Other Disorders Frequently Comorbid with Autism

4

Marie Nebel-Schwalm and Julie Worley

Introduction

A diagnosis of an autism spectrum disorder (ASD) carries with it developmental impairments that are the major focus of treatment; therefore, it is not difficult to understand why rates of comorbid conditions are often underestimated and overlooked (Moseley et al. 2011). When they are assessed, some of the more commonly reported co-occurring disorders include intellectual disability (ID), anxiety (e.g., phobias, obsessive-compulsive disorder—OCD, panic disorder), mood (depressive disorders, bipolar disorder), attention-deficit/hyperactivity disorder (ADHD), and disruptive behavior disorders (Abdallah et al. 2011; Lord and Jones 2012; Matson and Nebel-Schwalm 2007; Mazzone et al. 2012).

The ability to accurately assess comorbid conditions among individuals with ASD can be difficult for several reasons. Individuals on this spectrum may display cognitive deficits and these include verbal abilities in general and emotional expression in particular (Stewart et al. 2006). Further, some symptoms of ASD are nonspecific to this disorder, which creates a challenge for the clinician. For example, in depression, symptoms such as poor eye contact, restricted affect, monotonous voice, and lethargy are often observed, but these can and do occur in ASD without the presence of depression (Ghaziuddin and Zafar 2008). Therefore, efforts to clarify the prevalence and features of comorbid disorders represent an important step toward more accurate assessment and treatment planning. In the following sections, we will consider general comorbidity rates and examine commonly reported comorbid conditions. Some of these categories have been renamed in the *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (DSM-5; American Psychiatric Association 2013); therefore, specific updates are noted in these instances. The information presented here emphasizes psychological and psychiatric disorders; however, medical conditions are also discussed where relevant.

General Comorbidity Prevalence Rates

Comorbidity rates across various psychological disorders among children and adolescents with autism range from approximately 40 (Moseley et al. 2011) to 70% (Brereton et al. 2006; Simonoff et al. 2008). These studies reveal an inverse relationship between the ages of participants and comorbidity levels. A similar comorbidity pattern is seen in those with high-functioning autism and Asperger syndrome. As one illustration, Mattila et al. (2010) found higher rates of comorbidity in the younger cohort (ages 7–12 years) from a community-based sample as

M. Nebel-Schwalm (✉)
Department of Psychology, Illinois Wesleyan University, P.O. Box 2900, Bloomington, IL 61702–2900, USA
e-mail: mnebelsc@iwu.edu

J. Worley
Center for Autism Research at the Children's Hospital of Philadelphia, Philadelphia, PA, USA

T. E. Davis III et al. (eds.), *Handbook of Autism and Anxiety,* Autism and Child Psychopathology Series,
DOI 10.1007/978-3-319-06796-4_4,

compared to an older, clinic-based cohort (ages 13–16 years).

Individuals with ASD yielded higher rates of comorbidity when compared with those with ID (Brereton et al. 2006), and those with ASD had higher rates when compared with a clinical comparison group matched on age and gender (Joshi et al. 2010). In the latter study, the ASD group had higher rates of encopresis, language disorders, and anxiety disorders, but lower rates of substance use disorders (Joshi et al. 2010).

In studies of adults with ASD, but not ID, comorbidity rates ranged from 63 to 80% (Ryden and Bejerot 2008; Ghaziuddin and Zafar 2008, respectively). Common comorbidities reported in both studies were major depressive disorder (MDD), social anxiety disorder (SAD), OCD, and ADHD. Generalized anxiety disorder (GAD; Ghaziuddin and Zafar 2008) and panic disorder (Ryden and Bejerot 2008) were also reported.

Comorbidity rates in adults with ASD and ID range from 40 to 56% (Lunsky et al. 2009; Melville et al. 2008; Tsakanikos et al. 2011). The differences in rates may be due to various sample settings (i.e., population-, community-, clinic-, and hospital-based), type of informant (i.e., caregiver, clinician, or both), and breadth of disorders being assessed.

As previously noted, comorbidity rates appear to be lower in older samples of children and adolescents. A simple explanation is that younger children experience higher rates of comorbidity when compared with older children and adolescents. However, others have pointed out that older adolescents and adults have had more time to learn how to cope with their symptoms, receive interventions, and are more likely to take psychotropic medication for comorbid issues, thus keeping these symptoms in check (Melville et al. 2008). A final consideration is that the developmental heterogeneity among younger children and adolescents, as compared to adults, reflects a more varied symptom presentation which can hamper accurate diagnoses. Thus, with older individuals, clinicians may be better able to discern and identify patterns of co-occurring disorders, but in younger samples, these diagnoses may be premature, provisional, less accurate, and more likely to change. However, once symptoms have been assessed, we have some evidence that they do persist over time. For example, according to a study of 12-year-olds with ASD, symptoms of comorbidity persisted 4 years later despite predictions that they would decline (Simonoff et al. 2013).

Intellectual Disability

ID (formerly referred to as mental retardation) is frequently concomitant with ASD. When considering the autism spectrum as a whole, epidemiological rates of ID comorbid with ASD range from 51 to 55% (Centers for Disease Control 2009; Charman et al. 2011), but when considering only the more severe disorders on the autism spectrum (i.e., autistic disorder), rates have been reported to be as high as 75% (Chakrabarti and Fombonne 2005; Lainhart 1999). With the publication of the *DSM-5* and the merging of the ASD into one-dimensional category (APA 2013), rates capturing the spectrum as a whole are more useful and follow in line with clinical practice.

While rates of ID comorbid with ASD are high, indicating both low intellectual and adaptive functioning, average or above-average intellectual functioning has also been reported, albeit a smaller percentage (Charman et al. 2011). Nonetheless, children with ASD most often have below-average adaptive skills, despite their level of cognitive functioning (Bölte and Poustka 2002; Charman et al. 2011; Kanne et al. 2011). Kanne et al. (2011) examined adaptive skills in children diagnosed with ASD and the relationship of these skills with ASD symptom severity. The mean adaptive scores for children and adolescents with ASD were low across all domains (i.e., socialization, communication, and daily living skills); no significant associations emerged between observations of ASD symptom severity and adaptive functioning. Thus, these results help to highlight that even though symptoms of ASD are quite heterogeneous, individuals with ASD often perform significantly below their age level with regard to adaptive functioning skills.

Although ID and ASD are frequently comorbid, differential diagnosis remains difficult for young children and individuals who are low functioning (de Bildt et al. 2004; see Chap. 3).

Behavioral overlap between the disorders makes the distinction difficult, and this overlap is most evident in the areas of social and communication impairments, which are core diagnostic criteria of ASD and are also skills indicative of adaptive functioning. However, research has shown that standardized measures of ASD can be useful in identifying ASD symptomatology in those diagnosed with ID or other developmental delays (de Bildt et al. 2004; Trillingsgaard et al. 2005).

Even though it can be difficult to assess for the presence of ID within ASD (or vice versa), it remains important to do so for a number of reasons. First, a comorbid diagnosis may have additive effects on functioning, resulting in greater impairment (Ben Itzchak et al. 2008; Matson et al. 2009). Second, high rates of ID comorbid with ASD may impress the need to assess for additional comorbidities. For example, epilepsy has been one of the most frequently reported co-occurring medical conditions in individuals diagnosed with ASD. While it is common in ASD, the probability of developing epilepsy increases for those diagnosed with both ASD and ID (Tuchman and Rapin 2002). As another example, challenging behaviors are often concomitant with ASD and emerge at a relatively young age (Fodstad et al. 2012), and individuals with ASD typically engage in more than one problem behavior (Emerson 2001; Murphy et al. 2009). Again, there is an increased risk of problem behaviors for individuals diagnosed with both ID and ASD (Murphy et al. 2009). Unfortunately, research shows that the additive effects of comorbid ID and ASD diagnoses lead to a poorer prognosis compared to individuals with an ASD diagnosis alone (Shattuck et al. 2007). Therefore, the high prevalence rates of ID comorbid with ASD highlight the need to accurately assess for the presence of ID in this population and will aid in selecting appropriate interventions.

Attention-Deficit/Hyperactivity Disorder

Among the most debated issues in ASD, as defined in the *Diagnostic and Statistical Manual of Mental Disorders (4th Edition, Text Revision; DSM-IV-TR*), was the exclusion of a comorbid diagnosis of ADHD (American Psychiatric Association 2000). The debate was whether symptoms of ADHD were part of the ASD diathesis (Mayes, Calhoun, Mayes, & Molitoris 2012b) or a co-occurring disorder (Frazier et al. 2001; Goldstein and Schwebach 2004; Yoshida and Uchiyama 2004). Rates of ADHD within the ASD population have been assessed and are reported to range widely from about 17 to 83 % (Frazier et al. 2001; Hanson et al. 2012; Hartley and Sikora 2009; Lee and Ousley 2006; Leyfer et al. 2006; Yoshida and Uchiyama 2004), with some suggesting that ADHD is the most common comorbid disorder of ASD (Kaat et al. 2013). Thus, it is not surprising that the *DSM-5* now allows clinicians to diagnose ADHD as a comorbid condition (APA 2013).

Despite the *DSM-IV-TR* embargo on the dual diagnosis of ASD and ADHD, researchers continued to investigate overlapping features of the two disorders by comparing scores on measures assessing for symptoms of ASD and ADHD across groups. Results suggest that children diagnosed with ASD have more symptoms of ADHD compared to typically developing children and, conversely, that children diagnosed with ADHD have more symptoms of ASD compared to typically developing children (Hattori et al. 2006). While there is some overlapping phenotypic expression as noted above, differences also exist. Hartley and Sikora (2009) conducted a study to determine which symptoms of ASD distinguished between individuals diagnosed with ASD, ADHD, and anxiety disorders. Based on parental reports during a semi-structured interview, individuals with ASD had greater impairment in nonverbal behaviors, development of friendships, repetitive and idiosyncratic language, and make-believe/imaginative play compared to those with ADHD. However, there were no differences between symptoms of seeking to share enjoyment with others, restricted interests, adherences to nonfunctional routines, stereotyped motor mannerisms, and preoccupation with parts of objects. Thus, similar to other findings, symptoms within the restricted interests and repetitive behavior domain did not differ between children diagnosed with ADHD and children diagnosed with ASD.

Given these similarities, there is a concern regarding accurate phenotyping of these disorders. Different diagnostic methods have been employed across studies, and in some cases this results in a heterogeneous group of children that may include some false-positive ASD diagnoses. Hanson et al. (2012) utilized the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000) and Autism Diagnostic Interview-Revised (ADI-R; Lord et al. 1994) to confirm ASD diagnoses and the Child Behavior Checklist (Achenbach and Rufle 2000) and the Teacher Report Form (Achenbach 1991) to measure ADHD symptoms. ADHD symptoms were much lower in this study compared to other studies, with approximately 17% of the children having clinically elevated scores per parent report and just under 3% with elevated scores according to parent and teacher report. However, the latter low rate may be due in part to lack of agreement among parents and teachers, rather than a lower incidence of clinically significant ADHD symptoms per se. In contrast to the aforementioned results of Mayes et al. (2012b), Hanson and colleagues found support for the notion that ADHD and ASD are distinct disorders and that ADHD can be diagnosed as a comorbid disorder.

Many researchers agree that ASD symptomology can be distinguished from that of ADHD (Frazier et al. 2001; Hanson et al. 2012) and that the phenotypic expression of ADHD is similar in children with and without ASD (Frazier et al. 2001). Accurate assessment is imperative because children diagnosed with ASD, who also have significant symptoms of ADHD, have also been found to have greater impairment in their executive functioning and adaptive skills, worse autism symptomatology, and more maladaptive behaviors compared to children with ASD and no ADHD (Yerys et al. 2009). Identifying these symptoms will enable a child to receive appropriate treatment designed to target symptoms of ADHD, which may then increase the effectiveness of treatments designed to target core deficits associated with the ASD diagnosis (Yoshida and Uchiyama 2004).

Oppositional Defiant Disorder and Conduct Disorder

In the *DSM-5,* oppositional defiant disorder (ODD) and conduct disorder (CD) have been grouped together in "Disruptive, Impulse-Control, and Conduct Disorders," (APA 2013). Because many studies discuss both disorders together we will report on evidence regarding both ODD and CD in this section. Some researchers have reported equal rates of ODD in typically developing children and children diagnosed with ASD (Gadow et al. 2008), while others have reported significantly higher rates in children diagnosed with ASD (Mayes et al. 2012a). The percentage of children diagnosed with ASD, who meet diagnostic criteria for ODD, has been reported to be as high as 20–40% (Gadow et al. 2004; Mayes et al. 2012a). De Bruin et al. (2007) found that symptoms associated with disruptive behavior disorders (i.e., ADHD, ODD, and CD) were the most frequently endorsed symptoms in individuals with ASD when compared to symptoms of other psychiatric disorders.

While researchers have supported the ability to diagnose ODD in children with ASD (Gadow et al. 2008), it is important that problem behaviors (e.g., verbal and physical aggression), which are frequently concomitant with ASD, are not considered diagnostic of ODD or CD in isolation of other symptomatology. Mayes et al. (2012a) examined aggressive, oppositional, and explosive behaviors in children with ASD compared to typically developing children and five psychiatric control groups (i.e., children with ADHD-combined type, ADHD-inattentive type, depression, anxiety disorder, and acquired brain injury). Children diagnosed with ASD exhibited significantly more behaviors across all three disruptive behavioral categories compared to typically developing children, and comparable rates were reported between children with ASD and children with depression. Explosive and oppositional behaviors were reported for >67% of children with ASD; however, rates of aggressive behaviors were significantly lower at 17%. Thus, rates of ODD symptoms are high, despite lower rates

of aggressive behavior, suggesting that children are not being captured under CD/ODD solely because they exhibit problem behaviors.

In another study, Guttmann-Steinmetz et al. (2009) compared symptoms of ODD and CD across five groups of boys including typically developing children, ADHD only, ASD only, ASD and ADHD, and chronic multiple tic disorder and ADHD. First, very few differences in CD symptomatology emerged across groups; however, this can be attributed to an overall low endorsement of these symptoms. Regarding ODD, according to both teacher and parent reports, symptoms were more prevalent in boys diagnosed with ASD compared to typically developing controls. Boys with both ASD and ADHD exhibited more symptoms of ODD compared to those with ASD only. Lastly, while parent report indicated no significant differences between boys with ASD and ADHD and those with ADHD only or chronic multiple tic disorder and ADHD, teachers reported more symptoms of ODD for boys with ASD and ADHD. While research to date has shown that some children with ASD also exhibit a pattern of symptoms consistent with a diagnosis of ODD, less research has been conducted on this topic compared to the comorbidity of other psychiatric disorders with ASD. Further research is needed to fully understand this relationship.

Tic Disorders

The primary tic disorders in *DSM-5* include Tourette's disorder, persistent (chronic) motor or vocal tic disorder, and provisional tic disorder (APA 2013). Tourette's disorder is the combination of motor and vocal tics persisting beyond 1 year, whereas persistent tic disorder is a single modality tic (either motor or vocal, but not both). Provisional tic disorder includes motor and/or vocal tics that have not been present for >1 year. Rates of tic disorders among those with ASD range from 8.1 (Baron-Cohen et al. 1999) to 22 % (Canitano and Vivanti 2007). Baron-Cohen et al. (1999) suggested their rate was likely an underestimate, given their small sample of 37 participants and because the participants were from a special school rather than a clinic. Higher estimates were reported in the following study that utilized parent and teacher ratings, rather than clinical interview. According to parental report, preschool-aged children had lower rates of tic symptoms when compared with older children (25 and 60 %, respectively; Gadow and DeVincent 2005). Parent ratings of tics did not distinguish between different subtypes of ASD (e.g., autism, Asperger syndrome, or pervasive developmental disorder not otherwise specified—PDD-NOS); however, teacher ratings of preschoolers yielded higher rates of tics for children with autism as compared to those with Asperger syndrome or PDD-NOS (61 %, 36 %, and 33 %, respectively).

Much is unknown about the etiology of tics and their relationship to ASD, but researchers have proposed a common underlying neural circuitry for tics, stereotypies, self-injurious behaviors, and compulsive behaviors (Muehlmann and Lewis 2012). Differentiating between tics and stereotypies requires careful observation and assessment. Some important features to note are the age of onset, whether they can be suppressed, and how the movements are perceived by the individual (Freeman et al. 2010; Gilbert 2006). Tics typically emerge after 3 years of age (average age of onset is 5–7 years, p. 80; APA 2013), are nonrhythmic, can be suppressed with purposeful and voluntary movements, and they are usually not viewed favorably by the individual. By contrast, stereotypies usually begin before 3 years of age, are rhythmic, can break through voluntary movements when the individual is overwhelmed or excited (Gilbert 2006), are more likely to be viewed positively, and may occur while the individual is daydreaming or recalling a favorite movie scene or video game (Freeman et al. 2010). Of course, it is possible for the individual to present with both stereotypies and tics (e.g., Ringman and Jankovic 2000).

Tics can be very disturbing to older adolescents and adults who are aware of how they are being perceived by others. Clinicians warn against raising false hope for treatment of tic disorders and caution that, at best, 25–50 % of them

will be successfully suppressed with medication (Gilbert 2006). Therefore, psychoeducation is an important component in treatment in order to set realistic expectations.

Sleep Disorders

Primary sleep disorders in the *DSM-5* include dyssomnias (i.e., insomnia, hypersomnia, narcolepsy, breathing-related sleep disorder, and circadian rhythm sleep disorder) and parasomnias (i.e., nightmares, sleep terrors, and sleepwalking disorders). Most of the studies presented in this section report on aspects of insomnia, including delayed sleep latency, night wakings, decreased sleep efficiency, and daytime sleepiness (APA 2013). Sleep disturbances in children with ASD have been well-documented and are consistently reported to be higher than in their typically developing peers (e.g., Krakowiak et al. 2008; Park et al. 2012; Sounders et al. 2009) and even higher than in developmentally delayed individuals (Krakowiak et al. 2008). In a population-based study of 2–5-year-olds, 53% of children with ASD, 46% of those with a developmental disability, and 32% of typically developing children reported sleep problems (Krakowiak et al. 2008). Sounders et al. (2009) found a similar pattern of sleep problems with 4–10-year-olds using actigraphy (a wristwatch-like monitor of movement). The majority of children with an ASD (67%) had sleep problems as compared to typically developing children (47%). In an older sample whose age range was 4–15 years, rates of sleep problems were 47 and 20% among those with an ASD and typically developing children, respectively (Park et al. 2012). A breakdown by diagnostic status revealed that 75% of children with autism and Asperger syndrome had a sleep disturbance as compared to 52.4% of those with PDD-NOS (Sounders et al. 2009). Overall, percentages of those on the autism spectrum with sleep problems typically range from 50 to 80% (Richdale and Schreck 2009; Williams et al. 2004) and the pervasiveness of sleep problems has caused some to consider it part of the autism symptom complex (Mayes and Calhoun 2009).

Reliable assessment is an important part of diagnosing sleep disorders. The accuracy of parent reports of sleep problems is largely supported by objective measures such as actigraphy and polysomnography, but underestimations have been noted. For example, in one study with 59 children, parents reported sleep duration to be 9.8 hours on average as compared to an average of 7.8 hours according to the actigraphy results (Sounders et al. 2009). Even among adults with ASD who do not complain of sleep problems, laboratory measures (i.e., polysomnography) have documented qualitative sleep deficits (Limoges et al. 2013). A study on adolescents and young adults (ages 15–25 years) found that actigraphy results reported more sleep problems when compared with parent or caretaker report (Oyane and Bjorvatn 2005), suggesting that underreporting may be more a function of adaptation to sleep problems than an accurate portrayal of symptoms. This highlights the need for clinicians to carefully assess the quality of sleep even if the individual (or caretaker) is not spontaneously reporting difficulties.

Once identified, sleep problems have been shown to persist, although they may change with development (Goldman et al. 2012). Younger children are more likely to have difficulties with bedtime resistance (e.g., intense tantrums), sleep anxiety, and night wakings (Krakowiak et al. 2008; Goldman et al. 2012), whereas older children have more problems with falling sleep and daytime sleepiness (Goldman et al. 2012). Adults on the spectrum suffer from delayed sleep latency, daytime sleepiness, and frequent night wakings (Matson et al. 2008). When comparing adults who have comorbid ASD and ID with adults who have ID only, 45% of those in the former group had sleep problems as compared to 14% in the latter group.

The impact of poor sleep in children with an ASD on parents has been noted, particularly the adverse effects of children's sleep problems on maternal well-being (Park et al. 2012). Hodge et al. (2013) found that mothers of children with ASD reported more sleep problems for their children and themselves and parenting stress than mothers of typically developing children, and

children's sleep problems were significantly correlated with maternal mental health. It follows, therefore, that the accurate assessment and treatment of sleep problems and sleep disorders has benefits beyond the targeted client and may reduce parental stress.

Feeding Disorders

Feeding disorders are not exclusive to children diagnosed with ASD; however, they tend to be reported at higher rates compared to typically developing children (TDC), with rates reported as high as 67–75 % (Martins et al. 2008; Schreck et al. 2004). Although symptoms related to feeding disorders are not inherent to the diagnostic definition of ASD, some researchers (e.g., Ahearn et al. 2001; Martins et al. 2008) have attempted to subsume feeding difficulties under the *DSM-IV-TR* diagnostic criterion for ASD (APA 2000). A new diagnostic criterion has been added to the *DSM-5* definition of ASD, hypersensitivity or hyposensitivity to sensory stimuli, which may capture feeding difficulties related to food texture or type sensitivities (APA 2013).

While children with ASD exhibit various feeding difficulties (e.g., low food acceptance, food selectivity), relatively few studies have included a control group of typically developing children for comparison (e.g., Ahearn et al. 2001). Schreck et al. (2004) conducted one of the first studies that included a control group of typically developing children, and results indicate that parents of children with ASD reported significantly more feeding problems compared to the reports of parents of children who were typically developing. Almost 75 % of children with ASD were reported to have a restricted diet, and they were more likely to refuse food, require specific utensils while eating, and to only accept foods that were prepared at a lower texture (i.e., pureed food).

Many potential explanations for the high comorbidity between ASD and feeding problems have been proposed. For example, feeding problems can be a manifestation of ASD diagnostic criteria (Ahearn et al. 2001; Martins et al. 2008), be related to family eating habits (Martins et al. 2008; Schreck and Williams 2006), stem from aversions to different sensory stimuli (Martins et al. 2008), or develop from oral-motor difficulties or medical problems such as reflux, eosinophilic esophagitis, or dysphagia (Manikam and Perman 2000; Nadon et al. 2011). Aside from the etiological theories, parents often respond in a way that perpetuates mealtime problem behavior through reinforcement (e.g., coaxing their children to take a bite, removing unwanted food from the child's plate; Borrero et al. 2010) and by exhibiting emotional reactions to problems during mealtimes (Martins et al. 2008).

Some researchers have looked at the potential environmental influences on the child's mealtime behaviors. For example, Nadon et al. (2011) utilized a comparison group comprised of typically developing siblings in an effort to control for environmental factors on problematic eating behaviors. Results indicated that children with ASD as a group had significantly more mealtime problems compared to the group of typically developing siblings, with food selectivity being the most commonly reported problem. Other mealtime problems rated as significantly worse compared to their siblings included staying in their seat during mealtimes, eating at the family table, eating an adequate number of meals, tolerating novel foods on their plate, refusing previously accepted foods, refusal to try novel foods, texture selectivity, and temperature selectivity. Thus, results suggested no significant familial impact on feeding problems.

With regard to potential medical causes, feeding difficulties may emerge and serve as an indicator of underlying gastrointestinal (GI) problems or disorders such as reflux, aspiration, or dysphagia (Manikam and Perman 2000). GI problems have been reported in a high number of children with ASD (Horvath and Perman 2002; Kuddo and Nelson 2003), and they have the potential to cause mealtime problems, which may result in conflict between parent and child. For example, reflux may lead to vomiting or gagging, and in an effort to avoid these consequences, children may begin to refuse food. Mealtime problem behaviors exacerbate following continued efforts (e.g.,

coaxing) by parents to get their child to accept food (Manikam and Perman 2000). This highlights the fact that medical factors should be assessed prior to initiating treatment of food refusal or selectivity.

The impact of feeding disorders can be substantial. They often emerge at a very young age, frequently when transitioning from pureed to higher textured foods, and can continue without sufficient intervention (Williams et al. 2005). Researchers have reported that many children with ASD will not eat outside of their home environment (e.g., at school), which can be stressful for parents and present nutritional concerns (Nadon et al. 2011). Families often have to make multiple meals in an effort to satisfy the nutritional needs of the family while satisfying the selective requests of the child (Nadon et al. 2011). Thus, intervention is not only beneficial for the child but also for the family unit as a whole.

Elimination Disorders

Self-care skills are critical when considering quality of life issues, and among these, toileting skills rank very high. Thus, comorbid elimination disorders can present significant barriers to quality of life for individuals and their caretakers (Rinald and Mirenda 2012). Elimination disorders in the *DSM-5* form their own category and include enuresis, encopresis, other specified elimination disorder and unspecified elimination disorder (APA 2013). In a medical clinic-based study of children and adolescents in general, prevalence estimates for enuresis (nocturnal, diurnal, or both) was 10.5% and encopresis (with or without constipation) was 4.4% (Loening-Baucke 2007). This is comparable to the rates cited in the *DSM-IV-TR* and *DSM-5* for enuresis (5–10% among 5-year-olds with lower rates for older children) and higher than the rate of 1% for encopresis (APA 2000, 2013). When comparing children with ASD with typically developing children, in one study, 18.4% of those with ASD and 2.5% of those without ASD had enuresis (van Tongerloo et al. 2012). Among encopretic individuals in general, it is estimated that 80% or more have constipation (also called retentive subtype); however, some argue that the subtype without accompanying constipation (called nonretentive) is more common among those with ASD (Radford and Anderson 2003). Although both subtypes of voiding can be involuntary or intentional, nonretentive encopresis may more often be associated with oppositionality (APA 2013). Successful toileting requires many skills such as proper bodily sensory perception, fine motor skills, communication skills, social awareness, and complex behavioral sequencing. For individuals with ASD, each of these areas can present a significant challenge (Radford and Anderson 2003). In addition to these, fear, anxiety, and pain may contribute to difficulties in obtaining appropriate toileting skills (Dalrymple and Ruble 1992; Radford and Anderson 2003). Some have noted that given the myriad requirements needed for these skills, it is a wonder that more individuals do not have problems (Radford and Anderson 2003). Among individuals with ASD, greater verbal impairments and lower cognitive abilities were correlated with later age of onset of toilet training and longer length of time needed for successful completion (Dalrymple and Ruble 1992). The average duration of urine training (1.6 years) and bowel training (2.1 years) for these individuals extended for such a long period of time that researchers suggested parents wait until 4 years of age to begin urine training and 4.5 years of age to begin bowel training (except when a child shows interest at an earlier age; Dalrymple and Ruble 1992).

Depressive Disorders

Mood disorders have been separated into two categories in the *DSM-5*: depressive disorders and bipolar and related disorders (APA 2013). Changes made to depressive disorders in the *DSM-5* include the addition of disruptive mood disregulation disorder and premenstrual dysphoric disorder, a revised persistent depressive disorder (which includes dysthymia and chronic major depression), and the elimination of the bereavement exclusion when diagnosing MDD

(Wakefield 2013). In this section, we will focus on MDD and dysthymic disorder (as previously defined in the *DSM-IV-TR*; APA 2000).

Across the age span, older individuals with ASD have higher rates of depression when compared with younger individuals (Simonoff et al. 2012). Prevalence rates among adults range from 37 to 70% (Ghaziuddin and Greden 1998; Lugnegard et al. 2011). Diagnostic rates of depressive disorders among children range from 1.4 (Simonoff et al. 2008) to 10% (Leyfer et al. 2006).

Individuals with less severe symptoms of social impairment and higher cognitive ability are at greater risk for developing depression (Sterling et al. 2008). In school-aged children, higher-functioning youth are more likely to have mainstream classroom experiences and face more frequent and difficult social demands (Mayes et al. 2011). Also, higher-functioning individuals perceive more social rejection and negative peer interactions and report more victimization, more conflict with friends, and more interpersonal conflict with family members (Magnuson and Constantino 2011).

It is challenging to accurately assess depression in the ASD population because core deficits of ASD often lend themselves to impaired abilities of expression. These include verbal abilities in general and emotional expression in particular (Perry et al. 2001). Also, lower-functioning individuals may lack insight; thus, the assessment of a mood disorder may depend on observable and behavioral symptoms. Unfortunately, clinicians may misattribute these symptoms to behavioral rather than mood-disordered etiologies (Lainhart and Folstein 1994).

A complicating issue is that behaviors associated with depression can occur at higher rates in the ASD population (e.g., changes in mood, sleep, and activity levels). These higher base rates make the detection of actual depressive symptoms more difficult because the observer must notice change in intensity rather than the emergence of a symptom. Thus, having an accurate sense of the individual's baseline functioning is critical for an accurate diagnosis of depression (Lainhart and Folstein 1994).

Some of the noted observable symptoms that could indicate depression in this population include increases in aggression, irritability, and stereotypies (Perry et al. 2001); screaming and social isolation (Clarke and Gomez 1999); and self-injurious behaviors (Magnuson and Constantino 2011). Also, decreases in certain behaviors, such as decreased involvement in a restricted interest (Perry et al. 2001), reduced communication, reduced mobility, and a decline in self-care skills (Clarke and Gomez 1999; Magnuson and Constantino 2011), may point to a mood disorder. Unfortunately, depressive disorders can be extremely impairing for the individual and his or her family members. Kim et al. (2000) found that individuals with ASD and comorbid depressive symptoms had poorer relationships with teachers, peers, and family members. Further, families of these individuals report lower quality of life and higher rates of depression among parents (Kim et al. 2000; van Tongerloo et al. 2012). Thus, proper assessment and an accurate understanding of how depressive disorders are manifested in this population could improve the quality of life for the individual and his or her family members.

Bipolar and Related Disorders

Information about prevalence rates of bipolar and related disorders as compared to depressive disorders among those with ASD is lacking. Some studies with clinic-referred samples of children and adolescents with ASD have reported rates ranging from 21 (Wozniak et al. 1997) to 27% (Munesue et al. 2008). In both cases, typically developing control groups were used, and bipolar disorders were higher for individuals with an ASD compared to those without. A lower estimate was reported in an epidemiological survey that assessed mood problems among those with ID (Bradley and Bolton 2006). They identified 36 matched pairs of teenagers (one with ASD and the other without) who were matched on sex, age, and IQ. Two individuals with ASD and none without ASD had a bipolar disorder diagnosis. This translates to a 5.5% comorbidity rate, which is significantly lower than previously mentioned

estimates. Differences in estimates could be due to sample characteristics (i.e., epidemiological vs. clinic-referred samples) and diagnostic methodology (i.e., standardized methods, such as the ADI-R, vs. less standardized methods). More information is needed to clarify the prevalence of bipolar disorders and whether ASD increases the risk of comorbidity (Simonoff et al. 2012).

Varied ways of conceptualizing mania in this population have led to assessment difficulties. Also, it is possible that clinicians are overlooking manic symptoms to a large degree (Munesue et al. 2008). Many of the studies previously mentioned reported cases with hypomania; thus, a more subtle presentation requires careful assessment and may be more likely to escape recognition or be attributed to other causes. There are important treatment implications when clinicians misattribute mood disturbances to a depressive disorder rather than a bipolar disorder; antidepressants can trigger a manic episode and are not the first line of treatment for bipolar disorders (Henry et al. 2001).

Suicidality

Suicide is one of the most disconcerting circumstances highly correlated with mood disorders in the typically developing population. Although it is not currently considered a disorder per se, suicidal behavior disorder has been included in conditions for further study in the *DSM-5* (APA 2013). Underreporting of suicide is a common problem, but even less is known about how this risk is manifested in those with ASD. Some studies have attempted to determine the prevalence of suicidality among developmentally delayed individuals. One such study on hospitalized developmentally delayed children found 20% reported suicidal ideation, behavior, or attempts; however, having an ASD lowered the prevalence of these symptoms to 12.5% (Hardan and Sahl 1999). Differences were also noted depending on the ASD diagnosis one had. Those with an autism diagnosis had a lower incidence of ideation and behaviors than those with a PDD-NOS diagnosis (8 vs. 15%, respectively). The authors in that case concluded that a diagnosis of autism was associated with a lower risk of suicide.

By contrast, a much higher rate was reported in a study of clinic-referred adults with ASD. In this case, 46% of the sample had suicidal ideation, attempts, or, in a few cases, completed suicides (Raja et al. 2011). The authors cautioned that the presence of ASD can make evaluation of comorbidity more difficult, particularly when verbal delays are present. The lack of adequate language for communication can mask emotional turmoil and make suicidal risk more difficult to assess. The individual may be portraying a calmer demeanor than is actually the case. Further, issues of self-harm and self-injury can be difficult to tease apart from suicidal behaviors because the intent of the behavior can be hard to discern. These obstacles highlight the need for clinicians to remain vigilant for signs of suicide in those with ASD.

Conclusions

Unfortunately, individuals with ASD experience significant distress due to core features of their disorder and, in many cases, co-occurring disorders. Underreporting of comorbidities in this population is common, yet, when they have been reported, prevalence rates are higher as compared to typically developing peers and, in some cases, psychiatric control groups. Our relatively poor understanding of comorbidities in this population has been aided by the phenotypic heterogeneity of ASD and the varied manifestations of comorbid conditions as compared to typically developing individuals. This further complicates the clinical picture and heightens the need for clarity and rigor regarding assessment. In some cases, we have seen attempts to clarify how various comorbid disorders may be uniquely expressed among those with ASD, but more work is needed. Our efforts in these areas will not only improve our ability to accurately identify comorbidities but will also aid efforts toward developing and implementing effective treatments for the betterment of these individuals and their families.

References

Abdallah, M. W., Greaves-Lord, K., Grove, J., Norgaard-Pedersen, B., Hougaard, D. M., & Mortensen, E. L. (2011). Psychiatric comorbidities in autism spectrum disorders: Findings from a Danish historic birth cohort. *European Child & Adolescent Psychiatry, 20,* 599–601. doi:10.1007/200787-011-0220-2.

Achenbach, T. (1991). *Manual for teacher's report form and 1991 profile*. Burlington: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Rufle, T. M. (2000). The child behavior checklist and related forms for assessing behavioral/emotional problems and competencies. *Pediatrics in Review, 21,* 265–271.

Ahearn, W. H., Castine, T., Nault, K., & Green, G. (2001). An assessment of food acceptance in children with autism or pervasive developmental disorders-not otherwise specified. *Journal of Autism and Developmental Disorders, 31,* 505–511.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders-text revision* (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Baron-Cohen, S., Mortimore, C., Moriarty, J., Izaguirre, J., & Robertson, M. (1999). The prevalence of Gilles de la Tourette's syndrome in children and adolescents with autism. *Journal of Child Psychology and Psychiatry, 40,* 213–218.

Ben Itzchak, E., Lahat, E., Burgin, R., & Zachor, A. D. (2008). Cognitive, behavior, and intervention outcome in young children with autism. *Research in Developmental Disabilities, 29,* 447–458.

Bölte, S., & Poustka, F. (2002). The relation between general cognitive level and adaptive behavior domains in individuals with autism with and without comorbid mental retardation. *Child Psychiatry and Human Development, 33,* 165–172.

Borrero, C. S. W., Woods, J. N., Borrero, J. C., Masler, E. A., & Lesser, A. D. (2010). Descriptive analysis of pediatric food refusal and acceptance. *Journal of Applied Behavior Analysis, 43,* 71–88.

Bradley, E., & Bolton, P. (2006). Episodic psychiatric disorders in teenagers with learning disabilities with and without autism. *British Journal of Psychiatry, 189,* 361–366. doi:10.1192/bjp.bp.105.018127.

Brereton, A. V., Tonge, B. J., & Einfeld, S. L. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. *Journal of Autism and Developmental Disorders, 36,* 863–870. doi:10.1007/s10803-006-0125-y.

Canitano, R., & Vivanti, G. (2007). Tics and Tourette syndrome in autism spectrum disorders. *Autism: The International Journal of Research and Practice, 11,* 19–28. doi:10.1177/1362361307070992.

Centers for Disease Control (2009). Prevalence of autism spectrum disorders: Autism and developmental disabilities monitoring network, United States, 2006. *MMWR Surveillance Summaries, 58,* 1–20.

Chakrabarti, S., & Fombonne, E. (2005). Pervasive developmental disorders in preschool children: Confirmation of high prevalence. *American Journal of Psychiatry, 162,* 1133–1141.

Charman, T., Pickles, A., Simonoff, E., Chandler, S., Loucas, T., & Baird, G. (2011). IQ in children with autism spectrum disorders: Data from the Special Needs and Autism Project (SNAP). *Psychological Medicine, 41,* 619–627. doi:10.1017/S0033291710000991.

Clarke, D. J., & Gomez, G. A. (1999). Utility of modified DCR-10 criteria in the diagnosis of depression associated with intellectual disability. *Journal of Intellectual Disability Research, 43,* 413–420.

Dalrymple, N. J., & Ruble, L. A. (1992). Toilet training and behaviors of people with autism: Parent views. *Journal of Autism and Developmental Disorders, 22,* 265–275.

de Bildt, A., Sytema, S., Ketelaars, C., Kraijer, D., Mulder, E., Volkmar, F., & Minderaa, R. (2004). Interrelationship between Autism Diagnostic Observation Schedule-Generic (ADOS-G), Autism Diagnostic Interview-Revised (ADI-R), and the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) classification in children and adolescents with mental retardation. *Journal of Autism and Developmental Disorders, 34,* 129–137.

De Bruin, E. L., Ferdinand, R. F., Meester, S., De Nijs, P., & Verheij, F. (2007). High rates of psychiatric comorbidity in PDD-NOS. *Journal of Autism and Developmental Disorders, 37,* 877–886.

Emerson, E. (2001). *Challenging behavior: Analysis and intervention in people with severe intellectual disabilities* (2nd ed.). Cambridge: Cambridge University Press.

Fodstad, J. C., Rojahn, J., & Matson, J. L. (2012). Emergence of challenging behaviors in at-risk toddlers with and without autism spectrum disorder: A cross-sectional study. *Journal of Developmental and Physical Disabilities, 24,* 217–234.

Frazier, J. A., Biederman, J., Bellordre, C. A., Garfield, S. B., Geller, D. A., Coffey, B. J., & Faraone, S. V. (2001). Should the diagnosis of attention-deficit/hyperactivity disorder be considered in children with pervasive developmental disorder? *Journal of Attention Disorders, 4,* 203–211.

Freeman, R. D., Soltanifar, A., & Baer, S. (2010). Stereotypic movement disorder: Easily missed. *Developmental Medicine & Child Neurology, 52,* 733–738. doi:10.1111/j.1469-8749.2010.03627.x.

Gadow, K. D., & DeVincent, C. J. (2005). Clinical significance of tics and attention-deficit hyperactivity disorder (ADHD) in children with pervasive developmental disorder. *Journal of Child Neurology, 20,* 481–488.

Gadow, K. D., DeVincent, C. J., Pomeroy, J., & Azazian, A. (2004). Psychiatric symptoms in preschool children with PDD and clinic comparison samples. *Journal of Autism and Developmental Disorders, 34,* 379–393.

Gadow, K. D., DeVincent, C. J., & Drabick, D. A. G. (2008). Oppositional defiant disorder as a clinical phenotype on children with autism spectrum disorders.

Journal of Autism and Developmental Disorders, 38, 1302–1310.

Ghaziuddin, M., & Greden, J. (1998). Depression in children with autism/pervasive developmental disorders: A case-control family history study. *Journal of Autism and Developmental Disorders, 28,* 111–115.

Ghaziuddin, M., & Zafar, S. (2008). Psychiatric comorbidity of adults with autism spectrum disorders. *Clinical Neuropsychiatry, 5,* 9–12.

Gilbert, D. (2006). Treatment of children and adolescents with tics and Tourette syndrome. *Journal of Child Neurology, 21,* 690–700. doi:10.2310/7010.2006.00161.

Goldman, S. E., Richdale, A. L., Clemons, T., & Malow, B. A. (2012). Parental sleep concerns in autism spectrum disorders: Variations from childhood to adolescence. *Journal of Autism and Developmental Disorders, 42,* 531–538. doi:10.1007/s10803-011-1270-5.

Goldstein, S., & Schwebach, A. (2004). The comorbidity of pervasive developmental disorder and attention deficit hyperactivity disorder: Results of a retrospective chart review. *Journal of Autism and Developmental Disorders, 34,* 329–339.

Guttmann-Steinmetz, S., Gadow, K. D., & DeVincent, C. J. (2009). Oppositional defiant and conduct disorder behaviors in boys with autism spectrum disorder with and without attention-deficit hyperactivity disorder versus several comparison samples. *Journal with Autism and Developmental Disorders, 39,* 976–985.

Hanson, E., Cerban, B. M., Slater, C. M., Caccamo, L. M., Bacic, J., & Chan, E. (2012). Brief report: Prevalence of attention deficit/hyperactivity disorder among individuals with an autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43,* 1459–1464.

Hardan, A., & Sahl, R. (1999). Suicidal behavior in children and adoelscents with developmental disorders. *Research in Developmental Disabilities, 20,* 287–296.

Hartley, S. L., & Sikora, D. M. (2009). Which DSM-IV-TR criteria best differentiate high-functioning autism spectrum disorder from ADHD and anxiety disorders in older children? *Autism: The International Journal of Research and Practice, 13,* 485–509.

Hattori, J., Ogino, T., Abiru, K., Nakano, K., Oka, M., & Ohtsuka, Y. (2006). Are pervasive developmental disorders and attention-deficit/hyperactivity disorder distinct disorders. *Brain & Development, 28,* 371–374.

Henry, C., Sorbara, F., Lacoste, J., Gindre, C., & Leboyer, M. (2001). Antidepressant-induced mania in bipolar patients: Identification of risk factors. *Journal of Clinical Psychiatry, 62,* 249–255.

Hodge, D., Hoffman, C. D., Sweeney, D. P., & Riggs, M. L. (2013). Relationship between children's sleep and mental health in mothers of children with and without autism. *Journal of Autism and Developmental Disorders, 43,* 956–963. doi:10.1007/s10803-012-1639-0.

Horvath, K., & Perman, J. A. (2002). Autism and gastrointestinal symptoms. *Current Gastroenterology Reports, 4,* 251–258.

Joshi, G., Petty, C., Wozniak, J., Henin, A., Fried, R., Galdo, M., et al. (2010). The heavy burden of psychiatric comorbidity in youth with autism spectrum disorders: A large comparative study of psychiatrically referred population. *Journal of Autism and Developmental Disorders, 40,* 1361–1370. doi:10.1007/s10803-010-0996-9.

Kaat, A. J., Gadow, K. D., & Lecavalier, L. (2013). Psychiatric symptom impairment in children with autism spectrum disorders. *Journal of Abnormal Child Psychology*. Advance Online Publication. doi:10.1007/s10802-013-9739-7.

Kanne, S. M., Gerber, A. J., Quirmbach, L. M., Sparrow, S. S., Cicchetti, D. V., & Saulnier, C. A. (2011). The role of adaptive behavior in autism spectrum disorders: Implications for functional outcome. *Journal of Autism and Developmental Disorders, 41,* 1007–1018.

Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism: The International Journal of Research and Practice, 4,* 117–132.

Krakowiak, P., Goodlin-Jones, B., Hertz-Picciotto, I., Croen, L. A., & Hansen, R. L. (2008). Sleep problems in children with autism spectrum disorders, developmental delays, and typical development: A population-based study. *Journal of Sleep Research, 17,* 197–206. doi:10.1111/j.1365-2869.2008.00650.x.

Kuddo, T., & Nelson, K. B. (2003). How common are gastrointestinal disorders in children with autism? *Current Opinions in Pediatrics, 15,* 339–343.

Lainhart, J. E. (1999). Psychiatric problems in individuals with autism, their parents and siblings. *International Review of Psychiatry, 11,* 278–298.

Lainhart, J. E., & Folstein, S. E. (1994). Affective disorders in people with autism: A review of published cases. *Journal of Autism and Developmental Disorders, 24,* 587–601.

Lee, D. O., & Ousley, O. Y. (2006). Attention-deficit hyperactivity disorder symptoms in a clinic sample of children and adolescents with pervasive developmental disorders. *Journal of Child and Adolescent Psychopharmacology, 16,* 737–746.

Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dihn, E., Morgan, J., et al. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36,* 849–861. doi:10.1007/s10803-006-0123-0.

Limoges, E., Bolduc, C., Berthiaume, C., Mottron, L., & Godbout, R. (2013). Relationship between poor sleep and daytime cognitive performance in young adults with autism. *Research in Developmental Disabilities, 34,* 1322–1335. doi:10.1016/j.ridd.2013.01.013.

Loening-Baucke, V. (2007). Prevalence rates for constipation and fecal and urinary incontinence. *Archives of Disease in Childhood, 92,* 486–489. doi:10.1136/adc.2006.098335.

Lord, C., & Jones, R. M. (2012). Annual research review: Re-thinking the classification of autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 53,* 490–509. doi:10.1111/j.1469-7610.2012.02547.x.

Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism diagnostic interview-revised: A revised version of a diagnostic interview for caregivers of individuals with

possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24,* 659–685.

Lord, C., Risi, S., Lambrecht, L., Cook, E. H., Leventhal, B. L., DiLavore, P. C., et al. (2000). The Autism diagnostic observation schedule-generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders, 30,* 205–223.

Lugnegard, T., Hallerback, M. U., & Gillberg, C. (2011). Psychiatric comorbidity in young adults with a clinical diagnosis of Asperger syndrome. *Research in Developmental Disabilities, 32,* 1910–1917. doi:10.1016/j.ridd.2011.03.025.

Lunsky, Y., Gracey, C., & Bradley, E. (2009). Adults with autism spectrum disorders using psychiatric hospitals in Ontario: Clinical profile and service needs. *Research in Autism Spectrum Disorders, 3,* 1006–1013. doi:10.1016/j.rasd.2009.06.005.

Magnuson, K. M., & Constantino, J. N. (2011). Characterization of depression in children with autism spectrum disorders. *Journal of Developmental & Behavioral Pediatrics, 32,* 332–340. doi:10.1097/DBP.0b013e318213f56c.

Manikam, R., & Perman, J. (2000). Pediatric feeding disorders. *Journal of Clinical Gastroenterology, 30,* 34–46.

Martins, Y., Young, R. L., & Robson, D. C. (2008). Feeding and eating behaviors in children with autism and typically developing children. *Journal of Autism and Developmental Disorders, 38,* 1878–1887.

Matson, J. L., & Nebel-Schwalm, M. S. (2007). Comorbid psychopathology with autism spectrum disorder in children: An overview. *Research in Developmental Disabilities, 28,* 341–352. doi:10.1016/j.ridd/2005.12.004.

Matson, J. L., Ancona, M. N., & Wilkins, J. (2008). Sleep disturbances in adults with autism spectrum disorders and severe intellectual impairments. *Journal of Mental Health Research, 1,* 129–139. doi:10.1080/19315860801988210.

Matson, J. L., Dempsey, T., & Fodstad, J. C. (2009). The effect of autism spectrum disorders on adaptive independent living skills in adults with severe intellectual disability. *Research in Developmental Disabilities, 30,* 1203–1211.

Mattila, M., Hurtig, T., Haapsamo, H., Jussila, K., Kuusikko-Gauffin, S., Kielinin, M., et al. (2010). Comorbid psychiatric disorders associated with Asperger Syndrome/high-functioning autism: A community- and clinic-based study. *Journal of Autism and Developmental Disorders, 40,* 1080–1093. doi:10.1007/s10803-010-0958-2.

Mayes, S. D., & Calhoun, S. L. (2009). Variables related to sleep problems in children with autism. *Research in Autism Spectrum Disorders, 3,* 931–941. doi:10.1016/j.rasd.2009.04.002.

Mayes, S. D., Calhoun, S. L., Murray, M. J., & Zahid, J. (2011). Variables associated with anxiety and depression in children with autism. *Journal of Developmental and Physical Disabilities, 23,* 325–337. doi:10.1007/s10882-011-9231-7.

Mayes, S. D., Calhoun, S. L., Aggarwal, R., Baker, C., Mathapati, S., Anderson, R., & Petersen, C. (2012a). Explosive, oppositional, and aggressive behavior in children with autism compared to other clinical disorders and typical children. *Research in. Autism: the international journal of research and practice Spectrum Disorders, 6,* 1–10.

Mayes, S. D., Calhoun, S. L., Mayes, R. D., & Molitoris, S. (2012b). Autism and ADHD: Overlapping and discriminating symptoms. *Research in Autism Spectrum Disorders, 6,* 277–285.

Mazzone, L., Ruta, L., & Reale, L. (2012). Psychiatric comorbidities in Asperger Syndrome and high functioning autism: Diagnostic challenges. *Annals of General Psychiatry, 32,* 237–251.

Melville, C. A., Cooper, S., Morrison, J., Smiley, E., Allan, L., Jackson, A., et al. (2008). The prevalence and incidence of mental ill-health in adults with autism and intellectual disabilities. *Journal of Autism and Developmental Disorders, 38,* 1676–1688. doi:10.1007/s10803-008-0549-7.

Moseley, D. S., Tonge, B. J., Brereton, A. V., & Einfeld, S. (2011). Psychiatric comorbidity in adolescents and young adults with autism. *Journal of Mental health Research in Intellectual Disabilities, 4,* 229–243. doi:10.1080/19315864.2011.595535.

Muehlmann, A. M., & Lewis, M. H. (2012). Abnormal repetitive behaviors: Shared phenomenology and pathophysiology. *Journal of Intellectual Disability Research, 56,* 427–440. doi:10.1111/j.1365-2788.2011.01519.x.

Munesue, T., Ono, Y., Mutoh, K., Shimoda, K., Nakatani, H., & Kikuchi, M. (2008). High prevalence of bipolar disorder comorbidity in adolescents and young adults with high-functioning autism spectrum disorder: A preliminary study of 44 outpatients. *Journal of Affective Disorders, 111,* 170–175. doi:10.1016/j.jad.2008.02.015.

Murphy, O., Healy, O., & Leader, G. (2009). Risk factors for challenging behaviors among 157 children with autism spectrum disorder in Ireland. *Research in Autism , 3,* 474–482.

Nadon, G., Feldman, D. E., Dunn, W., & Gisel, E. (2011). Mealtime problems in children with autism spectrum disorder and their typically developing siblings: A comparison study. *Autism: The International Journal of Research and Practice, 15,* 98–113.

Oyane, N. M. F., & Bjorvatn, B. (2005). Sleep disturbances in adolescents and young adults with autism and Asperger syndrome. *Autism: The International Journal of Research and Practice, 9,* 83–94. doi:10.1177/1362361305049031.

Park, S., Cho, S., Cho, I. H., Kim, B., Kim, J., Shin, M., et al. (2012). Sleep problems and their correlates and comorbid psychopathology of children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 6,* 1068–1072. doi:10.1016/j.rasd.2012.02.004.

Perry, D. W., Marston, G. M., Hinder, S. A. J., Munden, A. C., & Roy, A. (2001). The phenomenology of depressive illness in people with a learning disability and

autism. *Autism: The International Journal of Research and Practice, 5,* 265–275.

Radford, J., & Anderson, M. (2003). Encopresis in children on the autistic spectrum. *Early Child Development and Care, 173,* 375–382. doi:10.1080/0300443032000079069.

Raja, M., Azzoni, A., & Frustaci, A. (2011). Autism spectrum disorders and suicidality. *Clinical Practice & Epidemiology in Mental Health, 7,* 97–105.

Richdale, A. L., & Schreck, K. A. (2009). Sleep problems in autism spectrum disorders: Prevalence, nature, & possible biopsychological etiologies. *Sleep Medicine Reviews, 13,* 403–411. doi:10.1016/j.smrv.2009.02.003.

Rinald, K., & Mirenda, P. (2012). Effectiveness of a modified rapid toilet training workshop for parents of children with developmental disabilities. *Research in Developmental Disabilities, 33,* 933–943. doi:10.1016/j.ridd.2012.01.003.

Ringman, J. M., & Jankovic, J. (2000). Occurrence of tics in Asperger's syndrome and autistic disorder. *Journal of Child Neurology, 15,* 394–400.

Ryden, E., & Bejerot, S. (2008). Autism spectrum disorders in an adult psychiatric population. A naturalistic cross-sectional controlled study. *Clinical Neuropsychiatry, 5,* 13–21.

Schreck, K. A., & Williams, K. (2006). Food preferences and factors influencing food selectivity for children with autism spectrum disorders. *Research in Developmental Disabilities, 27,* 353–363.

Schreck, K. A., Williams, K., & Smith, A. F. (2004). A comparison of eating behaviors between children with and without autism. *Journal of Autism and Developmental Disabilities, 34,* 433–438.

Shattuck, P. T., Seltzer, M. M., Greenberg, J. S., Orsmond, G. I., Bolt, D., Kring, S., et al. (2007). Change in autism symptoms and maladaptive behaviors in adolescents and adults with an autism spectrum disorder. *Journal of Autism and Developmental Disorders, 37,* 1735–1747.

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 47,* 921–929.

Simonoff, E., Jones, C. R. G., Pickles, A., Happe, F., Baird, G., & Charman, T. (2012). Severe mood problems in adolescents with autism spectrum disorder. *Journal of Child Psychology and Psychiatry, 53,* 1157–1166. doi:10.1111/j.1469-7610.2012.02600.x.

Simonoff, E., Jones, C. R. G., Baird, G., Pickles, A., Happe, F., & Charman, T. (2013). The persistence and stability of psychiatric problems in adolescents with autism spectrum disorders. *Journal of Child Psychology and Psychiatry, 54,* 186–194. doi:10.1111/j.1469-7610.2012.02606.x.

Sounders, M. C., Mason, T. B. A., Valladares, O., Bucan, M., Levy, S. E., Mandell, D. S., et al. (2009). Sleep behaviors and sleep quality in children with autism spectrum disorders. *Sleep: Journal of Sleep and Sleep Disorders Research, 32,* 1566–1578.

Sterling, L., Dawson, G., Estes, A., & Greenson, J. (2008). Characteristics associated with presence of depressive symptoms in adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 38,* 1011–1018. doi:10.1007/s10803-007-0477-y.

Stewart, M. E., Barnard, L., Pearson, J., Hasan, R., & O'Brien, G. (2006). Presentation of depression in autism and Asperger syndrome: A review. *Autism: The International Journal of Research and Practice, 10,* 103–116. doi:10.1177/1362361306062013.

Trillingsgaard, A., Sørensen, E. U., Němec, G., & Jørgensen, M. (2005). What distinguishes autism spectrum disorders from other developmental disorders before the age of four years? *European Child & Adolescent Psychiatry, 14,* 65–72.

Tsakanikos, E., Underwood, L., Kravariti, E., Bouras, N., & McCarthy, J. (2011). Gender differences in comorbid psychopathology and clinical management in adults with autism spectrum disorders. *Research in Autism Spectrum Disorders, 5,* 803–808. doi:10.1016/j.rasd.2010.09.009.

Tuchman, R., & Rapin, I. (2002). Epilepsy in autism. *The Lancet Neurology, 1,* 352–358.

van Tongerloo, M. A. M. M., Bor, H. H. J., & Lagro-Janssen, A. L. M. (2012). Detecting autism spectrum disorders in the general practitioner's practice. *Journal of Autism and Developmental Disorders, 42,* 1531–1538. doi:10.1007/s10803-011-1384-9.

Wakefield, J. (2013). DSM-5: An overview of changes and controversies. *Clinical Social Work Journal, 41,* 139–154. doi:10.1007/s10615-013-0445-2.

Williams, P. G., Sears, L. L., & Allard, A. (2004). Sleep problems in children with autism. *Journal of Sleep Research, 13,* 265–268.

Williams, K. E., Gibbons, B. G., & Schreck, K. A. (2005). Comparing selective eaters with and without developmental disabilities. *Journal of Developmental and Physical Disabilities, 17,* 299–309.

Wozniak, J., Biederman, J., Faraone, S. V., Frazier, J., Kim, J., Millstein, R., et al. (1997). Mania in children with pervasive developmental disorder revisited. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 1552–1559. doi:10.1016/s0890-8567(09)66564-3.

Yerys, B. E., Wallace, G. L., Sokoloff, J. L., Shook, D. A., James, J. D., & Kenworthy, L. (2009). Attention deficit/hyperactivity disorder symptoms moderate cognition and behavior in children with autism spectrum disorders. *Autism Research, 2,* 322–333.

Yoshida, Y., & Uchiyama, T. (2004). The clinical necessity for assessing Attention deficit/hyperactivity disorder (AD/HD) symptoms in children with high-functioning pervasive developmental disorder (PDD). *European Child & Adolescent Psychiatry, 13,* 307–314.