How does ASD symptomology correlate with ADHD presentations?

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ABSTRACT

Elevated rates of attention deficit/hyperactivity disorder (ADHD) symptoms have been documented in the autism spectrum disorder (ASD) population. However, the recent restructuring of the ASD diagnostic category and its respective symptom structure has elicited concern about how these changes may impact prevalence rates, the deliverance of services, and the rates of comorbid psychopathology. At present, few researchers have investigated the prevalence rates of specific ADHD presentations within ASD populations. As we seek to increase our understanding of ADHD symptom manifestation in ASD populations it is important to establish base rates of attention and hyperactive symptoms. The current manuscript sought to investigate the prevalence of inattention and impulsive symptoms in 1722 infants and toddlers. Individuals were separated into three diagnostic groups for analyses, a DSM-5 ASD group, an atypically developing group, and a DSM-IV-TR ASD group. Initial analysis extended previous research by demonstrating significantly elevated rates of inattention/impulsive symptoms in toddlers meeting DSM-5 criteria for ASD when compared to the DSM-IV-TR ASD and atypically developing groups. Additional analysis demonstrated that ASD symptom severity was positively correlated with inattention/impulsive symptoms regardless of primary diagnosis. Lastly, analyses examined the exhibition of inattention and impulsive symptoms separately within diagnostic groups. Results suggest that the expression of impulsive and inattentive symptoms did not significantly differ within diagnostic groups.

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1. How does ASD symptomology correlate with ADHD presentations?

The core features of autism spectrum disorders (ASDs) are characterized by social skills and communication deficits (Cappadocia & Weiss, 2011; Horovitz & Matson, 2010; Matson & Wilkins, 2008a, 2009; Matson, Carlisle, & Bamburg, 1998; Matson, Leblanc, Weinheimer, & Cherry, 1999; Matson, Mahan, Hess, Fodstad, & Neal, 2010; Wilkins & Matson, 2009), stereotypies, and ritualistic behaviors (Gaspar de Alba & Bodfish, 2011). Other common symptoms that have been characteristic of individuals with an ASD include problems with impulsivity, hyperactivity, and attentional deficits (Matson, Mahan, Hess, & Fodstad, 2010). This disorder occurs at a high rate and has a lifelong course (Matson & Kozlowski, 2011).

Multiple problems such as stereotypies, challenging behaviors, and various forms of psychopathology occur in conjunction with ASD (Matson & Dempsey, 2008; Matson, Dempsey, & Fodstad, 2009). These conditions affect a variety of positive responses such as adaptive behaviors (Matson, Rivet, Fodstad, Dempsey, & Boisjoli, 2009). The debate as to whether
an individual with ASD could also suffer from Attention-deficit/hyperactivity disorder (ADHD) has been a recently debated topic (Matson & LoVullo, 2009; Matson, Rieske, & Williams, 2013) and is apparent in the differences between diagnostic criteria of the DSM-IV-TR and DSM-5.

With symptoms of ADHD being some of the most commonly endorsed behaviors in those with ASD (Lecavalier, 2006) some researchers have debated whether these symptoms were distinguishable between disorders or whether inattention/hyperactivity problems are just another hallmark of ASD. The overlap in symptomatology often complicates differential diagnosis and children with ASD commonly receive a diagnosis of ADHD first (Jensen, Larrieu, & Mack, 1997). Mayes, Calhoun, Mayes, and Molitoris (2012) reported evidence for symptoms that distinguish between the disorders and found that ASD symptoms are very rare in those with ADHD but that the reverse was not true. In fact, researchers report estimated rates of ADHD within the ASD population ranging anywhere from 20 to 70% (Rowlandson & Smith, 2009; Ryden & Bejerot, 2008; Stahilberg, Soderstrom, Rastam, & Gillberg, 2004; Yoshida & Uchiyama, 2004). Many researchers have also noted that the severity of ADHD symptoms in some children was so significant that they warranted a comorbid diagnosis with ASD (Frazier et al., 2001; Goldstein & Schwebach, 2004; Matson & Nebel-Schwalm, 2007; Yoshida & Uchiyama, 2004) supporting the idea that these are two distinct, but often co-occurring, disorders.

Both ASD and ADHD are considered to be neurodevelopmental in nature (Rivet & Matson, 2011; Weinkleau, Zeug, Anderson, & Ala’i-Rosas, 2011) and some researchers even suggest a shared genetic etiology between the disorders (Banaschewski, Poustka, & Holtmann, 2011; Reiersen & Todd, 2008; Reiersen, Constantino, Grimmer, Martin, & Todd, 2008; Smalley et al., 2002). Additionally, other researchers have reported common structural brain abnormalities that are shared in those with ASD and ADHD (Briere et al., 2007). Studies of families and siblings have found higher rates of ASD symptoms in children and their siblings diagnosed with ADHD (Reiersen, Constantino, Volk, & Todd, 2007) and symptoms of ADHD also appear to be evident in those with ASD irrespective of level of functioning (Mayes et al., 2012).

The study of these two disorders and their common co-occurrence is important not only in the determination and differential diagnosis but also in treatment consideration and recommendations. Researchers have reported that 40–50% of clinic-referred children with an ASD also met criteria for one subtype of ADHD and that these rates were not significantly different from the rates of clinic-referred children without ASD (Gadow et al., 2004; Gadow, DeVincent, Pomeroy, & Azizian, 2005). Previous research has also demonstrated that individuals with ASD and ADHD evidence significantly greater rates of externalizing symptoms (Goldin, Matson, Tureck, Cervantes, & Jang, 2013; Tureck, Matson, May, & Turygin, 2013). Further, children with comorbid ASD and ADHD evidence significantly greater rates of comorbid symptoms than children diagnosed with ASD or ADHD separately (Jang et al., 2013). However research has been focused on the presence of ADHD and has not investigated the prevalence of specific ADHD types. This information is particularly relevant to treatment approaches as treatment for symptoms of inattention, hyperactivity, or both will vary. Further, treatments geared toward those with ADHD alone will likely not be efficient or sufficient in treating children with ASD and ADHD.

The current study initially sought to replicate earlier research of ADHD symptom presentation within the ASD population with a group diagnosed utilizing DSM-5 diagnostic criteria. Specifically, we analyzed the presence and rates of attention and hyperactive symptoms and the severity/pattern of those symptoms amongst infants and toddlers who met DSM-5 diagnostic criteria for ASD compared to children who met DSM-IV-TR criteria for ASD but not DSM-5 criteria, and atypically developing children that did not meet criteria for ASD. Previous research by Leyer and colleagues (2006) indicated that contrary to typically developing children, children who met DSM-IV-TR criteria for ASD were more likely to meet criteria for inattentive subtype of ADHD. However, researchers have also previously reported equal rates of ADHD subtypes in ASD populations (Lee & Ousley, 2006).

Given the release of the DSM-5, minimal research is available surrounding the manifestation of comorbid symptoms in those with ASD. Such research is especially significant given the recent changes to the ASD criteria appearing in the DSM-5 and the previous exclusion of an ADHD diagnosis when ASD was present in the DSM-IV-TR. Results of the current analysis inform the evaluation of comorbid symptoms and increase awareness of comorbid symptom manifestation in infant and toddler ASD populations when compared to other atypically developing populations. This is especially important given the increased emphasis on early identification and intervention for ASD as the identification of comorbid impairments may serve as additional targets for intervention. It was hypothesized that the DSM-5 ASD group would evidence significantly greater rates of ADHD symptoms than the DSM-IV-TR and atypical groups. Based upon the results of previous research, the researchers hypothesized that symptoms of inattention would occur at higher rates within the ASD groups in comparison to the atypically developing group.

2. Methods

2.1. Participants

Participants in the current study included 1722 infants and toddlers enrolled in an early intervention program receiving state-funding for the identification of children at-risk for a developmental disability. Parents or caregivers served as informants for infants and toddlers that were referred to the program by a medical professional (i.e., Pediatrician) due to concerns of developmental delay. Participants in the current study were separated into three groups. The first two groups were diagnosed with ASD based upon DSM-5 criteria (n = 605) or based upon DSM-IV-TR criteria (n = 499). The DSM-IV-TR ASD group consisted of individuals who did not meet DSM-5 criteria. A third group consisted of individuals identified as atypically developing (n = 618) based upon the presence of a global developmental delay and/or the presence of other diagnoses (i.e.,
Cerebral Palsy, Down syndrome, Spina Bifida). Diagnoses were made by a licensed clinical psychologist. Diagnostic decisions were made based upon the DSM-IV-TR and DSM-5 algorithms for ASD, the developmental profiles of the Battelle Developmental Inventory – Second Edition (BDI-2; Newborg, 2005), and scores from the Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, Barton, & Green, 2001).

The sample contained 1231 males (71.2%) and 491 females (28.8%). Children included in the current sample ranged in age from 17 to 37 months ($M = 26.04, SD = 4.75$; Table 1). Ethnicity was identified based upon informant response and included; 658 African-American, 847 Caucasian, 39 Hispanic, while an additional 178 identified their child as ‘other’ or failed to respond.

### 2.2. Measures

**Baby and Infant Screen for Children with aUltisim Traits – Part 1 (BISCUIT-Part 1; Matson, Boisjoli, & Wilkins, 2007; Matson, Boisjoli, Hess, & Wilkins, 2010).** The BISCUIT-Part 1 and BISCUIT-Part 2 are two of three informant based measures for infants and toddlers ages 17–37 months included in the BISCUIT assessment package. The manifestation of ASD symptoms are assessed by BISCUIT-Part 1, while the BISCUIT Part-2 assesses for the presence of comorbid psychopathology symptoms, and the BISCUIT-Part 3 measures both internalizing and externalizing problem behaviors. Given the depth and breadth of the information assessed by the BISCUIT measures, it helps inform diagnoses and treatment. However, only the BISCUIT-Part 1 and 2 were retained for analysis in the current investigation.

The BISCUIT-Part 1 is comprised of 62 items and measures the core symptoms of ASD (e.g., maintains eye contact, peer relations, restricted interests and activities, and development of social relationships). Items are rated by the primary caregivers using a 3-point Likert scale ranging from 0 to 2 (i.e., 0, “not different; no impairment”; 1, “somewhat different; mild impairment”; or 2, “very different; severe impairment”). Ratings for the BISCUIT-Part 1 are then utilized to create a total score. A total score falls into one of three categories: no autism/atypical development (below 17), possible ASD/PDD-NOS (18–34), or probable ASD/PDD-NOS (35 or higher). Total score on the BISCUIT-Part 1 was employed as a measure of ASD symptom severity.

The BISCUIT-Part 1 has been found to have sound psychometric properties (i.e. internal reliability of .97), and an exploratory factor analysis identified a three factor structure: socialization/non-verbal communication, repetitive behaviors/restricted interests, and communication (Matson, Dempsey, et al., 2009). The scale also has excellent sensitivity and specificity (Matson, Rivet, et al., 2009).

**Baby and Infant Screen for Children with aUltisim Traits – Part 2 (BISCUIT-Part 2; Matson, Boisjoli, Hess, & Wilkins, 2011; Matson et al., 2007).** The BISCUIT-Part 2 contains a total of 65 items and is the focus of the current study. Items included assess for symptoms related to comorbid disorders observed to commonly co-occur with ASD (e.g., feeding/eating problems, specific phobia, obsessive-compulsive disorder, ADHD, and tic disorder; Ledford & Gast, 2006; Matson & Fodstad, 2009; Matson & Nebel-Schwalm, 2007; Sinzig, Walter, & Doepfner, 2009). Containing a total of five subcales, the BISCUIT-Part 2 measures comorbid symptoms associated with tantrum and conduct behavior, inattention and impulsivity, eating and sleeping problems, avoidance behaviors, and anxiety and/or repetitive behavior (Matson et al., 2011).

Item responses for the BISCUIT-Part 2 are based upon a 4 point Likert scale with each point demonstrating the degree to which each item has been a recent problem (i.e., 0, “not a problem or impairment, not at all”; 1, “mild problem or impairment”; 2, “severe problem or impairment”; or X, “does not apply or don’t know”; Matson et al., 2007). The scoring for the BISCUIT-Part 2 provides a total score for each subscale which then reflects the level of impairment observed (i.e., No/ Minimal Impairment, Moderate Impairment, and Severe Impairment; Matson et al., 2011). Psychometrically, the BISCUIT-Part 2 has been found to have excellent internal reliability ($\alpha = .96$; LoVullo & Matson, 2012).

### 2.3. Procedure

Approval from the state of Louisiana’s Office for Citizens with Developmental Disabilities and an Institutional Review Board was obtained prior to the collection of data. Additionally, informants provided informed consent for participation in

<table>
<thead>
<tr>
<th>Note: Standard deviations are provided in parentheses directly beside the mean.</th>
<th>Participants</th>
<th>ASD &amp; ADHD</th>
<th>ASD &amp; ASD</th>
<th>ASD &amp; PDD-NOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>2254</td>
<td>1231 males, 491 females</td>
<td>1231 males, 491 females</td>
<td>1231 males, 491 females</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>African-American, Caucasian, Hispanic, Other</td>
<td>African-American, Caucasian, Hispanic, Other</td>
<td>African-American, Caucasian, Hispanic, Other</td>
<td>African-American, Caucasian, Hispanic, Other</td>
</tr>
<tr>
<td>Gender</td>
<td>Female, Male</td>
<td>Female, Male</td>
<td>Female, Male</td>
<td>Female, Male</td>
</tr>
<tr>
<td>Age</td>
<td>$M = 26.04, SD = 4.75$</td>
<td>$M = 26.04, SD = 4.75$</td>
<td>$M = 26.04, SD = 4.75$</td>
<td>$M = 26.04, SD = 4.75$</td>
</tr>
</tbody>
</table>

Table 1: Participant demographics.
the current study. Informants were a parent or caregiver of an infant or toddler who were the guardian of the child for at least six months. As part of their participation in the EarlySteps program the informants were administered a comprehensive battery of assessments which included the BISCUIT measures. Evaluators with a minimum of a bachelor’s degree, but ranging up to a doctoral degree administered the screener battery. Evaluators received training in standardized assessment administration methods and training specific to the measures being administered. The evaluators employed by EarlySteps represent multiple disciplines with assorted certifications and licenses (e.g., speech/language pathology, education, psychology, social work, and early childhood development). For the purposes of this study, diagnostic categorization for the ASD groups was exclusive in that participants who met both the DSM-5 and DSM-IV-TR ASD criteria were included only in the DSM-5 ASD group.

2.4. Statistical analyses

Initially, a priori analyses were conducted verify that the current sample was normally distributed. A Chi-square test revealed that the diagnostic groups did not significantly differ based upon reported ethnicity. \( \chi^2 (8) = 8.47, p = .40 \). Gender differences were found to be significant between groups \( \chi^2 (2) = 8.29, p = .02 \). However, this was expected given the male to female ratio observed in the ASD population (approximately 4:1; Fombonne, 2005). An analysis of variance (ANOVA) was conducted to investigate differences between diagnostic groups based upon age. A significant difference between diagnostic groups was observed \( F(2, 1716) = 4.94, p = .01 \). Post hoc comparisons indicated that the atypical group \( (M = 25.67, SD = 4.79) \) was significantly younger than the DSM-5 ASD group \( (M = 26.5, SD = 4.52) \); no significant differences we observed between the remaining groups (i.e., DSM-IV-TR ASD, \( M = 25.94, SD = 4.94 \)). Because this difference was limited only to the atypical group and the DSM-5 group, age was not added as a covariate in subsequent analyses (Field, 2009). Results of comparisons between these two groups were interpreted with caution. In order to investigate the difference in ADHD symptom endorsement based upon primary diagnosis an ANOVA was computed. The independent variable was diagnostic category (i.e., DSM-5 ASD, Atypical, and DSM-IV-TR ASD) and the dependent variable was the participant’s cumulative score on the Inattention/Impulsivity subscale of the BISCUIT-Part 2.

Additional analysis sought to examine the relationship between ASD symptom severity based upon informant responses to the BISCUIT-Part 1 and symptoms of inattention/impulsivity. Pearson Bivariate correlations were calculated between ASD symptom severity and item endorsement for the Inattention/Impulsivity subscale. This analysis was followed by an investigation of the prevalence of inattention and impulsive symptoms in each diagnostic category. The Inattention/Impulsivity subscale contains six inattention items and ten impulsive items. Descriptive statistics were used to analyze the average item endorsement for both inattention and impulsivity within diagnostic groups. Pearson bivariate correlations were used to explore the relationship between ASD symptom expression and the exhibition of both inattentive and impulsive behaviors. Utilizing the BISCUIT-Part 1 total score as a measure of ASD symptom severity Pearson bivariate correlations were carried out with the computed inattention and impulsive total scores for each diagnostic group.

3. Results

Prior to the main analysis, descriptive statistics (i.e., mean and standard deviation) were calculated for each diagnostic group’s rate of endorsement for the Inattention/Impulsivity subscale of the BISCUIT-Part 2 (Table 2). To examine the differences in inattention/impulsivity symptom endorsement between diagnostic groups an ANOVA was computed. In the initial analyses diagnostic group served as the independent variable and total score for the Inattention/Impulsivity subscale of the BISCUIT-Part 2 served as the dependent variable and participant age was entered as a covariate.

However, the Levene’s F test revealed that the homogeneity of variance assumption was not met \( (p = .00) \). Given the violation of homogeneity of variance, in order to be conservative and retain power the Welch’s F test was selected for analysis (Field, 2009). The one-way ANOVA of symptom endorsement on a measure of inattention-impulsivity revealed a statistically

### Table 2

<table>
<thead>
<tr>
<th>Diagnostic category</th>
<th>DSM-5 ASD</th>
<th>DSM-IV-TR ASD</th>
<th>Atypical</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD severity</td>
<td>( M = 53.44 ) (20.76)</td>
<td>( M = 32.39 ) (16.59)</td>
<td>( M = 9.67 ) (7.01)</td>
</tr>
<tr>
<td>Inattention/Impulsivity subscale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>( A^7 )</td>
<td>.51*</td>
<td>.41</td>
</tr>
<tr>
<td></td>
<td>( M = 8.69 ) (5.69)</td>
<td>( M = 5.55 ) (4.70)</td>
<td>( M = 1.94 ) (2.65)</td>
</tr>
<tr>
<td></td>
<td>( A^3 )</td>
<td>.44*</td>
<td>.36</td>
</tr>
<tr>
<td></td>
<td>( M = 4.21 ) (2.71)</td>
<td>( M = 2.71 ) (2.32)</td>
<td>( M = 1.08 ) (1.53)</td>
</tr>
<tr>
<td>Inattention</td>
<td>( A^3 )</td>
<td>.47*</td>
<td>.35</td>
</tr>
<tr>
<td></td>
<td>( M = 4.49 ) (3.56)</td>
<td>( M = 2.84 ) (2.90)</td>
<td>( M = .86 ) (1.50)</td>
</tr>
</tbody>
</table>

* Significant at the .05 level.
** Significant at the .01 level.
significant main effect Welch’s $F(2,972) = 405.47$, $p = .00$. The estimated omega squared ($\omega^2 = .34$) suggests that approximately 34% of the total variation in the average score for inattention/impulsivity symptom endorsement is attributable to diagnostic group membership. A Games–Howell post hoc analysis was performed to select for post hoc comparisons to determine which diagnostic groups were significantly different. The results of post hoc analysis are presented in Table 2 and indicate that individuals in the DSM-5 ASD group ($M = 8.69, SD = 5.69$) exhibited significantly greater amounts of inattention/impulsivity symptoms on average than the atypical ($M = 1.94, SD = 2.65$) and DSM-IV-TR ASD ($M = 5.55, SD = 4.70$) groups ($p = .00$). Post hoc comparisons also revealed that individuals in the DSM-IV-TR ASD group exhibited significantly greater inattention/impulsivity symptoms than the atypical group ($p = .00$).

Results of the Pearson bivariate correlations are depicted in Table 2. The analysis revealed strong positive correlations between ASD symptom severity and the manifestation of inattentive/impulsive symptoms for the DSM-5 ASD ($r = .47$, $p = .00$), atypical ($r = .41$, $p = .00$), and DSM-IV-TR ASD ($r = .51$, $p = .00$) groups (Table 2). Each group’s ASD symptom scores were significantly positively correlated with the Inattention/Impulsivity subscale total score. Fisher $r$ to $z$ tests revealed that the correlation between ASD symptom severity and total inattention/impulsivity endorsement was significantly larger for the DSM-IV-TR ASD group ($z = 2.11$, $p = .02$) when compared to the atypical group (Table 3). However, no significant correlational differences between the DSM-5 ASD group and the atypical group ($z = 1.3$, $p = .10$) or the DSM-5 ASD and DSM-IV-TR ASD groups ($z = .87$, $p = .19$) were observed.

An analysis of differences within diagnostic groups failed to identify significant differences in the manifestation of inattention and impulsive symptoms when investigated separately. Specifically, diagnostic group membership did not serve as a predictor for significantly greater rates of endorsement for impulsive or inattentive symptoms (Table 2). Moreover, the correlation between ASD symptom severity and inattention symptom endorsement did not significantly differ within diagnostic groups (Table 3). However, a significant difference was observed regarding the correlation between ASD symptom severity and impulsivity between the DSM-IV-TR ASD group and the atypically developing group ($z = 2.40$, $p = .01$).

### 4. Discussion

Changes to diagnostic criteria and the structure of the ASD category overall have brought about significant controversy (Matson & Boisjoli, 2008; Matson, Hattier, & Williams, 2012; Matson, Kozlowski, Hattier, Horovitz, & Sipes, 2012; McPartland, Reichow, & Volkmar, 2012; Wing, Gould, & Gillberg, 2011; Worley & Matson, 2012). This controversy surrounds changes in ASD prevalence and symptom manifestation, specifically that current diagnostic criteria under identify atypical or less impaired individuals with ASD. Changes to the diagnostic criteria for ASD may also impact comorbid symptom manifestation. This issue clearly has implications for treatment (Advokat, Mayville, & Matson, 2000; Matson & Boisjoli, 2007; Matson & Wilkins, 2008b; Singh, Matson, Cooper, Dixon, & Sturmey, 2005). Multiple researchers have previously demonstrated increased rates of ADHD symptoms in various age ranges of the ASD population when compared to both atypically developing and typically developing peers (Simonoff et al., 2008; Stahlberg et al., 2004). The current study initially sought to replicate earlier research of ADHD symptom presentation in ASD populations with a group diagnosed utilizing DSM-5 diagnostic criteria.

Given the restructuring of the ASD diagnostic category appearing in the DSM-5, initial analysis included a direct comparison of the expression of inattentive/impulsive symptoms in toddlers who met diagnostic criteria based upon the DSM-5 and those who met DSM-IV-TR criteria, but not DSM-5 criteria.

Results of the current analysis support the authors’ initial hypothesis that the changes appearing in the DSM-5 did produce a significant difference in ADHD symptom manifestation when comparing a DSM-5 and DSM-IV-TR ASD group. On average, those individuals meeting DSM-5 criteria endorsed inattention/impulsive symptoms at a significantly greater rate and exhibited more severe symptoms. Our results suggest that those meeting the DSM-5 criteria for a diagnosis of ASD may be at an increased risk for a diagnosis of ADHD than those individuals who met DSM-IV-TR criteria. Researchers comparing the manifestation of comorbid symptoms between children with a DSM-5 ASD diagnosis and those that met criteria under DSM-IV-TR but not DSM-5 have demonstrated greater rates of comorbid symptoms in the DSM-5 population (Beighley et al., 2013; Williams, Matson, Beighley, Rieske, & Adams, 2014). These results suggest that the ASD population captured by the revised diagnostic criteria in DSM-5 may represent a more impaired ASD population. This finding highlights the need for increased emphasis on the assessment of comorbid psychopathologies in ASD populations, especially with regard to ADHD.
However, no significant differences were observed when the correlation of ASD symptom severity and inattentiveness/impulsive symptoms among ASD groups was examined. Despite an increase in rate and severity of ADHD symptom endorsement observed in the DSM-5 group, correlational analysis suggests that increased endorsement appeared independent of ASD symptom manifestation. Further, although it was not significantly different, a stronger correlation between ASD symptom severity and inattention/impulsive symptoms was observed for the DSM-IV-TR group in comparison to the DSM-5 group. Regardless of diagnostic group, ASD symptom severity was observed to be positively correlated with inattentiveness/impulsive symptoms. This may support previous researchers who suggested that ADHD symptoms occur in ASD populations independent of an individual's level of ASD functioning (Mayes et al., 2012).

Despite the amount of research surrounding ADHD symptom expression in ASD populations (e.g., Goldin et al., 2013; Jang et al., 2013; Tureck et al., 2013) little research to date has sought to examine the rates of individual ADHD presentation types. Research that is available has produced conflicted results and has largely been limited to child and adolescent populations. For instance, researchers have previously reported greater rates of the ADHD inattentive presentation in ASD populations (Leyfer et al., 2006). However, research by Lee and Ousley (2006) indicated equal rates of each ADHD presentation type in and ASD population. The current analysis sought to examine the prevalence of inattention and impulsive symptoms separately within an infantile sample. Contrary to previous research (Leyfer et al., 2006) our results indicate that item endorsement did not significantly differ within diagnostic groups. The observed discrepancy with prior research may be the result of factors such as differences in target populations (i.e., infants and children) or the measures used to assess symptoms of psychopathology.

No significant difference in endorsement rate was observed within each diagnostic group (i.e., DSM-5 ASD, DSM-IV-TR ASD, and atypically developing) when differentiating between symptoms of inattention and impulsivity. These results were in agreement with other research demonstrating no significant differences in the expression of ADHD presentation types (Lee & Ousley, 2006). However, the correlation between severity of ASD symptom expression and each ADHD presentation (i.e., impulsivity) did significantly differ between diagnostic groups. Specifically, the correlation between ASD severity and inattentive/impulsive total score and impulsive score was significantly greater for the DSM-IV-TR group when compared to the atypical group.

The current study was an investigation of the relationship between ASD and specific ADHD presentation types that added to an existing literature base by analyzing a large infant and toddler population. Future research should be carried out to investigate this topic further. Researchers should strive to include individuals who have a clinical ADHD diagnosis in addition to an ASD diagnosis. The current study did not employ inter-rater reliability for diagnostic decisions; this approach would increase the generalizability of future research. Given the results of the current analysis it may be beneficial to incorporate an equal amount of each ADHD presentation (i.e., ADHD combined presentation, predominately inattentive presentation, and predominately hyperactive/impulsive presentation). Further, the BISCUIT-Part 2 does not have individual subscales for inattention and impulsivity. The authors instead used consensus to determine which items were measuring symptoms of inattention or impulsivity. Future researchers should also strive to measure ADHD symptomatology utilizing measures with subscales that measure symptoms of inattention and impulsivity separately.

Conflicts of interest

The authors report no conflicts of interests and are solely responsible for the content and writing of this paper.

References


