Treatment of Autism Spectrum Disorders

31

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Major advances in the treatment of Autism Spectrum Disorder (ASD) have been made since the earliest manifestations of the condition were identified in the 1940s. This chapter provides an overview of evidence-based treatment practices by detailing primary treatment targets and approaches across the lifespan and exploring the diverse contexts in which these treatments can be effectively delivered.

ASD is a neurodevelopmental disorder characterized by deficits in social communication and interaction, as well as the presence of restricted and repetitive patterns of behavior or interest. According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders [DSM-5] (APA, 2013), individuals with ASD exhibit social and communicative deficits in the areas of social relationships, nonverbal communicative behavior, and social-emotional reciprocity. In addition, individuals with ASD may engage in varying degrees of ritualistic and stereotyped behaviors and may have strong sensory interests or aversions, which also can have an impact on the ability to learn and interact with others. While the exact cause of ASD remains unknown and there is no single identified "cure", these core symptoms can be important targets for treatment. The way in which symptoms are best treated will vary based on an individual's age and functional abilities.

ASD is phenotypically heterogeneous resulting in a diverse presentation across the population of individuals with autism (Bauminger-Zviely, 2014). Variations in social understanding, intellectual ability, adaptive behavior, language, academic ability, and vocational skills are expressed differently across development, and cause a differential impact on a person's overall level of functioning and quality of life (Hughes & Leekam, 2004). Due to this variability in autism symptoms, individualized treatment where functioning level drives treatment approach, is pivotal in promoting skill development across multiple domains.

For instance, some individuals with ASD may remain nonverbal and/or profoundly disabled and may need substantial support throughout life. Other individuals with the same diagnosis may need

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more limited accommodations and can advocate for their own needs. Notably, given that many autistic self-advocates and advocacy groups prefer the use of identify-first language like "autistic adult", for the portion of this chapter focused on adulthood, we have chosen to use identify-first terminology in order to respect the efforts of these stakeholders and advocacy groups (Brown, 2011).

Treatment Aims

Across the ability spectrum, the most important goals for treatment are typically those that support independence and promote quality of life for the individual with ASD and their family. Therefore, effective treatments often aim to incorporate a person-centered, strengths-based approach to support the development of functional skills. Varying perceptions of disability across cultures must also be considered in the development of person-centered approaches to the treatment of ASD. Therefore, targeted skills should be culturally relevant to promote dignity and encourage participation from family members and other stakeholders (Zhang & Bennett, 2001). In addition, treatment goals should be developmentally- and age-appropriate, and areas of focus typically change during critical periods across the life span. For example, developing early communication and play skills are often a focus of treatment in toddlers, and supporting academic participation and forming peer relationships are often a focus later in childhood. Further academic, social, and pre-vocational interventions are often necessary as individuals enter into adolescence, and autistic adults may benefit from support in developing skills related to independent living, employment, and financial management (Volkmar et al., 2014).

One way that the many existing treatment approaches in ASD have historically been categorized is by differentiating those models which are comprehensive (Comprehensive Treatment Models; CTMs) from those that are focused (Focused Intervention Practices; FIPs). CTMs include sets of practices that are aimed at achieving a broad learning or developmental impact on the core features of autism. In 2010, Odom and colleagues identified 30 CTMs operating within the US characterized by organization around a conceptual framework, operationalization, intensity, longevity, and focused outcomes (Odom et al., 2010; Wong et al., 2015). On the other hand, FIPs aim to address a single skill or goal of a learner with ASD. These practices are typically operationalized, target specific learning outcomes, and occur over a shorter duration of time compared to CTMs. Some well-known examples include discrete trial teaching, visual supports, various levels of prompting, peer-based intervention, and video modeling. Oftentimes, FIPs are considered the foundational blocks of the educational programs for individuals with ASD and are often highly salient in CTMs.

Our particular focus in this chapter is on evidence-based practices (EBPs) which have been demonstrated through research to lead to positive outcomes for individuals with ASD. While there are many ways to define EBPs, we rely in particular on several of the most recent comprehensive reviews of FIPs in autism including the National Standards Project, Part 2 (NSP2; National Autism Center [NAC], 2015) and the National Clearinghouse on Autism Evidence and Practice Review (Hume et al., 2021; Steinbrenner et al., 2020). We also draw from other systematic reviews and meta-analyses when available to inform what has been well researched and supported through robust evaluation.

In addition, given the importance of meaningful generalizable skills that will improve quality of life long-term, we place particular emphasis on treatments that incorporate positive behavior supports (PBS) and are delivered in natural environments. The PBS framework takes a proactive approach in considering necessary antecedent accommodations to support effective learning and prevent challenging behavior, with an overall focus in promoting dignity and respect on an individual level (Harris & Weiss, 2007).

We hope this combined approach will allow teachers, parents, and other service providers to select from research-supported interventions when creating individualized education or intervention programs for individuals with ASD. It must be noted, however, that the literature base for some types of treatments (especially for young children with ASD) is immense, while the body of EBPs for adolescents and adults with ASD is emerging but considerably smaller at present.

General Trends in Treatment Delivery

In addition to ASD-specific treatments provided by ASD specialists, the pervasive nature of ASD symptoms and the complex comorbidities experienced by many individuals on the spectrum mean that multidisciplinary collaboration is often required for optimal care. For instance, children or teens with ASD may receive both behavioral and educational interventions, as well as speech therapy, occupational therapy, and sometimes physical therapy. Psychiatric medications prescribed by a primary care physician or psychiatrist can also be used to treat associated psychiatric symptoms.

Active parent and caregiver involvement is also considered an essential component of quality care and many treatments include parent training or other types of stakeholder involvement to enhance effectiveness and ecological validity (National Research Council, 2001; Steinbrenner et al., 2020). Families may face many barriers which can limit their ability to participate in intervention (such as child-care, language barriers, transportation challenges, or lack of flexibility in their work schedules), as such, it is critical that family-centered care principles and cultural considerations are incorporated when considering selection of evidence-based practices. Health disparities in access to evidence-based treatment and shortages of trained providers have also contributed to recent scientific interest in scalability of treatment models and incorporation of technology into treatment. For instance, group models of parent training have been investigated (e.g., Hardan et al., 2015) and group-based interventions to teach social skills are common for youth with ASD (Gates et al., 2017). Emerging research on technology-based intervention practices has focused on studying the effectiveness and usability of technology with children (Mazon et al., 2019). Current trends reflect that technology-based interventions are appealing to individuals with ASD, most target emotional or social skills, and generally have promising levels of evidence for effectiveness and usability (Mazon et al., 2019). For instance, emerging research has shown that the use of social robots can promote social behaviors, spontaneous language, and decreased repetitive and stereotyped behaviors in individuals with ASD (Pennisi et al., 2015).

The remainder of this chapter is organized into four sections covering important phases of life for individuals with ASD: early childhood, school-age, adolescence, and adulthood. Within each section, we review key skills typically targeted in treatment and provide an overview of common treatment approaches used for individuals in that age group. While there are many more available treatment approaches than we can cover in a single chapter, our intention is to provide a broad overview of behavioral, developmental, academic, and vocational interventions commonly used for individuals with ASD and provide examples of well-known treatment types with empirical support. We also briefly reference the settings and contexts where treatment is provided, as these also change over development. Additionally, we review treatments for core ASD symptoms, as well as commonly associated conditions. These interventions may assist in reducing symptoms, improving cognitive abilities and executive functioning, increasing independence in daily living skills, and maximizing an individual's ability to function and participate in the community (Centers for Disease Control and Prevention, 2019).

Early Childhood Treatment

Early Intervention is a general term that refers to services for young children with disabilities and varied developmental delays. In the United States, early intervention programs are offered to children under 3 years of age under Part C, Infants and Toddlers, of the Individuals with Disabilities Education Act (IDEA, 2004). Criteria for receiving early intervention services for toddlers with atypical development vary by state. Children with ASD in this age group often receive a variety of services including behavioral intervention, speech therapy, occupational therapy, physical therapy, and other state-supported services (Stahmer & Mandell, 2007; Williams et al., 2021). Young children may also receive medically necessary therapies often provided through their medical insurance.

Early intervention for young children with autism requires collaboration and coordination across multiple disciplines. Further, caregiver involvement is pertinent and should be considered throughout the process of coordinating goals and treatment. Services for very young children are often implemented in the home setting to maximize family involvement and caregiver training (Rogers & Dawson, 2020; Thompson, 2011). Prioritizing caregiver involvement from the onset of training allows for parents to feel emotionally supported and empowered in the treatment of their children. Some early intervention services can also be delivered in community settings such as early intervention centers, daycares, or preschools (Thompson, 2011).

The importance of early developmental and behavioral treatment for children with autism has been increasingly recognized and is supported by a large body of research documenting the impact of early intervention on developmental outcomes (Frazier et al., 2021; NAC, 2015; National Research Council, 2001; Stahmer & Mandell, 2007; Steinbrenner et al., 2020; Wong et al., 2015). While it remains difficult to predict which children will respond best to intervention based on current scientific evidence, there are many factors that may influence a child's response to intervention including individual child characteristics, such as language levels, cognitive ability, and social interest. In addition, the specific type of intervention, the intensity and duration of intervention, and the setting in which treatment is delivered likely influence outcomes (Parker-McGowan et al., 2014; Thompson, 2011). While factors may vary across treatment modalities, the general recommendation is for young children with autism to receive a minimum of 25 hours of intensive treatment per week in order to support positive outcomes (Dimian et al., 2020; National Research Council, 2001).

The most effective interventions for young children target key skill areas related to autism-specific traits (NAC, 2015; Thompson, 2011; Wong et al., 2015). Relevant areas of focus include social communication skills, adaptive skills, cognitive development, and restricted and repetitive behaviors. Key social communication domains include pre-linguistic skills, joint attention, early language, social referencing, social initiation and reciprocity, and play. Adaptive skills to be targeted in early childhood include participation in activities of daily living, sleep, and feeding. Finally, cognitive and developmental areas most relevant for children with ASD include representational and symbolic play, emotional self-regulation, and imitation skills.

ABA-Based Interventions

The largest body of evidence related to the treatment of young children comes from treatment models based on the principles of Applied Behavior Analysis (ABA). Many of the focused intervention practices identified as evidence-based in recent comprehensive reviews are based on ABA including antecedent-based interventions, behavioral momentum intervention, differential reinforcement, discrete trial training (DTT), extinction, functional behavior assessment (FBA), functional communication

training (FCT), modeling, prompting, reinforcement, and task analysis (Hume et al., 2021; NAC, 2015; Steinbrenner et al., 2020).

The traditional ABA model is based on the early research of B.F. Skinner (1938) and uses a structured, adult-directed approach based on operant learning and conditioning to promote the acquisition of functional skills. Less desired behaviors can be treated through extinction and reinforcement of functional alternative behaviors (Cooper et al., 2007; Frazier et al., 2021). In this model, learning is often achieved through discrete trials (e.g., DTT), during which an instruction, or discriminative stimulus, is presented and child responses are prompted and reinforced. Prompts are faded in subsequent trials and independent responses are reinforced, often through the provision of tangible rewards. DTT can be implemented to target skills in multiple domains, including prelinguistic behaviors, social communication, play, joint attention, cognitive task performance, and school readiness (NAC, 2015; Roane et al., 2016; Steinbrenner et al., 2020). Adaptive living skills and play routines are often taught using chaining procedures, in which tasks are broken down into a series of discrete behaviors taught systematically (Cooper et al., 2007).

Early Intensive Behavioral Intervention (EIBI) has been acknowledged as an effective ABA-based treatment model for children under the age of five (Frazier et al., 2021; National Research Council, 2001; Steinbrenner et al., 2020). EIBI, based on work by Ivar Lovaas (1987), is an intensive treatment that involves 20–40 hours per week of behavioral intervention using the principles of ABA. Individualized assessment determines the identification of treatment goals and specific targets. Progress is measured through the collection and analysis of behavioral data collection and measurement. Treatment is typically delivered by clinicians trained in the implementation of ABA. EIBI is most commonly implemented in home settings, but can also be implemented in center-based programs or specialized preschool environments. EIBI has been identified as an effective treatment for improving skills in the areas of cognitive functioning, academic readiness, independent living skills, and play (NAC, 2015).

EIBI can also target the verbal communication deficits commonly seen in young children with ASD (NAC, 2015). For minimally verbal children, communication targets often include the acquisition of first sounds and words. DTT can be implemented as part of an EIBI program, for instance, to teach children to imitate or echo sounds, and subsequently to make requests to gain access to preferred items or activities. Nonverbal children who are learning to imitate sounds often receive training in the use of augmentative communication systems. Visual communication systems, such as The Picture Exchange Communication System (PECS), are commonly used to teach children to point to or to exchange pictures in order to make requests (Bondy & Frost, 2011). Later phases of PECS teach sentence structure and commenting functions using picture cards. Emerging evidence supports the use of these systems as a stepping stone to verbal communication and the use of augmentative communication may aid in decreasing challenging behaviors that serve communicative functions (Kasari et al., 2014; NAC, 2009; Wong et al., 2015). ABA principles can also be applied to enhance the communication of children with higher verbal ability within EIBI programs by targeting verbal conversation skills and supporting peer interactions.

Developmental Social Pragmatic Interventions

Another type of early intervention historically used with young children with autism is based on developmental social pragmatic (DSP) principles. DSP interventions are based on an understanding of the key developmental role of early social communication skills and the developmental sequence and critical relationship contexts in which these skills emerge in typically developing children. DSP interventions are designed to help children develop increased social and cognitive capacities through

play. These approaches attempt to mirror the order of skill acquisition seen in typical development, with an emphasis on social-emotional development. DSP interventions are designed to help children develop increased social and cognitive capacities through play. The relationship between the child and adult (i.e., parent or therapist) is also considered an essential active ingredient in the treatment. Caregivers are encouraged to join in their children's play and to respond and attend to all forms of child communication (Binns & Oram, 2019). Adults are encouraged to imitate the child's behavior and to attend to the sensory needs of the child by creating predictable play routines and enhancing the child's feelings of control (Gengoux et al., 2019a, b). DSP interventions often place attention on non-verbal methods of communication, including social engagement, communicative intent, and the meaningful use of symbols during child-directed play interactions. Reviews of the effects of DSP interventions have been mixed, likely due to varying treatment definitions, outcome measures, and inclusion or exclusion criteria; however, emerging evidence suggests that some DSP interventions, such as the Developmental, Individual Difference, Relationship-based (DIR)/Floortime Approach, Relationship Development Intervention (RDI), The Son-Rise program, and the Focused Playtime Intervention (FPI) may be effective in treating young children with ASD (NAC, 2015; Binns & Oram, 2019).

Naturalistic Developmental Behavioral Interventions

Naturalistic Developmental Behavioral Interventions (NDBI) are a category of interventions for young children with ASD that each incorporate a developmental and child-directed approach to implementing established principles of ABA in naturalistic settings (Landa, 2018; NAC, 2015; Schreibman et al., 2015; Steinbrenner et al., 2020). There is a growing evidence-base for these hybrid approaches to early intervention (NAC, 2015; Sandbank et al., 2020; Schreibman et al., 2015; Steinbrenner et al., 2020). Common characteristics of NDBI include developmental sequencing of treatment goals, child-initiated teaching opportunities during daily routines and play activities, and ongoing individualized assessment and measurement of developmental progress. Further, many of these practices are manualized and fidelity of treatment implementation is often measured for both parents and clinicians (Schreibman et al., 2015). Project AIM, a recent meta-analysis of interventions for young children with autism, identified key benefits to NDBI including generalized learning in natural environments, reduced prompt dependence, acquisition of natural-sounding meaningful language, and increased family involvement (Sandbank et al., 2020).

Pivotal Response Treatment (PRT), which focuses on targeting "pivotal" behaviors, is one evidence-based NDBI that has been repeatedly shown to improve autism symptomatology in children (National Research Council, 2001; NAC, 2015; Sandback, 2020; Steinbrenner et al., 2020; Tiede & Walton, 2019). In PRT, motivation is encouraged through following the child's lead, providing choices, interspersing easy tasks, reinforcing child's attempts, and building natural relationships between the child's behavior and the reinforcer. Additional pivotal areas of focus include child initiations, responding to multiple cues, and self-management (Koegel & Koegel, 2006). Evidence indicates that parents can be trained to implement PRT with fidelity, resulting in improvements in child communication skills and aspects of social development (Gengoux et al., 2019a, b; Hardan et al., 2015).

The Early Start Denver Model (ESDM; Dawson et al., 2009) is another NDBI with evidence supporting its efficacy in the treatment of young children with ASD. The approach applies ABA- and PRT-based teaching techniques in a play-based context to teach skills in a developmentally sequenced curriculum. In the first randomized controlled trial of this approach, significant improvements in IQ, adaptive behavior, and autistic symptoms were documented following two years of intervention in

toddlers with ASD (Dawson et al., 2009). In a recent meta-analysis of 12 ESDM trials, Fuller et al. (2020) found that children in the ESDM groups demonstrated improvements in language and cognition compared to those in control groups. However, significant differences were not observed for changes in adaptive behavior, social communication, repetitive behavior and restricted interests, or general measures of autism symptomology.

NDBIs continue to receive attention for their potential to improve interpersonal, social communication, joint attention, imitation, and play skills through taking a developmental approach to targeting behaviors related to social motivation (NAC, 2015; Steinbrenner et al., 2020; Tiede & Walton, 2019). The Joint Attention, Symbolic Play, Emotion, and Regulation model (JASPER; Kasari et al., 2021) and Incidental Teaching/Milieu Training model (Kaiser & Roberts, 2013) are additional examples of NDBI considered evidence-based treatment for young children with autism (Schreibman et al., 2015; Steinbrenner et al., 2020). Like PRT and ESDM, these treatments incorporate characteristics of NDBI including environmental arrangements and child interests to prompt target behaviors in natural environments and have been shown to result in improvements in the areas of social communication, play, cognitive ability, joint attention, and the reduction of challenging behavior in toddlers and preschoolers with ASD (Steinbrenner et al., 2020).

While much of the support for NDBI is found in studies of clinician-delivered service models, parent training is a critical component of many NDBIs and there is also evidence that these treatments can be effective when adapted to structured group models (NAC, 2015; Steinbrenner et al., 2020). For example, recent investigations have evaluated the efficacy and feasibility of parent- and teacher-implemented models of ESDM delivery (Eapen et al., 2013; Fuller et al., 2020; Vivanti et al., 2014). Enhanced Milieu Teaching (EMT; Kaiser, 1993), Social ABCs (Brian et al., 2016), Preschool Autism Communication Trial (PACT; Green et al., 2017), Early Social Interaction (ESI; Wetherby et al., 2014), and Project ImPACT (Stadnick et al., 2015) are other examples of naturalistic treatments primarily implemented by parents in home and community settings.

While initial results show the promise of NDBI for treating young children with ASD, further scientific evidence focused on study quality indicators, randomized controlled trial designs, and detection bias is necessary to better understand the specific predictors of treatment response for individual children (Sandbank et al., 2020). For instance, a multi-site trial of 87 toddlers with ASD comparing NDBI with DTT at two intensity levels (15 h versus 25 h per week) found no overall difference in outcomes for either intensity or intervention approach, demonstrating the challenge clinicians and parents still must face in making decisions about the best evidence-based approach for an individual child (Rogers et al., 2021).

Group Interventions for Preschool Children

Daycare or preschool environments present opportunities to facilitate social communication and peer interactions for young children in a group setting. Thus, recent studies of ASD interventions in early childhood have evaluated the efficacy of adapting or creating behavioral interventions designed for implementation in group settings. These interventions are typically derived from evidence-based behavioral interventions and employ strategies such as facilitated peer interactions, peer-mediated instruction, evidence-based instructional methods, and behavior management systems (Chang et al., 2016; Schwartz et al., 2013; Strain & Bovey, 2011).

Project LEAP (Strain & Bovey, 2011) evaluated the implementation of a teacher and peer-mediated behavioral intervention package for young children with ASD in inclusive preschool classrooms. Findings suggested that children in the LEAP classrooms showed significant improvements in autism symptoms, cognitive performance, and social communication skills. Project DATA (Developmentally

Appropriate Treatment for Autism) implemented a comprehensive treatment model consisting of explicit instruction and facilitated peer interactions delivered in inclusive educational settings (Schwartz et al., 2013). This treatment focused on training parents and teachers to implement evidence-based techniques during the school day. Findings suggested that children who participated in Project DATA demonstrated increases in social communication skills and parents reported improvements in ASD symptoms.

Chang et al. (2016) investigated the application of the JASPER model in a preschool classroom and found that children in the treatment group demonstrated significant improvements in joint attention and play skills compared to those in the delayed treatment group. Recent studies have also evaluated the application of the ESDM model in classroom and community-based child care settings; preliminary findings suggest positive outcomes characterized by improvements in receptive and expressive language, joint attention, cognitive skills, adaptive functioning, and social communication (Eapen et al., 2013; Fuller et al., 2020; Vivanti et al., 2014). While the preliminary findings of group-based interventions for young children are promising, further research is needed to understand the optimal delivery models, expected outcomes, and feasibility of widespread implementation in early education environments.

Treatments for School-Age Children

Treatment Settings

As children with ASD reach school age, school settings provide new opportunities for therapeutic intervention. At the same time, children may also continue to receive services in home, clinic-based, and community settings. During this developmental period, it is particularly important that children develop and practice interpersonal skills necessary for learning in group environments and for engaging in appropriate interactions with peers. Parents continue to play a critical role in supporting learning at home, including setting up playdates with other children to increase social interaction opportunities and taking their children on community outings to expand independence.

Many children with ASD may be eligible for special education services or associated accommodations within their public school system. In the United States, the Individuals with Disabilities Education Act (IDEA) was passed in 1975 to ensure that children with disabilities have access to free and appropriate support as part of their public education (IDEA, 1997). A process for Individualized Education Plans (IEPs) was established under IDEA and designed to provide a unique plan of action and set of goals to support each eligible child's academic performance (IDEA, 1997). Alongside educators, parents are expected to participate in the formation of the child's IEP and to play an active role in determining whether the child's needs are being met by the IEP (IDEA, 1997). The purpose of the IEP is to allow the child access to accommodations and services necessary to support education in the "least restrictive environment" (IDEA, 1997). If a child is determined by the IEP team to be eligible, school districts may provide services including Occupational Therapy, which can address fine motor and sensory regulation challenges, Speech Therapy, which can focus on verbal, nonverbal, and social pragmatic communication, and in some cases other behavioral supports, social skills groups, or mental health counseling.

Key Skills

As in early childhood, social communication skills remain a primary focus of ASD treatment in school-age children, often with expanded emphasis on skills for classroom-based learning and for building and maintaining peer relationships. During the school-age years, ABA therapy and Social Skills Training (SST) are often used to build on skills learned in early childhood (e.g., joint attention, functional play, language, and communication skills), while strengthening skills important for peer interaction, such as sharing, turn-taking, initiating and symbolic play skills. Cognitive therapies at this age often aim to introduce basic thinking and feeling concepts, as well as theory of mind skills, in order to improve emotional regulation and perspective-taking (Baron-Cohen, 2000).

Restricted interests can be another important treatment target for school-age children with ASD and may become more salient as expectations for independence increase. For example, children with ASD may display restricted interests in play activities, which can make peer interaction difficult. Children with ASD commonly fixate or "get stuck" on perseverative thoughts, making it difficult to flexibly engage in topics of interest to others (Keenan et al., 2017). This insistence on sameness or ritualistic behavior can also pose a challenge for children who are expected to conform to classroom behavioral expectations. Therefore, behavioral management, coping skills instruction, and cognitive therapies can be used to increase the flexibility of children with ASD at this age.

Evidence-Based Treatments

The large-scale "National Standards Project, Phase 2" (NSP2) is a comprehensive evidence review published in 2015 that outlined 14 "established" interventions for individuals under 22 years old (NAC, 2015). Many of these interventions are routinely used to target the core deficits of ASD in the school-age population, including behavioral interventions (ages 3–21), cognitive behavioral intervention packages (ages 6–14), modeling (ages 3–18), peer training package (ages 3–14), schedules (ages 3–9), scripting (ages 3–14), language training (ages 3–9), and story-based interventions (ages 3–14) (NAC, 2015). Other established interventions for this age range that include the involvement of educators and parents are Naturalistic Teaching Strategies (ages 0–9), Pivotal Response Treatment (ages 3–9), and Parent Training Package (ages 0–18).

Several other treatment packages identified by the NSP2 target a range of essential skills beyond the core deficits of ASD. For instance, Comprehensive Behavioral Treatment for Young Children (CBTYC) (ages 0–9) includes interventions such as Early Intensive Behavioral Intervention (EIBI) and ABA therapy, as well as inclusive behavioral programs. CBTYC is established by the NSP2 to decrease problem behaviors and increase academic and learning readiness, motor skills, cognitive functioning, and personal responsibility (NAC, 2015). Similarly, Behavioral Interventions (ages 3–21) have been established by the NSP2 to not only improve core ASD deficits such as communication, interpersonal skills, sensory and regulation, and restricted repetitive behaviors and interests, but they are also aimed to improve skills such as cognitive functioning, academic skills, learning readiness, personal responsibility, problem behaviors, emotion regulation, and play (NAC, 2015).

Visual Supports (VS) are an additional EBP for school-age children with ASD, often applied to cue or alert children to prepare to transition to upcoming activities (NAC, 2015). VS are used to aid children in learning desired behaviors and skills by providing a visual illustration combined with external prompting and reinforcement. In another comprehensive review of ASD intervention techniques, VS were found to help children ages 6–11 to improve core ASD target areas such as social, play, communication, and joint attention skills (Steinbrenner et al., 2020). Visible schedules, graphic organizers, work systems, and scripts are examples of VS that are useful for school-age children with ASD

(Steinbrenner et al., 2020). They also are evidenced to improve motor and vocational skills, challenging behaviors, and adaptive and self-help skills. Finally, they are particularly useful for school-age children to aid in school readiness, academic, and cognitive skills (Steinbrenner et al., 2020). VS are also commonly part of structured teaching packages. Treatment and Education of Autistic and related Communication-handicapped CHildren (TEACCH) is a manualized intervention that relies on multiple VS methods to create an adaptive environment for children with ASD and is often applied within school systems (NAC, 2009).

Applied Behavioral Analysis Strategies

ABA treatment targets often expand during the school-age years to reflect the increasing demands of the school environment. At this age, children with ASD may receive ABA therapy at home, in a clinic, and/or at school. Attending and focus are key developmental skills that are often emphasized by ABA therapists at this developmental level often for the purpose of maximizing engagement and learning in educational settings. Target outcome areas that ABA has been shown effective for in elementary children aged 6–11 include social and communication skills, behavioral management, and academic and school readiness skills (Steinbrenner et al., 2020). ABA therapy can also be used to help manage potentially disruptive behaviors, by replacing these behaviors with more adaptive, functionally-equivalent skills and communication strategies (Shenoy et al., 2017; Steinbrenner et al., 2020). Finally, ABA therapists often help school-age children practice behaviors that will increase compliance with adult instructions both at home and in the classroom (Young et al., 2010).

A substantial proportion of the focused intervention practices identified as EBPs for school-age children with ASD are ABA-based intervention practices (Hume et al., 2021; Steinbrenner et al., 2020). For instance, Antecedent-Based Interventions (ABIs) are evidence-based practices that involve the intentional moving of events or circumstances prior to a desired activity or request in order to increase the likelihood of the behavior in the future, or to decrease the occurrence of challenging/interfering behaviors. Prompting involves the use of words, gestures, or physical guidance to help learners gain new skills or engage in desired behaviors. Reinforcement involves the use of consequences to guide a learner's response or skill in order to increase the likelihood of that behavior in the future. Extinction is a technique that focuses on removing reinforcing consequences of challenging behaviors to decrease the likelihood of future occurrence of that behavior (Hume et al., 2021). Differential Reinforcement is another EBP that falls within the framework of ABA and is defined as a systematic process with goals of increasing desirable behavior through the use of positive consequences for demonstrating that behavior (Hume et al., 2021). The positive consequences can be delivered upon engagement in a desired behavior, engagement in an incompatible behavior to the undesired behavior, or when not engaging in the undesired behavior (Hume et al., 2021).

As discussed in the Early Childhood section, Discrete Trial Training (DTT), is also an evidence-based approach to instruction that includes massed or repeated trials with instruction and presentation, an individual's response, a planned consequence, and a pause before the next instruction (Hume et al., 2021). Functional Behavioral Analysis (FBA) is a systematic method to understand the hidden or underlying function or reason for a behavior in order to develop an effective plan of intervention. Functional Communication Training can also be used with school-age children to replace challenging behavior with an effective form of communication that is more functional and appropriate (Hume et al., 2021).

Modeling is another well-established behavioral intervention for children with ASD (NAC, 2015). Video Modeling (VM) is a type of social modeling that utilizes video technology and is evidence-based for school-age children ages 6–11 with ASD. Similar to live modeling, behaviors and skills are displayed through pre-recorded demonstrations that depict examples of how to engage in desired behaviors or skills (Steinbrenner et al., 2020). Skills may be demonstrated by utilizing peers or adult

models, point-of-view modeling, video self-modeling, video feedback, and video prompting (Steinbrenner et al., 2020). Children with ASD can be more engaged by playing a participatory role as the "model" by performing the skill and watching the video of themselves after (NAC, 2015). There is evidence that this strategy can improve core ASD target outcome areas such as communication, social, joint attention, and play skills (Steinbrenner et al., 2020). Additionally, VM is shown to aid in improving motor skills, vocational skills, challenging and interfering behaviors, and adaptive skills (Steinbrenner et al., 2020). There is also evidence that VMs supports non-core ASD target areas such as cognitive, school readiness, and academic/pre-academic skills (Steinbrenner et al., 2020). VM is thought to be a particularly engaging option for children who prefer visual-processing and enjoy electronic screen-related activities such as television, tablets, and phones (NAC, 2015).

School-Wide Positive Behavior Supports

Building on the evidence-base from ABA and incorporating principles of inclusion, self-determination, and person-centered planning, the field of Positive Behavior Support (PBS) has emerged as a comprehensive intervention approach for the prevention of severe problem behaviors sometimes displayed by individuals with ASD (Bambara & Kern, 2021). PBS can be applied at the individual level or within larger systems, as in the case of School-wide Positive Behavior Support, which provides a three-tiered prevention framework to guide academic, social, behavioral, and emotional support, and has been found effective in improving student outcomes (SWPBS; Horner et al., 2010; Solomon et al., 2012). PBS universally implements non-aversive behavioral strategies to reduce and prevent undesirable problem behaviors in the classroom without necessitating a punitive approach (Solomon et al., 2012). Behavioral expectations are presented in a simple, straightforward, and consistent manner to students (Solomon et al., 2012). A longitudinal randomized controlled trial of 12,344 elementary school children found that children who fell into an at-risk or high-risk category for social-emotional skills and behavior problems were significantly less likely to receive an office disciplinary referral when their schools implemented School-wide Positive Behavioral Interventions and Support (SWPBIS) compared to their peers in comparison schools (Bradshaw et al., 2015). At a four-year follow-up, teachers reported lower rates of bullying and peer rejection for those children who attended schools with SWPBIS compared to those who did not, suggesting that SWPBIS may improve the school climate regardless of risk level (Waasdorp et al., 2012).

Social Skills Training (SST)

Friendship skills such as maintaining reciprocal interactions with peers at school, in the home, and in the community become a primary treatment target for children with ASD entering their school years. Peer meditated interventions have been consistently shown to have positive outcomes for social, communication, and play skills for children with ASD (Gunning et al., 2019). Evidence also supports the use of Social Skills Training (SST) as an important modality of treatment for many school-age children who display core social deficits (Hume et al., 2021; Steinbrenner et al., 2020). SST have many models of delivery, but generally utilize group sessions with behavioral modeling of social situations and practice through role-play with facilitator feedback and reinforcement. Specific social skills such as making social eye-contact, demonstrating and recognizing facial expressions and emotions, posture, and social distance are often encouraged by facilitators (Hume et al., 2021; NAC, 2015). SSTs protocols often emphasize social cognitive skills, pragmatic language, and nonverbal communication skills. SSTs have also been found effective at improving school readiness, play skills, and adaptive and self-help skills in children between the ages of 6 and 14 years old (Steinbrenner et al., 2020). Higher-level social cognitive skills necessary for children with ASD can also be developed with SSTs, including Theory of Mind, problem-solving abilities, cognitive flexibility, social perception, and perspective-taking (Wong et al., 2015; NAC, 2015). Some of the manualized SSTs for children in this

age range include Adapted skills streaming (McGinnes-Smith, 2012), Children's friendship training (CFT) (Frankel & Myatt, 2003), Superheroes Social Skills Program (Jenson et al., 2011), and KONTAKT (Herbrecht et al., 2009).

Cognitive Behavioral/Instructional Strategies (CBIS)

Cognitive Behavioral/Instructional Strategies (CBIS) are another EBP for school-age children with ASD designed to challenge maladaptive thought patterns and behaviors (Steinbrenner et al., 2020). CBIS provide instruction on how to control or manage cognitive processes with the aim to elicit social, behavioral, or academic improvements (Hume et al., 2021; Wong et al., 2015). When delivered in clinic-based settings, parents often attend weekly therapy sessions in conjunction with their children in order to learn strategies to help their children at home and in the community (NAC, 2015). According to the NSP2, the Cognitive Behavioral Intervention Package (CBIP), which is evidence-based for children and adolescents with ASD between the ages of 6–14, is shown to increase personal responsibility and interpersonal skills (NAC, 2015). These types of therapies are also evidenced to increase cognitive functioning as well as decrease problem behaviors and challenges with sensory or emotional regulation (NAC, 2015). Evidence-based manualized CBIS for children in this age range include Exploring Feelings (Exploring Feelings; Attwood, 2009), and The Coping Cat Program (The Coping Cat Program; Kendall et al., 2002) (NAC, 2015). Randomized controlled trials have also shown evidence for the program Unstuck and On Target (UOT; Kenworthy et al., 2014), which can be implemented in classrooms and supports executive functioning weaknesses by using techniques from Cognitive Behavioral Therapy (CBT), a well-established evidence-based type of therapy that focuses on changing both thoughts and behaviors, to teach skills such as flexibility, planning, goal setting, and self-regulatory scripts. UOT in elementary school-age children with ASD has also been associated with greater improvements in classroom behavior compared to those who received Social Skills training (Kenworthy et al., 2014).

Existing evidence also suggests that CBIS can be effectively used to address some of the comorbid symptoms and conditions often observed in school-age children with ASD. For instance, clinically elevated symptoms of separation, social, or generalized anxiety can be addressed in individuals with ASD by implementing treatments specifically designed to reduce anxiety symptoms in children with ASD, such as the Facing Your Fears (FYF) program (Reaven et al., 2012). This program consists of separate manuals for children and adolescents and is conducted in small groups and has been shown to be effective in the reduction of anxiety symptoms when delivered by trained clinicians (Reaven et al., 2018). Additional evidence that modified CBT programs are useful in decreasing anxiety and autism symptoms in school-age children comes from studies of programs like Behavioral Interventions for Anxiety in Children with Autism (BIACA), an adapted version of The Building Confidence Program, created specifically for school-age children and emerging adolescents with Autism with comorbid clinical anxiety (Danial & Wood, 2013; Wood et al., 2009, 2015).

Treatments in Adolescence

Adolescence is a time of hormonal changes in the body, structural and functional changes in the brain, and heightened learning in social and emotional domains leading to a need for increased emotional regulation and social comprehension (Tseng et al., 2020). Due to the increased demand during this stage of life, some of the social deficits that an individual with ASD might have, may become more pronounced in adolescence such that 30% of individuals with ASD experience functional setbacks in this stage (Picci & Scherf, 2015). Being that ASD is a lifelong disorder, outcomes vary widely across individuals such that those with average or above average intellectual and language abilities tend to

have better long-term outcomes and show a greater level of improvement symptom presentation and function compared to those with a comorbid intellectual disability (Ratto & Mesibov, 2015). Furthermore, it has been found that individuals who struggle in navigating complex social interactions may suffer bullying and victimization and these rates are much higher for those on the autism spectrum compared to typically developing individuals (Miller et al., 2014). Mental health treatment in adolescence can also become increasingly important as this is a time when other comorbid psychiatric disorders like anxiety and depression may arise (Miller et al., 2014).

Key Skills

Social situations targeted for skill development in adolescents with ASD may include making friends, navigating romantic relationships, and engaging in social gatherings. Improved conversational skills can be important building blocks for these interactions; therefore, focusing on reciprocity, and both understanding and using non-verbal language, can have important implications for skill development (Schall & McDonough, 2010). Due to increased independence in this stage, adaptive and practical skills generally related to independent living skills (NAC, 2015) possibly in the home (e.g., cooking, cleaning, and chores) and community (e.g., budgeting, shopping, and taking transportation) as well as personal care (e.g., dressing, hygiene) may be target skills. Furthermore, vocational skills (i.e., related to employment, preparation for employment, or specific skills for a job), cognitive skills (e.g., executive functioning, problem-solving, information processing, reasoning, memory), and academic skills like planning and organization can also be key areas of focus at this stage of development (NAC, 2015).

Evidence-Based Treatments

Evidence-based treatments, or established interventions, that are commonly used in adolescence include ABA-based strategies like modeling and self-management interventions, as well as social-cognitive interventions and CBT. Some additional emerging interventions include mindfulness-based interventions and computer-assisted interventions.

Applied Behavioral Analysis and Related Strategies

When used in adolescence, ABA-based treatments are often used for the management of challenging behaviors with the goal of reducing inappropriate or self-injurious behavior (NAC, 2015). ABA services can be delivered in school settings and at home by a service provider or delivered by parents. ABA may be particularly useful for adolescents with more severe ASD in order to teach alternative behaviors and skills (Ratto & Mesibov, 2015).

Similar to the school-age period of childhood, many established EBPs for teens utilize behavioral strategies underlying ABA, like antecedent-based interventions, differential reinforcement, extinction, prompting, reinforcement, functional behavioral analysis, functional communication training, and discrete trial training (Steinbrenner et al., 2020). These strategies are commonly used to target self-help and adaptive skills, academic skills, vocational skills, social and communication skills and decrease challenging and interfering behaviors (Hume et al., 2021). The development of self-help and adaptive skills can be particularly important in adolescence due to the growing developmental importance of independence during this period of the lifespan.

For instance, modeling interventions have been demonstrated to be effective ways to teach adolescents with ASD new skills. In adolescents, these interventions aim to increase higher cognitive

functions, academic skills, communication skills, interpersonal skills, personal responsibility and decrease problem behaviors and sensory or emotional regulation problems (NAC, 2015). Similar to earlier in childhood, modeling interventions can be delivered live or via video and potentially through peer-based instruction (Hume et al., 2021). This form of intervention can be especially helpful for those with an affinity to technology and can promote the continued development of independence.

Self-management interventions for adolescents have also been demonstrated to be effective and may focus on increasing academic skills, interpersonal skills, self-regulation, and communication skills as well as decreasing restrictive, repetitive nonfunctional behavioral patterns, and restricted interests or activities (NAC, 2015). Self-management interventions can be especially important in adolescence due to a new capacity to think abstractly and an increased capacity for independence. Self-management entails building skills in self-awareness and self-regulation in order to develop self-evaluation and self-correction skills. Potential benefits of these interventions include awareness of behavior, accountability for completing tasks, direct and immediate feedback, skills in multi-tasking, and decreased stigma due to greater independence (NAC, 2015; Crutchfield et al., 2015; Finn et al., 2015).

Social Cognitive Interventions

Social cognitive interventions may focus on the domains of emotional processing, social perceptions, theory of mind, and attributional style all of which play a role in navigating the social world (Tseng et al., 2020). These interventions could target and build social skills, emotional regulation skills, academic skills, change behavior, or even develop cognitive skills in adolescents. Interventions that fall within this category can include both behavioral and cognitive strategies to teach these skills. For instance, peer-based instruction and interventions (PBII) can be used with adolescents to target appropriate social skills. PBII is an intervention in which peers promote social interactions or other individual learning goals (Hume et al., 2021). Social narratives (SN) are another evidenced-based intervention where various social situations are described to highlight important aspects of a target behavior or skill with the purpose of providing examples of appropriate responding (Hume et al., 2021). It is important to note that many evidence-based social cognitive interventions incorporate cognitive and behavioral principles for teaching social skills or addressing other core deficits. Cognitive Behavioral Therapy is also a stand-alone treatment that can be directly used to address comorbid mental health issues like anxiety or depression (see below).

Social Skills Training Social skills treatment for adolescents can be delivered in a one-on-one setting, dyad, or group setting and can vary from clinical settings to school settings, the individual's home, or through the community (Miller et al., 2014). These interventions, mainly based on behavioral and cognitive-behavioral principles, focus on improving the social skills of the individual through teaching skills, practicing skills with peers, and learning through modeling (NAC, 2015). Some of these interventions are manualized and group-based including programs like Multimodal Anxiety and Social Skills Intervention (MASSI; S. White et al., 2012), Social Skills Group Training (SSGT; "KONTAKT"; Herbrecht et al., 2009), and PEERS (Program for the Education and Enrichment of Relationship Skills; Laugeson et al., 2011). Social skills treatment can focus on a range of targets delivered via didactic lesson planning or group interventions like conversational skills, emotional knowledge, problem-solving, social and emotional perspective taking, social awareness, empathy building, theory of mind, emotional expressiveness, self-determination, and sometimes reduction of specific anxiety symptoms (Miller et al., 2014; Ratto & Mesibov, 2015). Although SST has been found to result in improvements in emotional regulation, social knowledge, and satisfaction, individuals with ASD may have difficulty generalizing skills into daily life. Parents can play an important role

in the generalization and maintenance of skills through being involved, informed, and assisting with accurate use of the skills outside of the group (Miller et al., 2014).

Cognitive Behavioral/Instructional Strategies (CBIS) There are a wide variety of cognitive behavioral/instructional strategies (CBIS) documented to be effective for the treatment of adolescents with ASD (NAC, 2015; Steinbrenner et al., 2020). Cognitive behavior therapy (CBT) is a specific modality of EBP that has been repeatedly applied in treatment of individuals with higher functioning ASD and co-morbid psychiatric disorders like anxiety. This therapy is based on the idea that thoughts, behaviors, and feelings are related and that unhelpful or maladaptive thoughts can maintain negative feelings. CBT-based programs are often manualized and typically include psychoeducation (e.g., information about the presenting problem like symptom presentation and impact on thoughts, behaviors, and feelings), cognitive restructuring (e.g., identifying automatic thoughts and working to challenge and change them) and behavioral activation (e.g., engaging in positive activities through structured scheduling into their daily routine). CBT can be delivered individually or in groups, typically involves homework for practice outside of sessions, and can include the involvement of caregivers or other family members. CBT treatments are characterized by their structured interventions, clearly identified expectations and duration, and consistent session formats and thus would typically only require a few modifications for an individual with ASD. Common modifications include materials with more visual cues, utilizing role-play, potentially adjusting the structure of sessions, and focus on a specific purpose like addressing anger management (NAC, 2015). CBT interventions often aim to increase skills related to higher cognitive functions, interpersonal skills and responsibility and decrease problem behaviors and sensory or emotional regulation difficulties (NAC, 2015).

Emerging Interventions

There are many emerging interventions that may have additional promise for adolescents with ASD. For instance, mindfulness-based interventions have been identified as a promising approach for targeting issues related to attention and executive functioning and may include yoga interventions, mindfulness-based psychological interventions, and traditional mediation training (Mak et al., 2018). Another distinct area where significant progress is expected in the coming years is in the application of technology to enhance treatment delivery and efficacy. Many computer-assisted and other technology-aided approaches have already been tried to supplement existing therapies or as the primary form of delivery for treatment (Soares et al., 2021; Crutchfield et al., 2015; Finn et al., 2015). While these have varied in their level of efficacy and generalizability, technology-based interventions have the potential to greatly benefit individuals with ASD due to the technology's ability to limit distractions (i.e., sensory stimuli), be consistent and predictable, and communicate clear expectations (Tseng et al., 2020).

Emerging Adulthood

The period of development spanning from ages 18 to 25 and encompassing social and economic changes prolonging entry into adulthood is now typically referred to as emerging adulthood. This period of development can be qualitatively different from both adolescence and adulthood due to differing roles, developmental challenges, and unique opportunities to explore identities (Arnett, 2000). For autistic individuals and their families, this time can be characterized by particular uncertainty, loss of previous support and services, and a transition into adult-appropriate resources for either career, education, or long-term care (Wood et al., 2018).

The transition to adulthood is often particularly challenging for autistic individuals, due to expectations related to independent decision-making and participation in the community. Independence requires the performance of cognitive and physical skills in the areas of self-care, personal safety, financial management, employment, and interpersonal relationships which, while feasible for some autistic adults, may be challenging for other individuals without substantial support (Loomis, 2014). Because of this, the emerging adulthood period may require skill development for self-sufficiency, mature relationships, adult roles, responsibility, and education and training for work during adulthood (Wood et al., 2018). The best practices in emerging adulthood for transition-age autistic individuals include continuity and coordination in social and institutional support from adolescence into adulthood that are strengths-based, provide career development and work opportunities, involve collaboration across agencies, include support for the family, foster self-determination and independence, develops social and employment skills, and provides job-related support (Wood et al., 2018). For example, the Stepped Transition in Education Program for Students with ASD (STEPS) is a program aimed to address psychosocial and transition-related needs of emerging adults and has been found to be feasible and acceptable by young people with ASD and their parents (White et al., 2021). This program displayed positive effects for secondary school students in the transition from high school and for students enrolled in postsecondary education, and there were increased rates of student adaptation to college (White et al., 2021).

Treatments in Adulthood

Research suggests that autistic adults have fewer opportunities to form meaningful social relationships, obtain employment, participate in education beyond high school, and live independently when compared to neurotypical adults (Seltzer et al., 2004). Despite the known challenges that autistic adults face, reviews of EBPs demonstrate gaps in the identification of vocational and mental health services for autistic individuals in adulthood (Wong et al., 2015; NAC, 2015). While the evidence for established interventions for autistic adults is not as robust, research in this area to date has focused on supporting these individuals in the areas of social relationships, independent living skills, higher education, and vocational skills.

One of the established interventions for adults 22 and older is behavioral intervention which include principles of learning, conditioning, and behavioral analysis that have been reviewed in previous sections. Similar to their application in adolescence, behavior intervention with autistic adults often aims to increase skills like communication, personal responsibility, and self-regulation and to decrease problem behaviors (NAC, 2015). Given the pervasiveness of the core symptoms of ASD that could intensify in adulthood, it will be helpful for future research to further explore psychosocial interventions that target communication, social interaction, and flexibility of thinking and behavior for adults (Bishop-Fitzpatrick et al., 2013). Furthermore, person-centered planning and universal design are especially important in considering how to best support autistic adults in enrolling in postsecondary education, obtaining meaningful employment, accessing adult services, and establishing appropriate housing.

Social, Psychosocial, and Emerging Interventions

Social functioning remains an important focus of treatment in adulthood as it has been found to be positively related to quality of life. Autistic individuals who have higher levels of social functioning

might experience less stigma and prejudice and thus increase their ability to achieve milestones associated with adulthood and independence like getting and maintaining a job or developing and maintaining meaningful relationships (Kim et al., 2019).

Psychosocial interventions, which focus on social cognition in order to improve attention to social cues and improve social functioning, have been a focus of treatment for autistic adults and have been shown to have positive effects (Bishop-Fitzpatrick et al., 2013). Social skills training in adulthood often draws on cognitive-behavioral or social-cognitive principles with variations in structure and educational curricula, from programs like PEERS (Laugeson et al., 2015) to more open-ended and experiential-based content (Lorenc et al., 2017). These trainings and psychoeducation program target core autism symptoms, empathy, social support, social isolation or loneliness communication, social interaction, and flexibility of thinking and behavior (Bishop-Fitzpatrick et al., 2013; Cunningham, 2014; Gantman et al., 2012; Hillier et al., 2007, 2011; Laugeson et al., 2015; Lorenc et al., 2017; McVey et al., 2016). Although there is a need for further research, overall, social skill trainings have been found to have positive outcomes (Cunningham, 2014; Gantman et al., 2012; Laugeson et al., 2015; McVey et al., 2016). Furthermore, Lorenc et al. (2017) identify an additional gap in the research on emotional support, advocacy, and mentoring interventions for adults.

Other emerging interventions, in which one or more studies indicate potentially positive outcomes, are also important to consider for the treatment of autistic adults given the small number of established practices. However, additional high-quality research needs to be conducted with adult populations to grow the evidence-base of effective treatments (NAC, 2015). Similar to adolescents, there is an emerging trend of computer-based interventions for adults that target deficits in communication and social interaction, and which have been found to be enjoyable and acceptable by autistic individuals (Bishop-Fitzpatrick et al., 2013). There has been some emerging data indicating how computer-based interventions compare in efficacy with in-person treatment and whether any of these interventions are more effective than non-computer-based interventions (Bishop-Fitzpatrick et al., 2013; Bölte et al., 2002; Golan & Baron-Cohen, 2006; Trepagnier et al., 2011).

Supports for Young Adults in Post-secondary Education

There has been a recent trend toward supporting autistic individuals in accessing postsecondary education (Wood et al., 2018; White et al., 2021). Many individuals with ASD are capable of enrolling in higher education programs, with approximately 66% of the autistic population scoring in the average or above average range on intellectual ability measures (Centers for Disease Control and Prevention, 2020). Barriers to successful enrollment and participation in postsecondary education programs include challenges in participating in social activities (i.e., living in dorms, extracurricular activities), managing time and changing schedules, and maintaining organizational skills, flexibility, and academic motivation (White et al., 2016; Hillier et al., 2021). While disability services are available on many college campuses, many individuals express hesitance to make use of these services due to stigma and fear of judgment from their neurotypical peers or professors (Kuder & Accardo, 2018; White et al., 2016; Hillier et al., 2021). Further, many autistic college students who have enrolled in support through disability services express that these supports are not tailored to the unique needs of autistic students (Barnhill, 2016; Kuder & Accardo, 2018).

Barnhill (2016) found that in an investigation of universities in the United States, 45 universities provided services specific to the autistic population. In a review of survey responses from 30 of those institutions, 15 (50%) universities reported providing social skills groups for college students with ASD, 5 (17%) offered group therapy, and 13 (43%) offered individual therapy specifically tailored to ASD. In their review of effective support for autistic college students, Kuder and Accardo (2018)

identified eight intervention studies that were shown to have positive outcomes for autistic college students. Effective practices included three studies of cognitive-behavioral interventions, one college transition program, three interventions focused on social communication skills, and one comprehensive overview of commonly used accommodations (Kuder & Accardo, 2018). Student-to-student mentoring/peer mentoring outcomes from several studies suggest peer mentoring programs not only help to support autistic college students socially and academically but also educate peers through first-hand experience interacting with autistic students, potentially breaking down stigma and biases (White et al., 2016; Hillier et al., 2021).

Vocational Training and Supported Employment

Many autistic adults have the desire to obtain meaningful employment, and those who are successful in doing so report lower anxiety, improved well-being, financial gain, independence, and feelings of acceptance and purpose (Hurlbutt & Chalmers, 2004). While many individuals with ASD receive intensive services throughout their lifespan, employment rates for the autistic adult population remain very low (Wehmatin et al., 2014). Despite the fact that over 50% of autistic adults have average or above-average IQ and possess the cognitive ability to contribute meaningfully in many vocational settings, impairments in social communication skills often create barriers to employment (Johnson et al., 2020).

The Rehabilitation Act of 1973 was created in order to promote governmental support for sustained employment for individuals with disabilities. As a result, state and federally funded vocational rehabilitation (VR) services are available to adults with disabilities in the United States. In their review of VR outcomes for adults with ASD, Alverson and Yamamoto (2018) found that the number of VR services received was the primary predictor of positive employment outcomes. Vocational training, which typically involves the use of self-management and behavioral skills training, has been identified as an emerging intervention for adults with ASD which involves the use of self-management in mastering tasks related to employment and monitoring performance (NAC, 2015).

The Treatment and Education of Autistic and related Communication-handicapped Children supported employment program (TEACCH; Keel et al., 1997) is an evidence-based professional training program that places specific emphasis on individual strengths and areas of interest in securing and maintaining employment. Through this program, individuals receive facilitated job placement and long-term behavioral support and supervision from an on-site job coach. Preliminary evaluations of the Project SEARCH plus ASD support model (Wehmatin et al., 2014) also suggest promising results for securing employment for autistic individuals. In this model, individuals receive 9-months of employer-based vocational training during their final year of high school. The treatment package includes systematic instruction based on the principles of ABA, on-site support from a behavioral expert, and intensive staff and organizational training. Randomized controlled trials of Project SEARCH have indicated higher employment rates and higher wages for those in Project SEARCH compared to control groups (Wehmatin et al., 2014; Smith et al., 2020a, b). While intensive on-site employment support programs have been shown to be effective in improving employment outcomes for autistic adults, the feasibility of implementation of these interventions may be compromised due to the needs for staffing and financial resources.

The Interview Skills Curriculum (ISC; Morgan et al., 2014) was developed in order to address social communication deficits that may impede autistic adults during the interview process. This 12-week treatment model targets social-pragmatic skills necessary for performance during interviews (e.g., non-verbal communication, small talk, interview skills) through role-play, modeling, and in-vivo feedback. Preliminary findings suggest that this may be an effective model, with participants in

the immediate treatment group showing greater improvements in interview skills compared to IQ-matched control group participants. Other researchers have built on the original ISC methodology. For example, the Virtual Reality Job Interview Training curriculum (VR-JIT) is an electronic interview training program that shows promise in teaching individuals with ASD to acquire and practice interview skills, both immediately after treatment and at follow-up (M. Smith et al., 2015; Smith et al., 2020a, b). The Job-Based Social Skills Program (JOBSS; Gorenstein et al., 2020) is a manualized intervention aimed to promote social and pragmatic skills in order to improve employment outcomes in autistic adults. This 15-week intervention incorporates foundational CBT and ISC methods and interview skills training in a clinician-led group-based setting. Results from preliminary trials of JOBBS indicated that those in the treatment group reported higher increases in employment compared to those in the waitlist control groups. Further, both individuals and their family members reported improvements in social-cognitive skills.

Importance of Systems in Supporting Adults

Collaboration and input from organizations result in the best employment outcomes for autistic adults; thus many researchers have taken a systems-level approach to evaluate support for autistic adults in the workplace (Hurlbutt & Chalmers, 2004; Johnson et al., 2020; Phillips et al., 2016). Human Resources Departments may collaborate with educational organizations and other agencies in order to evaluate the skill sets of individuals and maximize opportunities for internships and training programs to promote the successful employment of autistic adults (Johnson et al., 2020). Diversity training and collaboration with psychology and medical professionals may also be useful in facilitating workplace acceptance and addressing employer bias (Alhejji et al., 2016; Johnson et al., 2020; Phillips et al., 2016). Taking a combined approach to facilitating organizational-level support and promoting individual vocational skill development may be beneficial in reducing the need for extraneous resources and improving the feasibility of widespread vocational support.

Autistic adults also live in many different contexts, which must be taken into account when considering treatment delivery models and settings. A recent study by Dudley et al. (2019) found that in a sample of 274 caregivers of autistic adults, living with the family was the main predictor for less service use, higher unmet need, and more obstacles to accessing services. While autistic adults may experience many other benefits from living with family members, the barriers to service utilization described in the study may imply a significant scaffolding effect that has major implications for public policy for autistic individuals in adulthood (Dudley et al., 2019). Lorenc et al. (2017) discuss how supportive adult services should be encouraged but also require further research and financial support to have a widespread impact. Furthermore, the authors highlight that many existing policies are directive and top-down models that focus on mitigating deficits of an individual versus individualized care that addresses the diverse needs of each autistic adult (Lorenc et al., 2017).

Taken in summary, autistic adults can be expected to have varying trajectories and therefore interventions optimizing contextual support and individual skills training are necessary to support the overall quality of life and autonomy for this population. Further development of psychosocial, vocational, and educational supports like those discussed above is strongly needed. While attention to the need for ASD-specific supports is increasing, the establishment of these systems is substantially delayed when compared to interventions delivered in early childhood and adolescence. Continued research in the area of both individual and systemic interventions is necessary in order to inform policies that may better support autistic adults.

Conclusion

The chapter has reviewed a range of approaches commonly used in the treatment of ASD with an emphasis on EBPs across the lifespan. Particularly for young children, there is a growing consensus regarding best practices that combine intervention techniques from multiple theoretical frameworks and include stakeholder engagement and intervention across meaningful environments (Bruinsma et al., 2020). There remains a substantial need for intervention development and research into community effectiveness and scalability of innovative treatment models, particularly for treatments in older individuals where the evidence-base is less well-established.

In looking toward the future, the growing field of implementation science provides promising new tools for overcoming contextual barriers and cultivating a wide range of facilitators to support community uptake of EBPs (Stahmer et al., 2019). Additionally, concerns about significant health disparities for racial and ethnic minority groups and for low-income populations exist and continue to deserve serious scientific attention (Bilaver et al., 2020; Smith et al., 2020a, b). Consequently, community-based participatory research will continue to be necessary to bring meaningful, culturally effective practices to families who need them and to ensure that treatment development efforts are informed by and responsive to a diverse set of stakeholders.

Finally, while evidence is emerging that technology-based treatments may in many cases show similar efficacy to face-to-face treatments, their full potential as a scalable solution for widespread dissemination is not yet fully realized. Furthermore, the worldwide effects of the COVID-19 pandemic on the delivery of educational, behavioral, and mental health services have already had transformational effects on the field of ASD treatment and can be expected to continue to have a lasting influence on practice and research for many years to come.

In conclusion, the wide range of established evidence-based practices for the treatment of ASD and the rapid acceleration of treatment development over the last few decades provides substantial hope for individuals with autism and their loved ones. In particular, the emphasis on research into naturalistic, community-based interventions is inspiring and promises meaningful advances in inclusion and quality of life for individuals with ASD in the future.

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