Social Behavior and Social Interventions for Adults on the Autism Spectrum

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Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by two clusters of symptoms: deficits in social communication and restricted, repetitive behaviors or interests (APA, 2013). Though onset of symptoms must be present early in development, autism is generally considered a lifelong disorder, with support needs present even in those who achieve more positive outcomes (Fombonne, 2003). Autism is also known for its significant heterogeneity in clinical presentation (Masi et al., 2017), as represented by the oft-quoted statement: "if you've met one person with autism, then you've met one person with autism." Despite the wide spectrum of profiles, some have considered autism to be defined by core disruptions in social information processing, which results in differences in reciprocal social interaction (Pelphrey et al., 2011). Other commonalities within the diversity of autism spectrum may exist as well, all of which are centered around social behaviors. For example, challenges with pragmatic language, or the social use of language (e.g., adjusting conversation to context or person, responding contingently, spontaneously providing information for social purposes), are considered universally present in ASD (Tager-Flusberg et al., 2005). These

features may relate to the other diagnostic characteristics and social communication differences, such as difficulties understanding and utilizing nonverbal communication, and struggles developing, maintaining, and understanding relationships (APA, 2013). Finally, although other forms of psychopathology impact some social behaviors, such as flat affect or diminished eye contact (e.g., depression, anxiety, schizophrenia), reduced social reciprocity and interactive behaviors are most distinctive to the social profile of individuals on the autism spectrum (Morrison et al., 2017) and are more impaired than would be expected given the individual's cognitive level (APA, 2013). Ultimately, the importance of social behavior in ASD cannot be understated.

Although much is known about children diagnosed with ASD, including strong empirical support for numerous evidence-based practices and interventions (Odom et al., 2010), research into the development and treatment of ASD across the lifespan into adulthood is much more limited (Howlin & Moss, 2012; Shattuck et al., 2020). In recent years, such research involving autistic adults has garnered increased attention, especially as large cohorts of autistic children are aging into adulthood with significant service needs (Gerhardt & Lainer, 2011). However, there are still extensive and serious gaps in the field, given the historical focus of research and funding on youth populations (Baker-Ericzén et al., 2018a). In particular, development of evidence-

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based treatments for autistic adults continues to be identified as lacking and an ongoing urgent area of need (Lorenc et al., 2018), even though current research has clearly demonstrated that autistic adults exhibit poor outcomes, across multiple domains, including vocational, educational, independence, social functioning (Eaves & Ho, 2008). In understanding these pervasively poor outcomes, social functioning has emerged as an important predictor and mechanism of prognosis. For example, early childhood language skills and joint attention have been identified as specific predictors of adult social functioning (Gillespie-Lynch et al., 2012). In another study, social reciprocity emerged as the strongest predictor of adult outcome (Howlin et al., 2013).

In a review of studies examining outcomes in adulthood for those diagnosed with ASD, Magiati et al. (2014) found that although measures of cognition, language, and autism features remained stable or improved from childhood to adulthood, social functioning in autistic adults was generally very poor. The majority of studies reviewed reported high rates of social isolation and very few friendships or romantic relationships among adults on the autism spectrum, with some evidence indicating that social outcomes worsen across development (Howlin et al., 2013). In a comparison by age, autistic adults were significantly less likely to have a single high-quality friendship than autistic adolescents (Orsmond et al., 2004). Furthermore, autistic adults are at even higher risk than other neurodevelopmental disorder populations for poor social outcomes, such that autistic adults report lower perceived social support than both neurotypical peers and peers with ADHD, especially in relation to support derived from friends (Alvarez-Fernandez et al., 2017). Not surprisingly, this lack of social connection has been connected with high levels of loneliness and depressive symptoms reported by adults on the spectrum (Mazurek, 2014).

Overall, the social outcomes of adults diagnosed with ASD are unfortunately bleak. As youth enter young adulthood, there are significant changes that may contribute to the process of increasing isolation. Specifically, the transition out of high school represents a stark loss in structured opportunities for social interactions, whether through daily interaction with peers in classrooms or the presence of easily accessible extracurricular activities and school community events. Following high school, autistic individuals are more likely than their peers to struggle with maintaining contact with friends as well as seeking out and forming connections to new peer social groups in employment and higher education settings. This net loss of social opportunities has been confirmed through research, with autistic youth showing a significant decline in structured social opportunities immediately after graduating high school but showing no changes in participation in unstructured social activities (Lounds Taylor et al., 2017). Compounding these difficulties in the transition to adulthood, individuals on the autism spectrum also experience what has been deemed the "services cliff" following high school. The services cliff is characterized by a significant decline in access to and use of services, resulting in a rise in unmet service needs across the autism spectrum in young adulthood (Laxman et al., 2019; Shattuck et al., 2011). Further, documented disproportionality has shown that autistic young adults of color and/or from low-income backgrounds are even less likely to successfully access services after the educational entitlement system ends (Shattuck et al., 2011). This loss of supportive services is exacerbated by demands related to novel tasks and roles within adult contexts, such as employment, and increased expectations of independent functioning. In sum, as young people on the autism spectrum transition to adulthood, many lose the formal and informal supports, bolstering their social functioning.

Alternatively, one study did find more positive social outcomes for autistic adults (Farley et al., 2009). This sample was particularly unique due to its high representation of members of the Church of Jesus Christ of the Latter-Day Saints. Study findings suggest that in communities with high levels of support, integration, and community activities, autistic adults can achieve more favorable social outcomes. Further, with the development of new treatments for autistic adults, there is also emerging evidence that interventions

can promote improvements in the social functioning of this vulnerable population (Bishop-Fitzpatrick et al., 2013; Laugeson et al., 2015).

Taking these multiple components together, it is clear that social behavior in ASD is a critical area of study across the lifespan. The current chapter aims to summarize what is known about the social behavior of adults diagnosed with ASD, review the importance and impact of social behavior profiles on functional outcomes, and highlight examples from the growing field of available interventions targeting social outcomes in this population.

Social Behavior in Autistic Adults

Social behavior is a broad umbrella term that can be divided into several different dimensions. One common conceptualization of the components of social behavior includes four components: social communication, social cognition, social awareness, and social engagement/motivation. Autistic individuals often exhibit differences in each of these areas across the lifespan. However, as individuals mature and their social contexts change (e.g., from school to work), the implications of such differences can result in clinical presentations and dilemmas unique to each developmental stage. In the sections below, we will focus on presenting research and clinical information relevant to adults on the autism spectrum.

Social Communication

Social communication encompasses a wide range of verbal and nonverbal behaviors, all of which serve a communicative purpose, whether in initiation or response to a social partner. More simply, these behaviors can be thought of as knowing what to say (e.g., responding on topic, complying with social norms) and how to say it (e.g., tone, facial expression) to meet a social goal. Beginning with characteristics of speech and prosody, autistic adults demonstrate significant differences

from typically developing adults in their rate, volume, stress/emphasis, and phrasing (i.e., a measure of speech fluency, documenting word repetitions, stuttering, or revising while speaking; Shriberg et al., 2001). In coded observations of role-play conversations, autistic adults were less fluid in their conversational speech, were less likely to ask their partner questions, were rated as demonstrating lower interest in interaction, had fewer instances of integrated eye contact, and displayed more examples of inappropriate or flat affect (Morrison et al., 2017). Additionally, adults on the spectrum may struggle to understand and respond appropriately to figurative or nonliteral language, such as metaphors, hyperbole, and sarcasm due to patterns of concrete thinking (Kalandadze et al., 2018).

In one interesting study design, autistic adults were asked to generate questions they had about "getting along with other people," which were then addressed collaboratively in a group setting through problem-solving. The questions and responses provided by participants revealed challenges with a number of social communication skills, such as conflict resolution, navigating workplace interactions, getting to know someone better, starting and maintaining conversations, entering group conversations, asking someone on a date, and knowledge of social norms (Sperry & Mesibov, 2005). Beyond general social interactions with peers, specific social contexts in adulthood create unique manifestations of social communication errors. In the work place, such social errors and challenges can manifest as problems with coworkers, due to being too blunt or engaging in "policing" behaviors due to rigid adherence to rules (e.g., reporting a coworker for being late). There are also ramifications for interactions with supervisors, where autistic individuals may be perceived as overly resistant to change, inflexible, or insubordinate. Adults themselves report workplace challenges in making small talk, interacting with clients, and providing constructive feedback (Baldwin & Costley, 2016). Qualitatively, they describe having to work harder to "appear as normal" and learn the "rules" in employment settings (Baldwin & Costley, 2016).

Social Cognition

Social cognition most commonly refers to the ability of individuals to perceive the intentions and internal states of others, including thoughts and emotions. The most prominent social cognitive skill studied in autism is theory of mind, a more technical term for perspective taking abilities, including how others' internal experiences may differ from one's own. Autistic adults show a clear pattern in which social cognition, such as theory of mind and emotion perception, is more impaired than nonsocial cognition, including memory and attention (Velikonja et al., 2019). In individuals on the autism spectrum, neurobiological research has documented consistent differences in the brain structures associated with social cognition, including the amygdala, superior temporal sulcus, and fusiform gyrus (Pelphrey et al., 2004). Interestingly, as adults on the autism spectrum age, some of these social cognition deficits may abate relative to neurotypical adults. One study found that there were less pronounced differences in theory of mind abilities between autistic and neurotypical adults in middle and later adulthood (Lever & Geurts, 2016). However, on a task of emotional perception, *Reading the Mind in the Eyes* (Baron-Cohen et al., 2001), there was a nonsignificant effect of age on performance through adulthood, though the authors noted interesting gender differences in trajectories over time (Pagni et al., 2020).

These social cognitive differences contribute to observed deficits in traditional tasks measuring empathy in adults with ASD (Baron-Cohen & Wheelwright, 2004). However, more nuanced examination shows instead a consistent impairment in cognitive empathy, or the ability to infer others' mental states, and inconsistent findings with respect to emotional empathy, or the ability to share in the emotions of others (Smith, 2009). Several studies have actually found no differences by diagnostic status in emotional empathy (Dziobek et al., 2008) or in physiological reactions to emotional situations (Trimmer et al., 2017). Ultimately, this may suggest that while autistic adults struggle to independently identify and understand others' emotional states, they experience similar levels of concern and sympathy for others.

Importantly, deficits in theory of mind leave autistic adults vulnerable to victimization and being taken advantage of, given their impaired ability to detect deception (i.e., understanding that someone might say something they do not believe; Mathersul et al., 2013). Data bear this risk out, such that autistic adults are more likely than their neurotypical peers to be victimized (Brown-Lavoie et al., 2014). Though other neurodevelopmental disorder populations also have elevated social vulnerability, autistic adults have been found specifically to have lower risk awareness and lower social protection due to diminished social networks and friendships, even when compared to other disability groups (Fisher et al., 2013). In clinical settings, these findings may manifest in adults on the spectrum and their families anecdotally reporting greater incidents of safety concerns and victimization experiences (i.e., financial, sexual) due to such naiveté.

Difficulties in social cognition and perspective-taking may also contribute to inappropriate social behaviors sometimes utilized by autistic adults. For example, research has documented an increased use of inappropriate romantic courtship behaviors by autistic adults, including following or monitoring the activities of their love interest (e.g., pseudo-stalking), choosing inappropriate people of interest (e.g., strangers, celebrities), and persisting in pursuit following a nonresponse or negative response from a desired partner (Stokes et al., 2007). However, importantly, people close to these adults on the autism spectrum (e.g., family members) most often report that the individual is unaware of the inappropriateness of their behaviors and had difficulty understanding that the other person was not interested, suggesting the presence of a deficit in perspective-taking rather than malicious intent (Stokes et al., 2007). This explanation has been confirmed through mediation analysis, showing that theory of mind deficits predicted inappropriate courtship behaviors in autistic adults (Mintah & Parlow, 2018). This study also found that poor theory of mind skills were related to an increased likelihood of interpreting ambiguous interactions as indicators

of flirtatious interest. Thus, the authors summarize that the observance of such inappropriate courtship behaviors is likely an unintentional result of misunderstanding and misinterpreting cues (Mintah & Parlow, 2018).

Social Awareness

Social awareness includes skills related to picking up on social cues and being broadly aware of the surrounding social landscape (e.g., visual, auditory information). The basic foundations of social awareness appear to be disrupted in those diagnosed with autism, with a large number of studies documenting that autistic individuals engage in atypical gaze orienting in social interactions and depictions, with decreased attention and priority given to social stimuli (e.g., people, faces; Chevallier et al., 2013; Fletcher-Watson et al., 2009). However, even when attention is directed toward social stimuli, autistic adults may not process the information in a manner facilitating social awareness. For example, one study showed that individuals diagnosed with ASD do not show a typical pattern of brain activation in response to fearful faces looking off to the side, which activated regions associated with danger in typical controls (Zürcher et al., 2013). Although interpretation of cues to deduce others' mental states falls under the domain of social cognition, one's ability to successfully achieve that hinges necessarily on the accurate and timely sensory perception of cues (e.g., seeing changes in facial expression, shifts in body language, orientation of gaze). Such cues in a social interaction or within one's environment may be fleeting, and even minor differences in attention may have significant consequences (Fletcher-Watson et al., 2009). These differences in social awareness likely contribute to common social errors observed in adults with ASD, such as topic perseveration (e.g., not identifying social cues indicating lack of interest) or dominating the conversation (e.g., not noticing social cues that the other person would like to speak). Further, evidence indicates that social stimuli may actually be less distracting to autistic individuals than

to neurotypical people (Chevallier et al., 2013), possibly resulting in autistic adults appearing "oblivious" to their social environments.

Finally, despite difficulties in social awareness and understanding others' mental states, autistic adults often do experience subjective feelings of judgment and lack of social acceptance related to their symptoms and behaviors (Kapp et al., 2019a). Research investigating the phenomenon of "camouflaging," in which autistic individuals mask, hide, or otherwise compensate for their autism features in social interactions, has clearly demonstrated their awareness of the need to change one's behavior to achieve various aims (Hull et al., 2017).

Social Engagement and Motivation

Some theorists cite social motivation as the foundational social deficit in ASD that creates cascading effects on ongoing development (Chevallier et al., 2012). Specifically, this theory posits that lack of social motivation results in less social experience, which subsequently leads to differences in social communication and cognition from reduced opportunities to acquire such knowledge. However, the explanation that autistic individuals are not interested in or motivated by social interaction runs counter to many anecdotal observations among clinicians and parents, where forming friendships and romantic relationships is reported as a primary goal and a source of distress when not achieved. The popularity of social skills treatment programs in the community also suggests a desire for social engagement and signifies motivation for improved social connection and acceptance, with the primary barrier being not knowing how to achieve that goal rather than a lack of interest. Subsequent challenges to this theory have posited alternative explanations for behaviors that may appear as lack of social motivation or interest (Kapp et al., 2019b).

In contrast, qualitative analysis of interviews with young adults on the autism spectrum confirms a strong desire for social engagement and efforts to form friendships while acknowledging significant challenges in doing so (Sosnowy

et al., 2019). Autistic young adults identified acceptance of atypical behavior and common interests as essential features of successful friendships in adulthood (Sosnowy et al., 2019). Perhaps relatedly, multiple small-scale studies have documented that adults on the spectrum report increased comfort in and preference for social interaction with other adults diagnosed with ASD relative to interaction with neurotypical adults (Morrison et al., 2020; Crompton et al., 2020). In contrast, neurotypical adults expressed preference for continued interaction with other typically developing adults (Morrison et al., 2020). From this lens, it is possible that social engagement in autistic adults may be impacted by dyadic factors beyond the individual, with lack of mutual understanding from both sides (Milton, 2012). This hypothesis is reinforced through data that show adults on the spectrum spend as much time interacting with others as do neurotypical adults (Hintzen et al., 2010). Instead, what does differ is the company they keep during that time, such that autistic individuals spend the majority of their social time with family members, whereas neurotypical adults' social time is more evenly split between family and friends (Hintzen et al., 2010). Consistent with the self-determination theory of social engagement, autistic adults also report the highest levels of intrinsic motivation for interaction in situations where they felt comfortable, accepted, and listened to, which was usually with family members and close friends (Chen et al., 2015). This was in contrast to social interactions with less familiar people, such as coworkers or classmates, where they reported being extrinsically motivated to interact to satisfy external demands (i.e., feeling like they had to; Chen et al., 2015).

Importance of Social Functioning

These differences in and challenges with social behavior have important ramifications for multiple domains of functioning for adults on the autism spectrum, including their ability to develop and maintain meaningful relationships of all kinds, obtain and maintain meaningful

employment and postsecondary education, and demonstrate well-being via their mental health and subjective quality of life.

Social Relationships

Several adult outcome studies have reported that more than half of autistic individuals do not have any meaningful, close friendships (Howlin & Moss, 2012; Eaves & Ho, 2008). Compared to other disability groups, autistic adults are least likely to report regular, weekly get-togethers with friends (Newman et al., 2011). Beyond not having close friendships and get-togethers, 28% of autistic adults reportedly had no social contact with peers in the past 12 months – a rate more than three times higher than that of adults with intellectual, learning, or emotional disabilities (Orsmond et al., 2013). Interestingly, one study found that adults on the spectrum participate in community activities, such as classes, clubs, volunteer work, or sports, at comparable rates with other disability groups (Newman et al., 2011). This finding is contrary to the drastic differences in frequency of get-togethers with friends, strongly indicating that adults on the spectrum primarily struggle with skills that promote social connection and ultimately turn acquaintances into friends outside of organized social contexts (e.g., school, church, clubs, sports teams). For example, conversational skills are critical to the development of relationships and have been linked to frequency of social contact and the formation of friendships in autistic adults (Friedman et al., 2019; Orsmond et al., 2013). Clearly, the formation of friendships is not only contingent on access to peers through participation in social activities but also on an ability to engage and connect with those peers in meaningful ways (i.e., conversational exchange).

Autistic adults also report similar levels of interest in having romantic relationships and engaging in sexual activity as their neurotypical peers but are significantly less likely to have romantic involvement (Cheak-Zamora et al., 2019; Hancock et al., 2020). A large study inclusive of over 200 autistic adults identified that

social engagement explained the relationship between ASD diagnostic status and difficulties with romantic relationships (Hancock et al., 2020). Two qualitative analyses of factors that enabled or inhibited romantic intimacy in autistic adults found that they specifically benefited from explicit and direct communicative styles and had more difficulty with giving and receiving romantic signals (e.g., flirting, expressing emotion; Sala et al., 2020; Smith et al., 2020). Interestingly, autistic adults also report learning less about sexuality from their peers than did neurotypical adults, likely another manifestation of the social behavioral profile of ASD that interferes with success and satisfaction in this area (Hancock et al., 2020). Of note, accumulating anecdotal and clinical observations in the field have informed recent empirical investigation into the gender identity and sexual orientation of individuals on the spectrum. Findings suggest higher rates of gender dysphoria and lower rates of heterosexual orientation in adults on the autism spectrum (George & Stokes, 2018a, b). Unfortunately, some of the social behaviors of autistic individuals (e.g., specialized interests, concreteness, difficulties with adjusting behavior to context) also contribute to parents' apprehensions in discussing sexuality with their autistic child, which puts these individuals at further disadvantage (Ballan, 2012).

Despite the challenges imbued by social differences, there are also indications that autistic adults can have successful and fulfilling romantic relationships. Indeed, in one recent study with a large sample of autistic adults ($n = 675$), over 50% reported being in a current romantic relationship, with very low levels of dissatisfaction with those relationships (Dewinter et al., 2017). Further, research results suggest that autistic adults may also demonstrate stronger commitment, as evidenced by longer relationship duration (Jobe & White, 2007), and greater honesty in relationships (Russell et al., 2019). Notably, it may be that more recent cohorts of adults on the spectrum are experiencing improved romantic relationship outcomes. Initial adult outcome studies generally observed very low par-

ticipation in this area, with a review from almost a decade ago showing that more than half of studies reported less than 15% of autistic adults being involved in significant romantic relationships (range 0–38%; Howlin & Moss, 2012). More recently, data suggest much greater proportions of autistic adults have had meaningful romantic relationship experiences (>50%), though the rates are still significantly lower than neurotypical samples (Byers et al., 2013; Dewinter et al., 2017; Strunz et al., 2017).

Professional and Educational Pursuits

Autistic adults are chronically unemployed or underemployed. In two studies of outcomes in the transition to adulthood period, including one using a large national dataset, only 44% of young adults on the spectrum had held any sort of paid job in the immediate years after high school (Eaves & Ho, 2008; Friedman et al., 2019). Those that had a history of paid employment were more likely than the general population to work part-time or very few hours, be overqualified, be paid wages close to or below the minimum wage, and be employed as a casual worker with no ongoing job security or benefits (Baldwin et al., 2014; Eaves & Ho, 2008; Friedman et al., 2019). Similarly, autistic young adults are also less likely to enroll in or complete postsecondary education than their neurotypical peers or other disability groups (Newman et al., 2011), with less than half reporting any higher education participation in the 8 years after high school.

The social functioning of adults diagnosed with ASD is inextricably tied to their professional and educational success. In surveys examining barriers to employment, the most commonly identified factors by autistic adults were difficulties getting past the interview stage and social communication with coworkers or supervisors (Coleman & Adams, 2018; Lorenz et al., 2016). Conversational abilities and social skills have been shown to longitudinally predict vocational success and educational attainment in adults with ASD (Chiang et al., 2013; Friedman

et al., 2019; Liptak et al., 2011). In a review of predictors of vocational success, social competence and social support factors were identified across multiple studies (Walsh et al., 2014). As compared to their neurotypical peers, autistic college students report lower levels of belonging, lower quality social relationships, and higher rates of all forms of bullying (e.g., physical, verbal, rumors) and social exclusion (McLeod et al., 2019). In a qualitative study of college students with neurodevelopmental disorders, negative peer interactions were cited as a barrier to success in postsecondary education, but only for those diagnosed with ASD (Bolourian et al., 2018), further underscoring the specificity of significant social challenges for this population. Interestingly, diagnosis disclosure to employers has also been connected with increased likelihood of job obtainment and maintenance (Ohl et al., 2017). Similarly, college students who disclosed their ASD diagnosis to faculty also described finding the process helpful (Bolourian et al., 2018). However, this skill of diagnosis disclosure, in and of itself, can often invoke worry about stigma and require confidence to do so appropriately (Anderson et al., 2017; Bolourian et al., 2018).

Despite these challenges, young adults on the autism spectrum have many strengths that may serve them well in postsecondary education. These include strong technological skills, self-advocacy experiences, persistence, diligence, and strong interests in their subjects of study (Anderson et al., 2017). Similarly, autistic adults often have positive qualities that may be harnessed successfully in the right workplace setting, including dependability, patience for repetitive work, honesty, and specialized interests/knowledge (Solomon, 2020). Unfortunately, employers often hold false beliefs about efficiency and productivity of individuals diagnosed with ASD and are influenced by negative stigma and societal attitudes about ASD (Scott et al., 2017). However, employers who do hire adults on the spectrum often find that the benefits outweigh any costs and evaluate their employees' performance more favorably than expected (Scott et al., 2017).

Mental Health and Quality of Life

The mental health crisis among autistic individuals is pervasive and profound. Research suggests autistic adults are at elevated risk for co-occurring mental health problems, though there is a wide range of prevalence estimates of mental health disorders for this vulnerable population (30–84%; Bishop-Fitzpatrick & Rubenstein, 2019; Howlin & Moss, 2012; Lai et al., 2019). There is mixed evidence regarding whether autistic individuals with co-occurring intellectual disability vary in their rates of co-occurring mental health conditions as compared to autistic individuals without cognitive impairments (Howlin & Moss, 2012), with some evidence suggesting that those without cognitive impairments may be at higher risk for internalizing problems, such as anxiety and depression (Bishop-Fitzpatrick & Rubenstein, 2019). One sample of autistic college students found that most were experiencing loneliness, 74% reported suicidal ideation or behavior in their lifetime, and rates of severe stress were five times greater than a typical college student sample (Jackson et al., 2018). Beyond mental health disorders, autistic adults also report lower quality of life as compared to normative samples (Crane et al., 2019). Arguably, the social difficulties associated with autism play an important role in understanding the incidence of mental health problems and poor well-being in this population. Social support, or the availability of helping relationships, has predicted positive quality of life, well-being, and adaptation following stressors in autistic adults (Bishop-Fitzpatrick et al., 2018; Hedley et al., 2019; Renty & Roeyers, 2007). Beyond friendships, involvement in intimate romantic relationships has also been shown to be protective, relating to improved quality of life across multiple domains (Pearlman-Avnion et al., 2017). Unfortunately, autistic adults who struggle with forming meaningful relationships are less likely to be able to draw upon these supportive resources to bolster their resiliency and well-being.

Adults perceive stigma related to autism features and mental health problems, resulting in a heightened desire to "camouflage" (Crane et al.,

2019; Kapp et al., 2019a). However, these camouflaging behaviors come at a high emotional cost, with reports of exhaustion, identity loss, depressive symptoms, and suicidality (Cage & Troxell-Whitman, 2019; Cassidy et al., 2018; Hull et al., 2017). Further, the construct of collective self-esteem, or one's beliefs about how autistic individuals as a group are viewed by society and by oneself, has been linked to personal self-esteem, anxiety, and depressive symptoms in autistic adults (Cooper et al., 2017), further compounding the potential negative effects of perceived stigma. Another socially based barrier to mental health results from the social communication differences characteristic of autism, which, according to autistic adults themselves, interfere with their ability to seek mental health treatment and express internal experiences (Camm-Crosbie et al., 2019). Systems challenges in accessing mental health treatment also exist, such that mental health providers are often ill-equipped to interact with and serve adults on the autism spectrum, due to lack of training, experience, and confidence (Maddox et al., 2020).

Evidence-Based Social Interventions

Given the pervasively poor outcomes seen in adulthood for autistic individuals, the development and dissemination of evidence-based interventions is crucial. However, there is currently a dearth of rigorously tested and widely available treatment options for this population, whose needs will continue to grow exponentially (Gerhardt & Lainer, 2011). Many of the approaches that have been validated in autistic children are either inappropriate for adults (e.g., play-based, early intervention) or have not been adapted to meet their unique needs (e.g., romantic relationships). Among psychosocial interventions, a recent review identified 41 studies over the last 37 years investigating treatments in adult populations (Pallathra et al., 2019). Unfortunately, only 11 of these were randomized control trials (RCTs), considered the gold standard of intervention evaluation. Further, only one

of those was rated as having strong methodological quality. In the following section, the current state of the literature with respect to social interventions for autistic adults will be reviewed and examined.

Social Skills Interventions

Although social skills group interventions are not novel forms of treatment for autistic populations, there has been a striking lack of empirical investigation into their efficacy in adulthood. While a recent review of interventions aiming to target social behavior in autistic individuals found 16 studies inclusive of adult participants, only studies examining mindfulness, mental health, and social cognition were included (Ke et al., 2018). Further, methodological rigor was poor among the majority of studies, with several single subject designs and lack of control groups (Ke et al., 2018). Another review identified 12 intervention studies targeting social skills for adults with ASD (Pallathra et al., 2019); however, 6 of these focused on isolated skills, such as increasing question asking (Palmen et al., 2008) or reducing negative statements in conversation (Koegel et al., 2016). Though perhaps effective in achieving improvements in these specific social behaviors, programs with such limited scope are clearly insufficient to address the social needs of autistic adults more broadly. As such, more research investigation into traditionally defined, comprehensive social skills treatments is needed.

Only one comprehensive social skills program for adults on the autism spectrum, known as *PEERS® for Young Adults*, has had multiple RCTs to support its efficacy (Gantman et al., 2012; Laugeson et al., 2015; McVey et al., 2016). *PEERS® for Young Adults* is a 16-week social skills group intervention that focuses on skills related to making and keeping friends, developing and maintaining romantic relationships, and handling conflict and rejection. Topics include conversational skills, peer entry and exiting strategies, nonverbal communication (e.g., assessing interest, acceptance), appropriate use of humor, finding sources of friends, electronic communication,

get-togethers, dating, conflict resolution, responding to bullying, and perspective-taking. The results of three RCT studies showed improvements among autistic adults in overall social skills, ASD-related social impairments, social skills knowledge, and social engagement (e.g., number of get-togethers) across self-report and caregiver-report measures (Gantman et al., 2012; Laugeson et al., 2015; McVey et al., 2016). Within individual studies, additional benefits were achieved in the areas of loneliness, empathy, and social anxiety (Gantman et al., 2012; McVey et al., 2016). Essential to the *PEERS® for Young Adults* program is the presence of two groups: one for the adults themselves and a second group for social coaches. Social coaches are important people within the adult's life (e.g., parents, older siblings, life coaches) who agree to participate in the program, learn the same skills, and serve as a support to the adult as they practice and apply skills outside of sessions. Research on the *PEERS®* method in adolescents suggests that additional improvements observed after the end of treatment (e.g., 4 months to 5 years later) may be attributed to the ongoing involvement of such social coaches (Laugeson et al., 2015; Mandelberg et al., 2014). *PEERS® for Young Adults* draws upon the evidence-based methods of instruction for social skills training in autistic individuals across the lifespan, including small group format, inclusion of social coaches, didactic instruction, concrete rules and steps, modeling of skills, opportunities for in-session practice, use of praise, and generalization homework (Moody & Laugeson, 2020).

Although the *PEERS® for Young Adults* program does include instruction on dating skills (e.g., flirting, asking someone on a date, going on dates, dating safety), the primary focus of the intervention is on the development of friendships. Only one program, known as *Ready for Love*, focusing exclusively on romantic relationship social skills has been tested in adults with ASD (Cunningham et al., 2016). The *Ready for Love* intervention produced positive benefits in ASD-related social impairments and empathy more broadly, as well as more targeted benefits in dating skills. Strengths of this study included a rela-

tively large sample size ($n = 39$), given typical sizes of other intervention studies for autistic adults. Though some additional psychoeducation interventions related to sexuality and safety (e.g., anatomy, reproduction, privacy) exist, these were not considered to be targeting social components of romantic relationships (Sala et al., 2019). Additionally, other interventions supporting romantic functioning have begun to be tested in other neurodiverse populations but have yet to be extended to adults on the autism spectrum (Exell et al., 2020). Consequently, there is a strong need for more widespread and accessible intervention programs focused on romantic relationships, dating, and sexuality for autistic adults (Cheak-Zamora et al., 2019).

Employment-Related Interventions

In response to the underemployment and unemployment rates of autistic adults, programs have emerged in order to teach employment-related skills. Initially, most of these programs, summarized by Walsh et al. (2014), focused on direct teaching of vocational hard skills needed for specific jobs, such as photocopying, cleaning, stocking, and customer service. Strategies to teach autistic adults these hard skills included positive reinforcement, video modeling, coaching, and gradual fading of supports as would be seen in techniques derived from the science of applied behavior analysis (ABA). More comprehensive supported employment programs, which most often include job coaching, have also been shown to be effective in enhancing job outcomes in adults on the spectrum (Wehman et al., 2014). Project SEARCH is one of the most extensively tested supported employment skills programs for individuals with disabilities more broadly. However, Project SEARCH has also developed a curriculum with autism-specific supports that has empirical support from a large-scale RCT (Wehman et al., 2019). This RCT was inclusive of autistic adults with or without co-occurring intellectual disability, highlighting its applicability across the wide range of cognitive functioning within the autism spectrum. The program

includes a 9-month rotating internship in the last year of high school, which can be up to age 22 for individuals on the spectrum, focused on gaining on-the-job experience with supports to build resumes with past work experience. Project SEARCH + ASD supports also includes social communication instruction using ABA teaching strategies and seamless integration with adult Vocational Rehabilitation service providers to reduce delays to adult services after high school. Over 70% of Project SEARCH participants were engaged in competitive employment at a 1-year follow-up, as compared to only 17% of the control group (Wehman et al., 2019). Project SEARCH also performs better than other "treatment as usual" supported employment models, in terms of cost effectiveness, employment retention, and wage (Schall et al., 2015).

More recent programs have focused less on hard skills and on-the-job coaching as seen in supported employment and more on the soft skills that are identified by autistic individuals and supported by research to be barriers to positive vocational outcomes (Coleman & Adams, 2018; Lorenz et al., 2016). These employment-specific social communication skills include strategies for conversations, negotiation/conflict, offering and asking for assistance, responding to requests, networking, perspective-taking, and working within a team (Baker-Ericzén et al., 2018b; Sung et al., 2019). Many also include additional approaches to support emotion regulation and executive functioning (e.g., goal setting, problem-solving, organizational skills). Similar to the format of social skills groups, these programs often utilize a group format, didactic lessons, positive and negative exemplars, cognitive and behavioral skills practice, and homework assignments. Though all intervention models tested showed evidence of effectiveness in improvement in social communication skills, all were feasibility and pilot studies and were thus limited by small samples (n<17) and lack of control groups (Baker-Ericzén et al., 2018b; Sung et al., 2019). An additional study that utilized a less structured discussion of relevant topics (e.g., problem-solving, employment, friendships, perspective-taking) through group leader questions prompts also reported on qualitative benefits to social interactions, self-esteem, and job-seeking behaviors (Hillier et al., 2007).

Additionally, there has been a recent surge in short-term, targeted interventions aimed at improving the job interviewing skills of autistic adults (Smith et al., 2021; Strickland et al., 2013). Most often, these programs include a virtual reality training component with complex programming that allows dynamic responding (Burke et al., 2020; Smith et al., 2021). These virtual interactive interview interventions have demonstrated significant positive effects on self-efficacy, confidence, and skills while interviewing (Burke et al., 2020; Smith et al., 2021; Ward & Esposito, 2019). In examining outcomes after 6 months posttreatment, participants who received virtual reality job interview training were more likely to have gained competitive employment (Smith et al., 2015). Secondary analysis of participant data demonstrated that the number of virtual reality practice interviews significantly predicted employment outcome at 6 months, through a mediating effect of live interviewing skills at end of treatment (Smith et al., 2017). Further, these studies demonstrate some methodological strengths not always seen in the adult autism intervention literature, including larger sample sizes (n = 153, Burke et al., 2020), use of RCTs with a treatment-as-usual group (Smith et al., 2021), and inclusion of autistic individuals with and without cognitive impairments (Smith et al., 2021).

More informally, a study examining the supervisors of gainfully employed adults on the autism spectrum identified common supervision strategies that bolstered the success of these individuals in the workplace (Hagner & Cooney, 2005). In addition to organizational supports, such as maintaining a consistent schedule, providing structure, tracking workflow, using direct communication, and verifying understanding of instruction, there were also several socially oriented strategies that emerged as supportive in employment settings. These included assisting the autistic employee in learning social rules, norms, and cues on the job, encouraging coworkers to initiate interactions, and assigning one or

two other coworkers to provide suggestions and "keep an eye out" for their autistic coworker (Hagner & Cooney, 2005).

Postsecondary Education Interventions

In addition to employment programs, there have been a few programs aimed at promoting positive social adaptation within the postsecondary school environment (Gelbar et al., 2014). One promising program consisted of a 3-day pre-enrollment program in the summer before the fall semester, in which incoming autistic college students were invited to stay in campus housing (Lei et al., 2020). Over the course of several years, a total of 122 students with ASD participated in the research evaluation of the summer program. Participants received academic socialization experience in attending lectures, interacting with faculty, accessing tutoring support, and disclosing diagnoses. Further, participants were given information about social clubs on campus, access to cafeterias for shared meals, and opportunities for informal socialization with other participants. Participants reported satisfaction with the program, within qualitative data suggesting that the program facilitated social connections and mitigated social concerns about entering postsecondary education (Lei et al., 2020).

Emotion Recognition Interventions

Interventions specifically targeting social cognition, such as emotion recognition and theory of mind, have also been tested in autistic adults. Programs have utilized computerized software programs and virtual reality platforms with success to teach social cognitive skills (Golan & Baron-Cohen, 2006; Kandalaft et al., 2013). Adaptations of social cognition interventions for individuals with schizophrenia have also been applied to adults on the spectrum, including a group-based adaptation of the Social Cognition and Interaction Training (SCIT) program (Turner-Brown et al., 2008) and an adaptation of Cognitive Enhancement Therapy (CET), which includes both online neurocognitive training and a structured group class curriculum delivered over 18 months (Eack et al., 2013). Both of these models were effective in improving emotion understanding, and CET demonstrated benefits across multiple other neurocognitive domains (e.g., processing speed, flexibility, organization; Eack et al., 2013). Researchers have also explored the use of oxytocin, administered intranasally, as a physiological mechanism to improve emotion recognition with mixed results (Wieckowski et al. 2020).

Discussion

The current chapter reviewed the scientific knowledge on the social behavior of adults diagnosed with ASD, along with empirically supported interventions for this highly understudied and marginalized population. Consistent with the diagnostic symptoms of the disorder, autistic adults demonstrate distinctive profiles across all major domains of social behavior. As discussed, social behavior and functioning displays reliable connections to the functional outcomes of autistic individuals. However, it is also important to consider that social behavior, especially in autism, does not exist in a vacuum. Instead, there are interactive effects and perpetuating processes. For example, executive and cognitive functioning components, such as processing speed deficits, have also been linked to social communication abilities in adults on the autism spectrum (Haigh et al., 2018). Sensory processing abnormalities may further contribute to differences in social awareness through difficulties filtering out extraneous details, delays in processing of relevant stimuli, and difficulties integrating information from multiple senses (Thye et al., 2018). Further, the greater levels of stress observed in and reported by autistic adults may be one component linked to further exacerbation of social difficulties (Bishop-Fitzpatrick et al., 2015). However, as highlighted in the current chapter, it is also likely that the social challenges experienced by individuals on the spectrum contribute

to increased stress and decreased well-being, thus creating a cascading cycle. Given the negative outcomes associated with social skills deficits, targeting social functioning in treatment is one fruitful avenue for clinicians to pursue, with a growing body of evidence suggesting positive benefits, despite methodological limitations in the current literature base (Bishop-Fitzpatrick et al., 2013).

Clinical Implications

As discussed, differences in social behavior and the associated challenges often have harmful impacts on the lives of adults on the autism spectrum. Fortunately, advancements in the field have enhanced understanding of how these social differences manifest and interfere with functioning in adulthood. Although currently limited, the growing body of research supports that psychosocial interventions are effective in improving social outcomes. Taken together, the following clinical implications are considered.

First, thorough clinical assessments of social functioning are essential. In autistic adults, utilization of both self-report and informant-report of social skills and social functioning via validated and normed questionnaires is recommended to guard against limitations due to lack of insight or proxy reporter bias. Further, clinical interviewing surrounding relationships may need to be expanded beyond what is typically indicated for clients with other forms of psychopathology, given deficits in understanding of relationships. For example, deeper inquiry into friendships (e.g., frequency of contact with friends, types of friendships, social engagement activities) and romantic relationships (e.g., dating history, sexual intimacy, assessment of romantic interest, and reciprocity) could both be illuminating avenues of pursuit. Additionally, behavioral observations of social interactions can help clinicians to further understand and assess social functioning, as well as track changes over the course of treatment. Though clinicians frequently note client behaviors throughout the course of a clinical

encounter, observation of a more intentional social interaction may have added value.

In addition to assessment, treatment planning to include interventions targeting social behavior for adults on the autism spectrum may be warranted, assuming the adult is socially motivated and interested in receiving these services. Even adults who are presenting to treatment for other mental health challenges, such as depression and anxiety, may benefit from interventions incorporating social components, many of which have been found to be powerful mechanisms of change in mental health symptoms (McVey et al., 2016). However, these interventions must be individualized to the needs of the adult, whether it be skills related to friendships, romantic relationships, or the workplace. Further, the social goals of the adult themselves should be elicited and prioritized to ensure motivation and promote self-advocacy skills. In treatment planning, clinicians may consider integrating social skills lessons into their own work or referring clients to complementary group social skills intervention services, which tend to be the modality with the strongest evidence base for autistic individuals (Laugeson et al., 2015). Close coordination of individual treatment with group services is recommended in order to reinforce and consolidate the skills learned over time. This may be done through acquisition of teaching materials used in group treatment or through consultation with group leaders to facilitate common understanding and reinforcement of skills in individual therapy.

Finally, it is essential that whatever social behaviors are targeted, the skills taught are considered ecologically valid, meaning that skills align with the social behaviors of socially accepted peers (Laugeson & Ellingsen, 2014). Too often, adults (and youth) on the autism spectrum receive ineffective social skills instruction derived on the perceptions and beliefs of adults and providers of what is appropriate behavior in a given situation. Additionally, the involvement of caregivers, family members, and/or close friends may have added benefits in promoting generalization of skills and facilitating practice outside of sessions.

Future Directions

Despite the development of promising new research focusing on autistic adults, a number of limitations exist in the literature. In particular, a primary gap exists within the representativeness of the samples included in the current research. Almost all of the studies cited in the current chapter utilized samples of young or middle-aged adults (e.g., 20–40 years of age). Thus, increased research attention is needed for older adults diagnosed with ASD, including their social behavior profiles and overall outcomes, but also effective treatments and mechanisms to support well-being within this understudied population. Similarly, much of the current literature also draws exclusively from cognitively able adults who would be classified as "Level 1" per the DSM-5, indicating relatively lower support needs. Very few studies have focused specifically on autistic adults with intellectual disability or more substantial support needs, nor has research extensively explored within-spectrum differences in social behavioral presentations and treatment response (e.g., examining IQ as a moderator, comparing groups across the three DSM-5 support-level classifications). Additionally, the current literature has clearly documented the social communicative differences and poor social outcomes observed in autistic adults. However, predictors and correlates of such behaviors and outcomes are less clearly understood and could be an important avenue for future research. Finally, there is a strong need for rigorous testing of social interventions for adults, with larger samples, randomized control designs, replication, and long-term follow-up studies.

Conclusions

In sum, autistic individuals experience unique and pervasive challenges in adulthood, as social demands shift and the availability of supportive services diminishes. Social functioning is an essential factor in these challenges and a prime target for intervention. Though research is limited, current evidence does indicate that adults on the spectrum benefit from psychosocial interventions targeting social behaviors. The development and dissemination of evidence-based practices in this underserved population has the potential to enable autistic adults to reach their potential and showcase their many strengths.

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