Challenging Behaviors Associated with Autism and Pervasive Developmental Disabilities

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Introduction

Autism spectrum disorder (ASD) encompasses a category of neurodevelopmental disorders characterized by difficulties in social reciprocity and interaction and restricted, repetitive behaviors (American Psychiatric Association, 2013). ASD affects communication across settings—ranging from effectively communicating one's needs to navigating subtle aspects of social interactions like relational conflict—and rigidity or repetitiveness of behaviors that can impact daily functioning (e.g., struggling with changes in routines). In addition to these diagnostic features, psychological and medical conditions like intellectual disability, anxiety disorders, and sleep difficulties frequently co-occur with ASD (e.g., Chandler et al., 2016; Hartley et al., 2008; Maenner et al., 2020; Salazar et al., 2015; Sivertsen et al., 2012). Many autistic individuals also display challenging behavior, or patterns of behavior that can disrupt functioning and may result in harm to one's self or others (e.g., Emerson, 2001; Newcomb & Hagopian, 2018). Prevalence rates of challenging behavior in populations with ASD vary across studies (e.g., Hill et al., 2014; Jang et al., 2011; Matson et al., 2008) but are found to be consistently higher than in populations without disabilities (e.g., Gurney et al., 2006; Nicholas et al., 2008).

Challenging behavior presents in diverse ways, and common examples observed in ASD include aggression, noncompliance or refusal, tantrums, self-injurious behavior, and elopement or wandering. Several topographies are especially

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concerning given the risk of harm toward self or others. Elopement is observed in about 1 in 3 children with ASD or intellectual disability; slightly higher rates are observed in children with both ASD and intellectual disability (e.g., Rice et al., 2016). The prevalence rate of self-injurious behavior has been estimated at 28% (Soke et al., 2016), yet research suggests that self-injurious behavior occurs at some point during the lifespan in upward of 40% of autistic individuals (e.g., Richards et al., 2017). Studies on aggression in ASD have ranged from 8% to 68% (Hill et al., 2014).

Variation in prevalence rates across studies may be partially attributed to variation in the measurement of behaviors, particularly when non-standardized measures of parent report are incorporated as opposed to measures validated across populations with and without disabilities (e.g., Hill et al., 2014). There is also great variability in how challenging behavior presents, and differences in how one operationally defines a behavior impacts understanding of its occurrence. This variability in presentation may create challenges when identifying prevalence, but its nuances are crucial to understanding the extent to which the challenging behavior impacts the functioning of the individual. To illustrate, when defining challenging behavior broadly, one autistic adolescent who presents with challenging behavior may demonstrate task refusal but only when presented specific demands at home. Another adolescent with challenging behavior may display frequent and intense rates of self-injury, aggression, and property destruction that hinder participation in school and the community. A full understanding of challenging behavior requires integration of observed dimensions of behavior and factors impacting these dimensions.

Co-occurring conditions influence some of these differences in presentation, including associated medical conditions like sleep difficulties (e.g., Johnson et al., 2018). Cognitive functioning seems to also act as a contributing factor insofar as the rate of challenging behavior in those with profound or multiple disabilities is substantially higher than the rate observed in milder disabilities (Poppes et al., 2010), and challenging behavior is observed at significantly higher rates among those diagnosed with intellectual disability (e.g., Hartley et al., 2008; Soke et al., 2018). Despite higher prevalence rates in both ASD and intellectual disability populations, the association between ASD and challenging behavior is not consistently mediated by lower cognitive or communication abilities. Although lower intellectual functioning has been identified as a risk factor for symptoms related to challenging behavior like irritability (e.g., Estes et al., 2007), individuals with ASD and average cognitive abilities present with challenging behavior as well (Kaat & Lecavalier, 2013). In one sample of 1609 autistic and neurotypical children, no significant differences were found between parent ratings of challenging behavior for autistic children and average cognition and those for autistic children and below average or impaired cognitive abilities (Mayes et al., 2012). Other recent large samples have not identified strong relationships between nonverbal or verbal cognitive abilities and challenging behaviors in ASD either (e.g., Kanne & Mazurek, 2011; Williams et al., 2018).

Taken together, the relations between co-occurring conditions and challenging behavior in ASD are likely complex and will benefit from ongoing study. Moreover, the presentation of challenging behavior within ASD is heterogeneous, ranging from mild challenging behaviors that have little impact on daily functioning to intense, treatment-resistant patterns of challenging behaviors. In the pursuit of individualized treatment for these challenging behaviors, researchers and clinicians must also consider the barriers and stressors the behaviors are placing on the individual and their communities.

Implications for the Individual and the Family

Challenging behavior can lead to serious negative consequences for the individual emitting that behavior, including the need for medical intervention (DiGuiseppi et al., 2018; Mandell, 2008). In a sample of 760 families with autistic children, more than 10% of the children had experienced hospitalization, with hospitalized youth more prone to engage in self-injurious or aggressive behavior (Mandell, 2008). Even higher rates of emergency room utilization have been observed for autistic adults (Iannuzzi et al., 2015). Identified risk factors associated with higher emergency room utilization include lower adaptive functioning, higher severity of ASD symptomology, and additional psychological diagnoses or sleep difficulties (e.g., Mandell, 2008; Righi et al., 2018). Though hospitalization is necessary in some contexts, barriers to accessing community-based behavioral health services appear to contribute to these rates (e.g., Kalb et al., 2012; Mandell, 2008).

Autistic individuals who engage in challenging behavior are commonly prescribed psychotropic medications as well (e.g., Esbensen et al., 2009; Mandell et al., 2008; Spencer et al., 2013). Studies conducted in large samples of publicly and privately insured children and adolescents in the U.S. suggest that more than half of autistic children are prescribed at least one psychotropic medication (Mandell et al., 2008; Schubart et al., 2014; Spencer et al., 2013). As individuals age, they are more likely to be prescribed multiple medications. Notably though, evidence of polypharmacy is observed in children under the age of 10 years, when empirical evidence of benefit is not as established in and beyond ASD (Spencer et al., 2013). These findings are concerning as data on long-term safety and clinical benefit is scarce.

Beyond healthcare utilization, the presence of challenging behavior can impact how one experiences and navigates their communities. Students with disabilities including ASD experience school suspension at a higher rate than peers without disabilities (Krezmien et al., 2006). Subsequently, autistic students who experience school disciplinary actions like detention and suspensions are at higher risk of experiencing hospitalization and police contact (Turcotte et al., 2018). In fact, an estimated 20% of autistic adolescents and adults have experienced some form of interaction with the police (Rava et al., 2017). Aggressive behaviors and

externalizing behaviors related to traits like argumentativeness increase the risk of such interactions occurring (Rava et al., 2017; Tint et al., 2017).

The strain of challenging behavior is also felt within families. Parents of autistic children experience higher levels of stress when compared with parents of children with other disabilities and parents of children without disabilities (e.g., Blacher & McIntyre, 2006; Estes et al., 2013). Furthermore, the presence of child challenging behaviors contributes to lower quality of life for their parents (Vasilopoulou & Nisbet, 2016) and greater family stress and dysfunction (e.g., Lecavalier et al., 2006; Sikora et al., 2013). Negative family experiences related to challenging behavior may exacerbate or foster additional challenging behaviors in the child, leading to a cycle of negative familial interactions that perpetuate challenging behavior (Karst & Van Hecke, 2012). When these interactions are interrupted—by way of interventions that decrease child challenging behavior while promoting psychoeducation via parent training—improvements in perceived parental competence may be observed within families with autistic children (e.g., Iadarola et al., 2018). The implications of challenging behavior extend beyond the individual to the family, requiring consideration for not only for how treatments support the individual but also those who care for them.

Theories on the Etiology of Challenging Behavior

A singular explanation that accounts for the differences in the rate of challenging behavior between ASD and neurotypical populations is unlikely. Although several prominent theories on the etiology of challenging behavior have been offered, with varying levels of research support, a full understanding of etiology of challenging behavior seems to require a multifactorial explanation. The leading models often consider challenging behavior as a product of environmental, biomedical, or psychiatric influences. Here, we focus on environmental and biomedical models.

Environmental Influences

The impact that the environment plays in the development of challenging behavior has been well documented in the research literature and underlies most common non-pharmacological interventions (Matson et al., 2011). The primary theory regarding environmental influences on challenging behavior explains behavior as a learned response developed through operant conditioning (Skinner, 1938). According to the operant learning model, behavior is a product of both the environmental stimuli that evoke it (i.e., antecedents) and the environmental stimuli that strengthen or reinforce it (i.e., its consequences). Thus, in any given context, should a behavior be followed by a rewarding outcome, that behavior is more likely to occur in that context or a similar context in the future (i.e., reinforcement). When a

behavior is not followed by a beneficial outcome (i.e., extinction) or an aversive outcome (i.e., punishment), that behavior is less likely to occur in the future.

Challenging behavior maintained by social functions or purposes may be the product of positive reinforcement, such as social attention or preferred toys and activities, or negative reinforcement, such as avoidance of an unpleasant work task. When challenging behavior is maintained by automatic reinforcement, the behavior produces its own beneficial consequence, such as pleasurable sensory stimulation or reduction of an aversive state or sensation. For autistic individuals, it is not uncommon for challenging behavior to be maintained by social attention (Love et al., 2009); more often though, challenging behavior exhibited by individuals with ASD functions to access preferred items or to escape demands (e.g., Hong et al., 2018; Hong & Matson, 2021). Research on stereotypy, which is regularly observed in autistic individuals and occasionally considered a challenging behavior, overwhelmingly points to an automatic function (DiGennaro Reed et al., 2012; Hong et al., 2018). An environmental account of challenging behavior is supported by an exceptionally large research literature documenting the effectiveness of treatments targeting the identified maintaining reinforcers for such behavior (Horner et al., 2002). Moreover, the majority of interventions that are deemed as evidence-based by large-scale reviews are directly based on an environmental account of behavior or involve treatment components targeting the function of challenging behavior (National Autism Center, 2015; Wong et al., 2015).

Biomedical Models

Unlike the operant learning account of challenging behavior, biomedical models consider biological factors as the cause or a primary contributor to challenging behavior. One biomedical explanation is that challenging behavior may attenuate unpleasant sensations associated with a medical condition. For example, Christensen et al. (2009) evaluated a young boy with ASD who exhibited self-injury and aggression and found that the self-injury was automatically maintained (i.e., nonsocial). It was also deduced that his behavior was correlated with bouts of constipation. When the boy was constipated, more challenging behavior was observed, and when he was not constipated, near-zero levels of challenging behavior occurred. It then seems possible that self-injurious behavior may have mitigated pain associated with constipation, and once constipation was treated, there was no longer motivation to engage in self-injury.

In a second biomedical account, certain medical conditions may serve as setting events that increase the likelihood that challenging behavior will occur. Setting events are distal factors that change an individual's threshold or tolerance for aversive environmental events and increase the likelihood that an individual will act on that event. To illustrate, an individual who is sleep-deprived is more likely to experience irritability and poor impulse control (Short & Louca, 2015; Bauducco et al., 2016), which in turn may lead to challenging behavior in the face of an unpleasant

event (e.g., a preferred item is restricted). Indeed, numerous studies have found an association between poor sleep and challenging behavior in individuals with ASD (e.g., Johnson et al., 2018; Sikora et al., 2012). Additional medical conditions—including otitis media (Luiselli et al., 2005; O'Reilly, 1997), the onset of menses (Carr et al., 2003), fatigue (Smith et al., 2016), and allergies (Kennedy & Meyer, 1996)—have been identified as setting events for challenging behavior in autistic individuals.

Furthermore, neurobiological explanations of challenging behavior in ASD have been suggested. In relation to self-injurious behavior, several studies have suggested that neurotransmitter dysregulation may be the cause. For example, Sandman (2009) proposed an "opiate hypothesis" for self-injury that suggests that for some individuals, engagement in self-injury results in the release of endogenous opiates and produces a euphoric feeling that essentially reinforces such behavior and increases the likelihood it will recur. A few studies have provided support for this hypothesis by showing decreased rates of self-injury in individuals prescribed naltrexone, an opioid antagonist (Roy et al., 2015; Sandman & Kemp, 2011). Conversely, double-blind placebo-controlled studies have found that only a small percentage of individuals taking naltrexone have shown significant improvement (Willemsen-Swinkels et al., 1995). Other theories related to neurotransmitter dysregulation have implicated serotonin (e.g., Kolevzon et al., 2014) and dopamine (e.g., Breese et al., 1995) as well, but these theories have garnered less research interest and support.

Mixed Model Considerations

There is considerable support for an environmental explanation of challenging behavior in ASD and intellectual disability populations, especially through the lens of the operant learning model. There is also notable evidence to support the contribution of genetic and biomedical conditions to the etiology of challenging behavior. It is unlikely that the etiology of all challenging behavior can be found in one model or theory. A comprehensive model that incorporates both environmental and organic etiological explanations will likely be most fruitful in understanding causation and therefore more effective in guiding treatment.

A comprehensive biobehavioral model of challenging behavior requires consideration of genetic-environmental interactions. Within a systematic review, Tunnicliffe and Oliver (2011) found that behaviors across various genetic syndromes appeared to be highly influenced by the environment as well as syndrome-specific topographical and functional patterns. For instance, individuals with Angelman and Smith-Magenis syndrome more often presented with challenging behavior that functioned to gain others' attention. Behavioral characteristics seen in other genetic conditions, such as impulsivity in Soto's syndrome, social anxiety in fragile X syndrome, and reduced pain perception in Smith-Magenis syndrome, appear to contribute to higher rates of challenging behavior with these conditions. These hypotheses provide avenues for future research to better understand these

interactions and to eventually build a comprehensive biobehavioral model that can be used in clinical practice.

Treatment for Challenging Behavior

The operant learning model contributes to most evidence-based treatment approaches for challenging behavior and has evolved largely through work with individuals with ASD or intellectual disability (e.g., Matson et al., 2011; O'Reilly et al., 2010). Function-based treatments develop from functional behavioral assessments (FBAs), which are methods and procedures used to understand the variables that reinforce or strengthen behavior. Early FBA methods emerged more than 50 years ago (Bijou et al., 1968; Lovaas et al., 1965), and research continues to explore—and healthily debate—procedural modifications to enhance assessment precision and efficiency (e.g., Beavers et al., 2013; Hanley et al., 2014; Retzlaff et al., 2020). FBAs often integrate indirect assessment, such as interviews, rating scales, or questionnaires that collect information on challenging behavior in the absence of observation, and experimental or functional analysis, or the systematic introduction and withdrawal of environmental events hypothesized to influence the occurrence of a target behavior (Hanley et al., 2003).

Treatment of challenging behavior has transitioned from focusing on consequence-based interventions to increased emphasis on preventative measures and skill building (e.g., Cooper et al., 2020; Luiselli, 2008). In recent research, antecedent and consequence-based interventions are rarely implemented in isolation; rather, they are implemented together to form treatment packages. For instance, parent training treatment packages for challenging behaviors in autistic children (e.g., Bearss et al., 2015) integrate psychoeducation on antecedent interventions while also teaching parents how to assess the function of their child's challenging behavior to establish consequence-based interventions. What follows is an overview of function-based treatment approaches to challenging behavior, with an emphasis on autistic individuals.

Antecedent Interventions

Antecedent interventions are modifications made to the environment to change or shape an individual's behavior, independent of the target behavior. Accordingly, results of FBAs suggest factors in the environment that can be altered to decrease the probability of the individual engaging in the challenging behavior. Examples of antecedent interventions include altering activities, materials, or schedules; preparing individuals in advance for upcoming events; and providing access to additional cues within the environment (Steinbrenner et al., 2020).

Antecedent interventions may be classified based upon whether an intervention modifies some component of an operant contingency that maintains the challenging behavior (e.g., Cooper et al., 2020). Offering choices in the context of non-preferred tasks is an example of a *contingency-independent antecedent intervention* shown to be effective. Studies have shown decreases in challenging behavior when the choice relates to the order in which tasks may be completed or the choice relates to how a particular task may be completed (e.g., completing a worksheet using a gel pen as opposed to a pencil), particularly when used to treat escape maintained challenging behavior (e.g., Rispoli et al., 2013; Romaniuk et al., 2002). Contingency-independent antecedent interventions are developed using information collected through an FBA but are implemented autonomously from consequence-based interventions. Noncontingent reinforcement—or delivery of stimuli with known reinforcing properties on schedules independent of the individual's behavior (e.g., Richman et al., 2015; Vollmer et al., 1993)—is also used to treat challenging behavior in populations with intellectual disability and ASD.

Contingency-dependent antecedent interventions derive effectiveness through differential consequences for target or alternative behaviors that occur with or without the antecedent present. In consideration of restricted and repetitive behaviors observed in ASD, contingency-dependent antecedent interventions can be used for distinguishing when these behaviors may influence functioning and when they may be harmless. For instance, Tiger et al. (2017) taught two autistic adolescents to discriminate the settings where item hoarding and repetitive item use was appropriate using clear cues. For the first adolescent, the presence of a specific toy car signaled that hoarding behaviors would be blocked. For the second adolescent, a wristband placed on his arm signaled that he could engage in repetitive sock flapping without disruption. Tiger et al. (2017) noted that the goal of the intervention was not to eliminate the target behavior or the access to the reinforcement; rather, the goal was to influence by way of a signal when and where a behavior may occur, potentially supporting some individuals by reducing disruptive impact of restricted and repetitive behaviors.

Consequence-Based Interventions

Consequence-based approaches to challenging behavior are focused on behavior change processes that follow the behaviors targeted for suppression or following alternative, more acceptable behaviors selected to replace the challenging behavior. Oftentimes, antecedent interventions are considered preventative in that they reduce the likelihood of challenging behavior by limiting the opportunity for an individual to emit the target behavior or altering the motivating operations such that an individual is less motivated to emit the target behavior. By contrast, consequence-based interventions may only be effective if the behavior targeted for reduction fails to produce reinforcement previously associated with it (i.e., extinction), results in an aversive outcome (i.e., punishment), or an alternative behavior that produces

reinforcement substitutes for the target behavior (i.e., reinforcement). Thus, consequence-based approaches for challenging behavior involve one or more of three behavior change processes: punishment, extinction, and/or reinforcement.

Punishment-Based Strategies

The term *punishment* can have negative connotations in general society, which may be linked to early treatment studies where objectionable applications of punishment, such as shock (Lovaas & Simmons, 1969) and water misting (Jenson et al., 1985), were used to treat challenging behavior in autistic individuals. However, the process of punishment simply refers to a reduction or suppression of a behavior due to a consequence produced by that behavior. Accordingly, while the consequences associated with punishment are generally considered aversive to the individual to which they are presented, the technical definition of punishment does not suggest that such consequences should be painful or cause harm or discomfort. Rather, ethical codes (American Psychological Association, 2017; Behavior Analyst Certification Board, 2014) explicitly prohibit acts that intentionally cause harm. Customary parenting strategies, such as time-outs or mild reprimands—when effective—are examples of punishment-based approaches with high acceptability.

Punishment-based techniques are rarely used in isolation and even more rarely are they the first treatment approach attempted. Unfortunately, not all challenging behavior can be treated sufficiently without the addition of a punishment-based treatment component. For example, Wacker et al. (1990) found that when a reinforcement-based treatment was implemented to treat hand biting in a young boy with ASD, it was only when time-out was added to the treatment package that the hand biting reduced to acceptable levels.

A continuum of punishment procedures, ranging from fairly unintrusive to highly intrusive strategies, have been used to treat a variety of challenging behaviors for individuals including those with ASD. Punishment techniques that may be considered mild but effective include reprimands (e.g., Dominguez et al., 2014), time-out from reinforcement (e.g., Donaldson & Vollmer, 2011), and positive practice (i.e., repeating an appropriate alternative behavior contingent on the target behavior; e.g., Peters & Thompson, 2013). Response cost (i.e., contingent removal of reinforcement), a mildly intrusive technique, and response blocking (i.e., physically intervening to prevent a response), a more intrusive procedure, have both been used regularly in the treatment of self-injurious behavior, especially when it is automatically maintained (Rooker et al., 2018). Repetitive behaviors observed in individuals with ASD can be addressed with treatment packages involving response blocking or the use of response interruption and redirection (RIRD; Ahearn et al., 2007). The latter approach, which involves disrupting a vocal or motor stereotypy with demands followed by redirection to appropriate behavior, has become perhaps the most common consequence-based treatment for stereotypies (Raulston et al., 2019).

Extinction-Based Strategies

Extinction procedures are often a necessary component in effective treatment of challenging behavior (Hagopian et al., 1998). Extinction procedures have the potential to weaken challenging behavior by withholding the reinforcer demonstrated to maintain that behavior. Because extinction entails withholding the reinforcer maintaining the behavior targeted for reduction, it is often easier to employ extinction procedures for behaviors that are maintained by social reinforcers than those that are automatically reinforced. For automatically maintained challenging behaviors, it may be difficult to determine the reinforcing aspects of the target behaviors and nearly impossible to withhold the reinforcers maintaining them. Given these barriers, several studies have shown that by systematically applying apparatuses (e.g., padding) that block or reduce the potential sensory reinforcement of a particular automatically maintained challenging behavior, the reinforcing aspect of the behavior may be identified and effective treatment may then be developed (e.g., Moore et al., 2004).

The use of extinction, particularly in isolation, should be avoided in some cases due to negative side effects. Occasionally, the application of extinction procedures produces an immediate increase in the response rate of the behavior targeted for extinction (Lattal et al., 2013). Additionally, when previously reinforced behaviors no longer produce reinforcement, novel or topographically dissimilar behaviors may result. The resulting response variability may include adaptive behaviors (e.g., Lalli et al., 1994) or may result in other maladaptive behaviors (Lerman et al., 2003). Research has shown that incorporating other treatment components, such as differential reinforcement, may reduce the likelihood of negative side effects related to extinction (e.g., Piazza et al., 2003).

Reinforcement-Based Strategies

Punishment-based approaches to treating challenging behavior dominated the research literature until the 1980s (Lydon et al., 2015a, 2015b), but a substantial decrease in studies utilizing punishment and a concomitant increase in studies utilizing reinforcement-based approaches has been observed since the advent of functional analysis methodologies (i.e., Iwata et al., 1994). The ability to precisely identify the maintaining reinforcers of challenging behavior has allowed clinicians and researchers to teach individuals with challenging behavior to use more appropriate alternative behaviors to obtain the reinforcers maintaining their challenging behaviors and place the challenging behaviors on extinction, often without the need for punishment procedures. The application of reinforcement procedures to nontargeted behaviors is referred to as *differential reinforcement.* Although differential reinforcement is often used in conjunction with extinction of the target behavior, it can also be implemented without extinction (i.e., the target behavior also contacts the reinforcer). The goal is generally to strengthen behaviors other than the behavior targeted for reduction so as to increase more acceptable behaviors that may either be

incompatible with the targeted behavior or may provide the same functional outcome and thus compete with the target behavior. Differential reinforcement procedures may be applied to alternative behaviors (DRA), other or nontargeted behaviors (DRO), incompatible behaviors (DRI), and behaviors with more desirable properties, such as lower frequency responding (e.g., differential reinforcement of low rate responding or DRL).

Functional communication training (FCT) employs a DRA or differential reinforcement of communication (DRC) approach. Like other differential reinforcement approaches, FCT first requires identification of the reinforcer(s) maintaining the challenging behavior. A suitable communication response is then programmed for reinforcement while the challenging behavior is placed on extinction. Demonstrations of FCT have shown that when the communicative response is on a dense schedule of reinforcement, rapid reductions in challenging behavior and increases in communication occur (e.g., Wacker et al., 2011); however, to ensure that FCT is practical and results in long-term positive effects, strategies for schedule thinning are required (Hagopian et al., 2011). Perhaps due to communication deficits and challenging behavior occurring often in ASD, FCT has become one of the most common and effective approaches to treating challenging behavior in autistic individuals (e.g., Lindgren et al., 2020; Steinbrenner et al., 2020). A recent review synthesized the FCT literature and extended demonstration of the effectiveness of FCT using What Works Clearinghouse standards for intellectual disability and other educational disability categories (i.e., other health impairment, multiple disabilities; Gerow et al., 2018).

Extensions of Function-Based Treatment: Cognitive-Behavioral Therapy

Although most studies evaluating treatments for challenging behavior incorporate external change agents to manipulate the response-reinforcer contingencies, treatment can also target acquisition of self-management skills that may assist in the prevention of challenging behavior. Self-management skills in the form of cognitive-behavioral interventions have their strongest applications in the treatment of anxiety within ASD, with effects on challenging behaviors most often targeted as a secondary effect. Comorbid anxiety occurs at high rates in ASD (e.g., Salazar et al., 2015) but does not exist in isolation of challenging behavior. To illustrate, the experience of heightened anxiety in ASD is associated with increased reporting of aggressive behaviors (e.g., Gotham et al., 2013).

Cognitive-behavioral interventions are based on the understanding that learning and behavior are mediated by cognitive processes (Steinbrenner et al., 2020) and have been identified as a well-established treatment for adolescents and adults in the general population (Higa-McMillan et al., 2016). One of the proposed benefits of this approach is the broad generalization of strategies across settings and applications to covert thoughts, feelings, and behaviors (Singh et al., 2011). Although most cognitive-behavioral approaches focus on decreases in clinician-, self-, or parent-reported symptoms of anxiety, changes in parent-perceived challenging behavior

have been noted as well (e.g., Storch et al., 2015). Other approaches have specifically targeted decreases in child aggressive behaviors by, for instance, supporting the use of mindfulness approaches with children (e.g., Singh et al., 2011) and their parents (e.g., Singh et al., 2014).

Most of these approaches have targeted symptoms of anxiety through forms of cognitive-behavioral therapy adapted for use specifically with autistic individuals (e.g., Reaven et al., 2012; White et al., 2013; Wood et al., 2020). For example, the Behavioral Interventions for Anxiety in Children with Autism (BIACA) program incorporates parental engagement, integration of restricted or strong interests of the individual receiving treatment, reinforcement contingencies related to behaviors targeted for increase, and antecedent and consequence-based interventions to reduce the impact of challenging behavior on the primary targeted outcome of decreased anxiety (Wood et al., 2020). A recent meta-analysis indicates that cognitive-behavioral therapy shows benefit for autistic individuals who possess average to above average cognitive abilities, and these results appear to be moderated by parental involvement and longer treatment duration (Perihan et al., 2020). Future study in this area will benefit from continued exploration of aspects of cognitive-behavioral interventions and behavior interventions best suited for individuals with anxiety and more significant cognitive impairments (e.g., Lydon et al., 2015a, 2015b) but also improved identification of anxiety symptoms in individuals who may not readily verbalize these symptoms.

Psychopharmacological Treatments

While many children with ASD receive some form of behavior therapy, there remains a large number who are treated solely with medication or a combination of medication and behavior therapy (e.g., Mandell et al., 2008; Schubart et al., 2014; Spencer et al., 2013; Xu et al., 2019). Among the most frequently prescribed medications for autistic individuals are those falling within the antipsychotic, stimulant, and antidepressant drug classes (Jobski et al., 2017). Given that many individuals with ASD are dually diagnosed (Simonoff et al., 2008), it is not surprising that a wide range of psychotropic medications are commonly prescribed. At present though, only two medications have received FDA approval for treatment of core ASD symptoms, and both target irritability (Hyman et al., 2020). Both approved medications—aripiprazole and risperidone—are atypical antipsychotics that have been shown to reduce irritability in autistic individuals according to large randomized controlled trials (e.g., Marcus et al., 2009; McCracken et al., 2002; Owen et al., 2009). Despite approval, both medications are associated with potentially severe side effects (Cohen et al., 2013), which should give medical providers pause when considering their use.

When medication is considered in clinically appropriate cases, research indicates compounded benefit for medication combined with behavior therapy. Parents reported greater decreases in irritability and noncompliance in children who received risperidone—or aripiprazole as needed in cases in which risperidone was

ineffective—in conjunction with parent training in a 24-week clinical trial than in those who received medication alone in one randomized control trial (Aman et al., 2009). Further, these findings were observed at a 14% lower dosage of risperidone in the sample who received medication and parent training than the sample who received medication only. While behavioral treatments remain the most popular form of treatment for challenging behavior in ASD (Xu et al., 2019), it seems likely that medication will continue to be a primary treatment option for challenging behavior for the foreseeable future.

Conclusion

Empirical study of challenging behavior and ASD have long been intertwined, as evidenced by seminal articles in both behavior analytic treatment of challenging behavior in autistic children (e.g., Lovaas et al., 1965) and conceptualization of ASD as a psychological diagnosis (e.g., Kanner, 1943). As understanding in both areas evolves over time, we hope that increasing attention will be devoted to heterogeneity at the intersection of challenging behavior and ASD. Treatment informed by the operant model is currently at the forefront of the effort to address challenging behavior in ASD and will presumably remain at the forefront indefinitely. However, shifts to incorporate more preventative measures and skill building has arguably shaped the development of function-based treatments but also allowed for integration of complementary approaches, including psychopharmacology and cognitive-behavioral interventions. Continued investigation of the factors underlying challenging behavior—ranging from environmental contingencies to biomedical conditions to covert thoughts and feelings—will promote the development of more comprehensive, individualized treatment packages, providing hope for those who have not benefitted from a one-size-fits-all model.

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