatment is one that is focused on a certain component of symptoms of ASD. When evaluating comprehensive treatments, these methods are attempting to demonstrate significant changes in the variety of ways that ASD impacts development. Some treatments that are targeted may reflect ASD as being fractionated (Happé &

Ronald, 2008). This concept means that a disorder, such as ASD, can be defined by means of a multitude of symptoms that are able to be treated through independent measures. Additionally, it may include the idea that ASD is based on a primary deficit, where several other domains rely on the primary ability to adequately function in an effort for an individual to develop normally. This demonstrates a trickle-down or cascading effect model. When discussing targeted treatments, data may initially be derived from single-subject studies that are often deemed rigorous and difficult to conduct, that are able to provide explanations to questions with few individuals being evaluated over a short period of time. This method of design is able to establish an economical approach to the beginning testing models of a new treatment intervention.

Comprehensive treatments are able to have a more global view of ASD, notating that this neurodevelopmental disorder can have an effect on a multitude of domains of development. The goal of these types of treatment is to reduce the broad effects of ASD. If these treatment methods are successful, then the effects of treatment will be seen in a variety of behaviors and domains. Some of the more common targets of interdisciplinary comprehensive treatment interventions are to improve an individual's language, learning rates (i.e., IQ), social skills, adaptive behavior skills, and behavior challenges. It is not as helpful to use single-subject designs in these cases. In an effort to determine the global impact of a comprehensive treatment intervention on the development and learning of an individual that is able to be generalized across a multitude of contexts, researchers may use measures that summarize the data that are collected over several domains, measures of adaptive behaviors, and also comprehensive language measures. Standard scores will increase for a group of individuals on domains that are being affected by a treatment intervention if the treatment intervention is improving rates of learning or development. In order to demonstrate efficacy, though, the treatment intervention will need to be tested

through use of a randomized controlled design. Although the pilot studies of different treatment types can be different, the efficacy designs for both are delineated within the CONSORT guidelines. These stringent guidelines provide guidance at both the level of research design and research reporting. Furthermore, the rigor behind these CONSORT guidelines has proven to be beneficial within the autism field (Green et al., 2015). As a result of these developments, the effort and rigor of studies involving behavioral treatment coincides with what has been demonstrated in recent drug studies.

Section 1 Personal Reflection

What experience do you have with conducting research and the integration of evidence-based interventions into your clinical practice?

Section 1 Key Words

Autism Spectrum Disorder (ASD) - neurodevelopmental disorder that impacts an individual's social skill development as well as demonstrates marked impairments in both verbal and nonverbal communication

Distal outcomes - behaviors that are not able to be directly targeted by a treatment but are intended to change as a consequence of the treatment

Fractionated - a disorder, such as ASD, can be defined by means of a multitude of symptoms that are able to be treated through independent measures

Proximal outcomes - behaviors that are able to be directly targeted by a treatment

Section 2: Evidence-Based Interventions for ASD

Evidence-based interventions are treatment interventions that have been able to show efficacy through outcome evaluation. These intervention methods have been analyzed within a research study, using participants that are similar to the targeted individuals in regard to age, diagnosis, intellectual capacity, and language level (Odom et al., 2010). As a result, evidence-based interventions are more than likely efficacious when changing a targeted behavior. Evidence-based interventions that are well-established have been validated through implementation of clinical trials that have used randomly assigned comparison groups, blind assessments, inclusion and exclusion criteria that are clear, adequate diagnosis and sample sizes, statistical methods that are clearly delineated, and fidelity measures (Rogers & Vismara, 2008).

Interventions that are predominately utilized with children diagnosed with autism are that of behavioral models. These interventions are guided by behavioral theories. The most common behavioral intervention that is used is discrete trial training (DTT; Lovaas, 1981). DTT is known for the teaching of specific skills through use of steps that are both simplified and structured (Smith, 2001). Within this approach, the teacher or therapist will use prompts that are adult-directed, massed trial instruction, reinforcement that is provided after the completion of a targeted behavior, and repetition that is implemented to teach new skills. DTT has been successful at the production of a new response to a specific stimulus. However, there are limitations that have been noted with this intervention method. Some limitations include a lack of generalizability of skills that are learned, the individual becoming dependent on prompts to demonstrate the skill, and a lack of spontaneous communication. As a result, once a skill has been taught and learned using the DTT format, it is beneficial to have a plan in place to teach generalization across a variety of environments, contexts, and people as it is needed.

Early research evaluated the effects of DTT delivered at high intensity (i.e., 40 h per week) compared to DTT delivered at low intensity (i.e., 10 h per week) and with the use of eclectic interventions over a two year time span (Lovaas, 1987). In the group that received high-intensity DTT, 47% of the participants reached average intellectual skills (i.e., IQ above 75) and were able to participate in mainstream education. There have been several research studies that have replicated these early research findings (Bibby et al., 2002; Cohen et al., 2006). Furthermore, studies that have been conducted to evaluate effectiveness of ABA-based interventions have shown positive support for these interventions (Cohen et al, 2006). Research has evaluated DTT for both efficacy and effectiveness.

Early Start Denver Model (ESDM)

One early intervention that combines a relationship-focused developmental model with the principles and practices that comprise applied behavior analysis is known as the Early Start Denver Model (ESDM). This intervention is implemented by adults throughout the course of play and daily routines where highly precise naturalistic behavioral teaching is integrated. This makes this intervention a Naturalistic Developmental Behavioral Intervention (NDBI; Schreibman et al., 2015). Researchers conducted a RCT to evaluate the effects of the ESDM on children that were diagnosed with ASD (Dawson et al., 2010). Results indicated that the children who received the ESDM displayed greater gains in IQ, both receptive and expressive language, social skills, and adaptive behavior as well as decreases in symptoms of ASD as reported by parents when compared to those children that received treatment that was available within the community (Dawson et al., 2012). The ESDM has been used in a multitude of environments, including in intensive autism-based service delivery (Dawson et al., 2010), daycare facilities and preschools (Vivanti et al., 2013), educational programs for parents (Rogers et al., 2012), and telehealth (Vismara et al., 2013). Furthermore, the

ESDM has been utilized by psychologists, occupational therapists, behavior analysts, and speech therapists (Rogers & Dawson, 2010). Since this intervention can be used in a multitude of environments and by a variety of professionals, this flexibility may prove to be successful when countering the challenges that are presented through translation of an evidence-based intervention into a community-based intervention that can be implemented across cultures, languages, and settings. Additionally, this intervention may provide obstacles for professionals that are not used to manualized treatments as certain components of the ESDM intervention require systematic assessment, writing objectives, and progress monitoring that is based on data.

The ESDM intervention's effectiveness was analyzed with a group of Italian children diagnosed with ASD that resided in an Italian community and compared the results to another group of Italian children that resided in an Italian community and received treatment as they normally would (Colombi et al., 2016). The children that received the ESDM intervention received this treatment in a center-based environment for 6 h per week over a span of six months. The other group of children, who received treatment as they normally would have, received treatment for an average of 5.2 h over a six month time span. Both groups of children improved in cognitive, adaptive, and social skills after both three months and six months of receiving treatment. However, the group of children in the ESDM group made larger gains in three months in adaptive skills. These results further support the positive impact that ESDM has on a non-English-speaking population.

Social Communication, Emotional Regulations, and Transactional Support Model (SCERTS)

A multidisciplinary approach that is comprehensive and focuses on increasing both communication and socio-emotional skills of children diagnosed with ASD is known as the Social Communication, Emotional Regulations, and Transactional Support model (SCERTS). Within this intervention, the focus rests on Social Communication, Emotional Regulation, and Transactional Support as the main developmental dimensions that are to be intervened upon in an effort to provide support to children diagnosed with ASD. Furthermore, this intervention is based on empirical research as well as clinical investigation in understanding both conventional and unconventional communication within individuals diagnosed with ASD such as communicative functions and the function of behavior (Prizant & Duchan, 1981). This intervention also looks at the relationship that exists among communication, social-emotional development, and emotion regulation (Prizant & Rubin, 1999).

Researchers studied the effects of two different parent-implemented interventions that lasted for nine months that utilized the principles within the SCERTS model (Wetherby et al, 2014). One of these interventions was delivered on an individual basis (i.e., individual early social interaction) while the other intervention was delivered in a group setting (i.e., group early social interaction). These interventions were used to teach parents different strategies that they could use in an effort to develop social communication skills in children that were diagnosed with ASD. The children that participated within the study in the individual early social interaction group demonstrated significant changes within their communication, daily living, and social skills. On the other hand, the children that participated within the group early social interaction group did not demonstrate any significant change. As a result, implementation of the SCERTS

model with young children has been analyzed through use of efficacy studies that evaluated the same amount of the same intervention.

Pivotal Response Treatment (PRT)

One intervention that has been evaluated and is considered to be a naturalistic intervention based on ABA principles is that of pivotal response treatment (PRT; Ingersoll & Schreibman, 2006). This intervention is used to target pivotal areas of behavior. These areas include that of motivation, responsivity to multiple cues, self-management, and social initiations. PRT is able to create cascading effects that result in improvements within other social, communicative, and behavioral areas that have not been targeted specifically. The motivational strategies that are employed with use of PRT include the choice of the child, variation in tasks, interspersing of maintenance tasks, rewarding tries that are made by the individual, and integration of natural reinforcers. This intervention has been used to decrease self-stimulatory behaviors as well as to increase social, communication, and academic skills within individuals. The studies that have been conducted to evaluate PRT have mostly implemented single-subject designs (Koegel et al., 1987).

Developmental, Individual Difference, Relationship-Based (DIR) Model

Another intervention found within the literature is the Developmental, Individual Difference, Relationship-Based (DIR) model. This intervention focuses on relationships and interactions, emotional development, and differences that are present within sensory modulation, processing, and motor planning (Greenspan & Wieder, 1998). The main focus of this intervention is to create effective and interactive engagement in an effort to encourage children to view themselves as

intentional individuals that are able to build language, social, and cognitive skills. Research has evaluated the DIR intervention through use of a case review that included 200 participants that began intervention between two and four years of age and received a total of two to eight years of intervention (Greenspan & Wieder, 1997). Each participant was provided an initial evaluation as well as re-evaluations and additional evaluations from other professionals. The participants were then categorized into three different groups based on the results of their evaluations. Participants that were categorized as Type 1 fell out of the autism spectrum as noted on the Childhood Autism Rating Scale (CARS; Schopler et al., 1988) and made improvements in language, social, cognitive, and motor skills. Those participants that were in the Type 2 group demonstrated slower progress but were still able to show improvements in communication skills. Lastly, the participants in the Type 3 group were able to communicate using simple gestures and single words. However, they still demonstrated difficulty with self-stimulation and repetitive behaviors.

The TEACCH Autism Program

In the 1960's, earlier researchers such as Schopler and Reichler, worked to develop an intervention that helped individuals with ASD through the lifespan known as The TEACCH Autism Program. This intervention is based on difficulties that have been noted for individuals diagnosed with ASD such as problems associated with executive function, attention, and strength in visual processing. Furthermore, this intervention includes physical organization, schedules that are individualized, work systems, and a visual structure of materials that are used in activities. A few single subject and group design studies have been utilized to test this intervention; however, these studies have occurred without randomized control (Mesibov & Shea, 2010). As a result, evidence supporting the use of this program is rather limited.

Section 2 Personal Reflection

What evidence-based intervention methods have you been exposed to within clinical practice? What were the benefits and limitations to these intervention methods?

Section 2 Key Words

Discrete trial training - the teaching of specific skills through use of steps that are both simplified and structured

Evidence-based interventions - treatment interventions that have been able to show efficacy through outcome evaluation

Section 3: Vocational Interventions

A concern that is prevalent within the human services field as it pertains to individuals diagnosed with ASD is to ensure that research is available that can verify efficacious interventions and training for providers within community settings so that they are able to implement various interventions. As the incidence of ASD continues to increase, the number of young adults seeking employment through use of the adult services system also continues to increase.

Employment is often a part of postsecondary life and allows for multiple benefits including financial independence, socialization, and personal accomplishment. Individuals with disabilities gain employment at a much lower rate than individuals without a disability. Furthermore, individuals diagnosed with ASD are employed at lower rates than any other category of disability.

In order for employment opportunities to be successful for individuals diagnosed with ASD, interdisciplinary supports and services at key points within the process of employment are necessary. Additionally, these opportunities also necessitate a

comprehensive approach that includes various dynamics of independence and integration. This comprehensive approach starts prior to the individual's first day of employment. An individual diagnosed with ASD may need help with understanding their own strengths, interests, and preferences, how to search for employment, or even how to interview prior to gaining employment. After the individual has been hired, they may need further assistance with on-the-job training or occasional feedback to help ensure job stability. As a result, the correct supports and services for an individual diagnosed with ASD often relies on the collaboration of a multitude of individuals and professionals such as parents and caretakers, medical professionals, or therapists. As these individuals come together, a support network can be developed that can be used to help the individual overcome different barriers that may be present to employment as well as take advantage of opportunities and interventions that have efficacy that can be used to improve outcomes associated with employment.

When support is being provided within a work environment, it is important to understand and consider various strategies, accommodations, and learning needs that will help with being successful in employment endeavors. Individuals diagnosed with ASD have different strengths, associated with the defining characteristics of ASD, that can be beneficial in employment settings such as strengths in structured, predictable tasks, the use of visuals and social interactions that are familiar, and common needs surrounding social skills, problem-solving, and learning of new tasks. There are several strategies that are commonly used that can be helpful for aiding in the success of employment opportunities for individuals diagnosed with ASD.

Social Communication

Soft skills and interactions with others can be a barrier for individuals with ASD in employment opportunities (Lorenz et al., 2016). Some job skills that are often ignored when trying to prepare an individual for employment include getting along with co-workers, following the expectations of professional conduct, and

navigating social interactions with managers and customers. Therefore, it is important to work on social communication skills in employment settings. Individuals with ASD should have a functional communication system and individuals with limited communication skills should have access to an augmented and alternative communication device. Social skills should be practiced in multiple, natural settings as well as through the use of social narrative to teach new situations and context, including the perspectives of others. Problem solving skills should also be taught so an individual knows who to go to for help.

Visual Supports

Visual supports are able to be used to promote independence and accuracy within a work environment through display of information. This visual display of information can occur through a variety of formats such as activity schedules, organizational cues, reminders, and graphic organizers. Individuals diagnosed with ASD are often strong visual learners and visual supports can be utilized to reduce staff prompting and support. This ultimately provides the individual with more independence over their work tasks. Visual supports typically do not interfere with the work environment or require other employees to execute them. Therefore, they are a sustainable support that is able to be left within the work environment once direct support of the individual is able to be faded. Some visuals that could be implemented within a work environment include a checklist of items to include in a shipment, a list of job rules, and a visual tape marker that outlines a work space.

Positive Behavior Supports (PBS)

Behaviors that are exhibited by individuals with ASD can be interfering and a significant barrier within an employment opportunity. Managers and co-workers may not have prior experience working with individuals that display challenging behavior and may not tolerate this in the work environment. It may also be

challenging to implement an intervention plan within a work environment. Positive behavior supports (PBS) uses evidence-based interventions to prevent the exhibition of challenging behaviors. It is a proactive model that can be beneficial within a work environment where challenging behaviors and even the occurrence of infrequent behaviors can be a barrier to employment (Schall, 2010).

One type of intervention that can be used within the workplace is the use of self-monitoring. Self-monitoring teaches individuals to identify and regulate their own behaviors (Hagner & Cooney, 2005). This intervention can be used with a variety of skills but is often utilized to manage interfering behaviors or those centered around maintaining attention or social interaction skills. Individuals are taught to track the number of times they exhibit a specific behavior on a data form. This method promotes independence through an increase of self-awareness about the targeted behavior.

Systematic Instruction Using ABA

Individuals with ASD typically learn new skills best through approaches that are structured and that integrate the use of ABA strategies. These approaches can also be used within the work environment. The first step within this approach is to break down the task into separate steps or behaviors that can be completed. By doing this, these steps become easier to teach and to learn. As an individual is teaching the skill, this additional support that is provided to the learner is known as a prompt. Different prompts (i.e., visual, gesture, verbal, modeling) can be provided to help the learner be successful in demonstrating the skill but should be faded once the learner demonstrates success. After the learner is able to demonstrate success, reinforcement should be provided. Furthermore, the skills that the learner acquires should also be transferable to other contexts. Generalization is often difficult for individuals with ASD. Multiple practice opportunities for work-specific skills in a variety of contexts should be provided as a method for supporting gernalization of skills (Wehman et al., 2014).

Section 3 Personal Reflection

What are some other vocational interventions that you have encountered when helping individuals seek employment opportunities? Is there a vocational intervention mentioned that you would like to implement with an individual you are providing services to?

Section 3 Key Words

Positive behavior supports (PBS) - uses evidence-based interventions to prevent the exhibition of challenging behaviors

Self-monitoring - teaches individuals to identify and regulate their own behaviors

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