The effect of intellectual disability on the presence of comorbid symptoms in children and adolescents with autism spectrum disorder

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Abstract

Research is limited in examining the presence of comorbid symptoms in children and adolescents with autism spectrum disorder (ASD) and co-occurring intellectual disability (ID). The current study aimed to expand knowledge in this area by evaluating the presence of comorbid symptoms in children and adolescents with ASD, compared to those with ASD and ID. Comorbid symptoms examined using the Autism Spectrum Disorders-Comorbidity for Children (ASD-C-C) included tantrum behavior, repetitive behavior, worry/depression, avoidant behavior, under-eating, conduct problems, and over-eating. Two hundred and nineteen children and adolescents ranging from 3 to 16 years of age participated in the study. Significant differences were not found between the groups on any of the comorbid symptoms measured. The implications of these findings on treatment are discussed.

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1. Introduction

Intellectual disability (ID) is associated with impairment in cognitive functioning, social, and adaptive skills (Matson, Carlisle, & Bamburg, 1998; Matson, Rush, et al., 1999). Additionally, communication and social skill deficits as well as challenging behaviors are often observed in individuals with ID (Kozlowski, Matson, Sipes, Hattier, & Bamburg, 2011; Matson & Cervantes, 2013). Among common challenging behaviors, individuals with ID may exhibit self-injury, aggression, property destruction, pica, and stereotypies (Kozlowski et al., 2011; Matson & Boisjoli, 2007; Matson et al., 2005). Researchers have found that the rates of comorbid psychopathology in the ID population are substantially higher than in the general population (Matson, LeBlanc, Weinheimer, & Cherry, 1999); estimates as high as 40% of individuals with ID have at least one comorbid condition (Kozlowski et al., 2011; Smith & Matson, 2010). Likely comorbid mental health conditions include depression, anxiety disorders, and attention-deficit/hyperactivity disorder (Matson & Smirlo, 1997). Additionally, researchers have found that if an individual presents with substantial deficit in one comorbid domain, (s)he will evince more significant impairments across multiple domains (Kozlowski et al., 2011). These data have important implications for treatment and the side effects that may follow (Advokat, Mayville, & Matson, 2000; Matson & Wilkins, 2008a, 2008b; Matson, Mayville, et al., 1998; Singh, Matson, Cooper, Dixon, & Sturmay, 2005).

Autism spectrum disorder (ASD) is among the most common comorbid disorders in individuals with ID (Matson, Dempsey, & Fostad, 2009). It has been estimated that 4–40% of individuals with ID have ASD, and 50–70% of individuals with ASD have ID (Artigas-Pallares, Rigau-Ratera, & Garcia-Nonell, 2007; LaMalfa, Lassi, Bertelli, Salvini, & Placidi, 2004). ASD
is a neurodevelopmental disorder characterized by qualitative impairments in social communication as well as the presence of restricted, repetitive, and stereotyped patterns of interests, activities, or behaviors (Matson, Boisjoli, Hess, & Wilkins, 2010; Matson, Kozlowski, Hattier, Horovitz, & Sipes, 2012; Worley & Matson, 2012). Some researchers have found that individuals with greater intellectual deficits are more likely to have ASD (Vig & Jедrysek, 1999). Other researchers have indicated that autism symptomology is exacerbated by the presence of more severe cognitive impairment (LoVullo & Matson, 2009; Matson, Dempsey, LoVullo, & Wilkins, 2008). When ASD and ID co-occur, higher rates of stereotypies and challenging behaviors as well as greater deficits in social and adaptive functioning and verbal and non-verbal communication have been observed (Matson, Rivet, Fodstad, Dempsey, & Boisjoli, 2009).

A high rate of comorbid psychopathology has been found within the ASD population (Matson & LoVullo, 2009). Researchers have estimated that as many as 70% of children with ASD present with at least one comorbid disorder (Simonoff, Pickles, Charman, Chandler, & Baird, 2008). Comorbid disorders in children and adolescents with ASD are associated with functional impairments above and beyond those ascribed to the core symptoms of ASD (Joshi et al., 2010; Leyfer et al., 2006). Further, researchers have found individuals with ASD evince significantly more comorbid symptomology than peers with ID (Brereton, Tonge & Einfeld, 2006). However, the co-occurrence of ASD and ID has been associated with an even greater increase in rates of comorbid psychopathology in adults (LoVullo & Matson, 2009). The most common co-occurring disorders found in adults presenting with both ASD and ID include depression, bipolar disorder, schizophrenia, and anxiety (Matson, Gonzalez, Wilkins, & Rivet, 2008).

While the co-occurrence of ASD and ID is clearly associated with more comorbid symptomology in adults, it is uncertain whether children and adolescents with ASD are also at greater risk for comorbidities. The current study will examine the predictive nature of ASD as well as level of intellectual functioning in determining presence of comorbid symptoms in children and adolescents. The symptoms explored will include tantrum behaviors, repetitive behaviors, worry/depression, avoidant behaviors, conduct disorder, under-eating, and over-eating. Based on the extant research literature, it is hypothesized that the presence co-occurring ID will be associated with a more significant presentation of comorbid symptoms.

2. Method

2.1. Participants

Two hundred and nineteen children and adolescents, 3–16 years of age \( (M = 8.21, SD = 4.37) \) included in this study were selected from a larger database. All participants held a diagnosis of ASD. Diagnoses were made using a comprehensive assessment battery that included structured interviews, ratings scales, behavioral observation, and developmental/medical history by trained masters or doctoral level graduate students working under the supervision of a licensed clinical psychologist with over 30 years of experience. Additionally, all participants met ASD diagnosis criteria according to the DSM-IV-TR/ICD-10 Checklist (Matson, Gonzales, Wilkins, & Rivet, 2008).

Participants were divided into two groups; those with ID and those without. Diagnosis of ID was determined by IQ scores assessed through either the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) or Stanford-Binet Intelligence Scales-Fifth Edition (SB5). Cognitive tests were chosen based on a range of individual characteristics including age, level of functioning, language ability, and level of ASD symptomology. Participants with an IQ score below 70 were included in the ID group \( (n = 37) \), and those with an IQ score above 70 were assigned to the non-ID group \( (n = 182) \). The sample was composed of 179 males and 40 females, of which 82.57% were Caucasian, 11.01% were African American, 2.75% were Hispanic, and 3.67% were of other or unspecified ethnicity. Demographics for the sample are included in Table 1.

2.2. Measures

2.2.1. Autism Spectrum Disorders-Comorbidity Child Version (ASD-C-C; Matson & Gonzalez, 2007)

The ASD-C-C is a subscale of the Autism Spectrum Disorder Battery-Children Version (ASD-C). The ASD-C is a measure used in the assessment of ASD symptoms, comorbid disorders, and problems behaviors in children and adolescents 3–16 years of

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<thead>
<tr>
<th>Table 1</th>
<th>Demographic information.</th>
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<tr>
<td></td>
<td>ASD ( (n = 182) )</td>
</tr>
<tr>
<td>Age in years</td>
<td>7.65</td>
</tr>
<tr>
<td>(SD)</td>
<td>(3.35)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>81.32%</td>
</tr>
<tr>
<td>Female</td>
<td>18.68%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>88.95%</td>
</tr>
<tr>
<td>African-Am.</td>
<td>3.87%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.31%</td>
</tr>
<tr>
<td>Other/not specified</td>
<td>3.87%</td>
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Note: SD = standard deviation.
age. The ASD-C consists of 97 items and is completed by an informant. The measure is comprised of three subcales: Autism Spectrum Disorder–Diagnostic–Child Version, ASD-C, and Autism Spectrum Disorder–Comorbid–Problem Behavior–Child Version. Items are rated as either “0” = not a problem or impairment, “1” = mild problem or impairment or “2” = severe problem of impairment.

The ASD-C subscale contains 39 items and is specifically used to assess for commonly co-occurring disorders and symptoms. Factor analysis revealed that items load onto 7 distinct factors: Tantrum Behavior, Repetitive Behavior, Worry/Depressed, Avoidant Behavior, Under-Eating, Conduct Problems, and Over-Eating (Matson, LoVullo, Rivet, & Boisjoli, 2009). The ASD-C-C has been found to have high internal consistency (\( \kappa = .91; \) Matson & Wilkins, 2008a, 2008b), good inter-rater reliability (\( \kappa = .46; \) Matson & Wilkins, 2008a, 2008b), and good test–retest reliability (\( \kappa = .51; \) Matson & Wilkins, 2008a, 2008b). Further, scores on subscales of the ASD-C-C have been found to have convergent validity with similar subscales of the Behavior Assessment System for Children, Second Edition (Matson, Wilkins, et al., 2009; Reynolds & Kamphaus, 2004).

2.2.2. Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV)

The WISC-IV is a standardized measure of intelligence with a normative age range of 6 years 0 months to 16 years 11 months (Kaufman, Flanagan, Alfonso, & Mascolo, 2006; Wechsler, 2003). The WISC-IV takes from 60 to 90 min to administer depending on the individuals age and level of intellectual functioning. The measure produces a full scale composite IQ (FSIQ) score as well as index scores (i.e., verbal comprehension, working memory, processing speed, and perceptual reasoning; Kaufman et al., 2006). High test–retest reliability and internal consistency, especially the FSIQ (i.e., .98) have been reported (Kaufman et al., 2006; WISC-IV Technical Manual #2, 2003).

2.2.3. Stanford–Binet Intelligence Scales-5th Edition (SB5)

Approximately taking 1 h for standard administration, the SB5 consists of 10 subtests. The measure yields a FSIQ and the 10 subtests are split into verbal and nonverbal components, therefore a nonverbal and verbal IQ score is obtained (Roid & Barram, 2004). Psychometrically, the SB5 demonstrates a high internal-consistency reliability score of .98 and high test–retest reliability for the FSIQ (.93–.95; Roid, 2003). The abbreviated version of the SB5 was also administered to some participants included in the current study. The abbreviated version includes a singular verbal-based test and non-verbal test producing an abbreviated battery IQ (ABIQ). Newton, McIntosh, Dixon, Williams, and Youman (2008) found a high correlation between ABIQ and FSIQ (\( r = .71, p < .001 \)), therefore, participants with either ABIQ scores or FSIQ scores were included in the current study.

2.3. Procedure

This study was approved by the university’s institutional review board prior to data collection. Informed consent for the study participants was provided by biological parents and legal guardians before assessment was conducted. The ASD-C-C was administered to parents and care-givers as a component of a larger assessment package (e.g., WISC-IV, SB-5, behavioral rating scales, rating scales of psychopathology, academic achievement). In addition, demographic information on all participants was included in the data analysis. Both an ASD-C-C and a measure of intelligence was needed to be included.

3. Results

A chi-square analysis was completed to compare the groups on gender and race. No significant difference was found between groups on gender \( X^2 (1, N = 219) = .125, p = .724, \) however, a significant difference was found between the groups for race \( X^2 (1, N = 218) = 56.00, p < .001. \) Groups were then compared on age using a one-way analysis of variance (ANOVA). Significant differences were found between the groups for age, \( F(1, 218) = 28.38, p < .001. \) To address significant differences between the groups in both race and age, both variables were entered into the main analysis as covariates.

The main research question, does the co-occurring presence of ID have a significant effect on presentation of comorbid symptoms, was addressed using an Analysis of Covariance (ANCOVA). Presence of ID was entered into the analysis as the

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<tr>
<td>Means and standard deviations of ASD-C-C subscales.</td>
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<table>
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<tr>
<th>Subscale</th>
<th>ASD M (SD)</th>
<th>ASD and ID M (SD)</th>
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<tr>
<td>Tantrum behavior</td>
<td>8.09 (4.63)</td>
<td>7.47 (3.68)</td>
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<tr>
<td>Repetitive behavior</td>
<td>5.27 (3.66)</td>
<td>5.66 (3.85)</td>
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<tr>
<td>Worry/depressed</td>
<td>2.97 (2.62)</td>
<td>2.87 (2.78)</td>
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<tr>
<td>Avoidant behavior</td>
<td>4.83 (2.89)</td>
<td>4.80 (3.25)</td>
</tr>
<tr>
<td>Under-eating</td>
<td>1.07 (1.55)</td>
<td>7.22 (1.11)</td>
</tr>
<tr>
<td>Conduct disorder</td>
<td>2.09 (2.07)</td>
<td>1.88 (1.83)</td>
</tr>
<tr>
<td>Over-eating</td>
<td>1.19 (1.60)</td>
<td>1.83 (2.04)</td>
</tr>
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Note: \( M = \) mean.
fixed factor, and the subscales of the ASD-C-C were entered as dependent variables. Both age and race were entered into the analysis as covariates. Significant differences were not found between the ID group and non-ID group with regard to any of the total subscale scores. Non-significant results of the ANCOVAs are as follows: Tantrum Behavior $F(1, 207) = .034, p > .05$, Repetitive Behavior $F(1, 207) = 2.32, p > .05$, Worry/Depressed $F(1, 187) = 1.75, p > .05$, Avoidant Behavior $F(1, 216) = .130, p > .05$, Under-Eating $F(1, 218) = .254, p > .05$, Conduct Disorder $F(1, 204) = 1.78, p > .05$, and Over-Eating $F(1, 211) = 1.35, p > .05$. See Table 2 for a summary of the descriptive statistics.

4. Discussion

Presence of co-occurring ID in children and adolescents with ASD did not significantly effect the presentation of comorbid symptoms compared to those without ID. Parents and caregivers of children and adolescents with comorbid ID did not endorse greater severity of tantrum behavior, repetitive behavior, worry/depression, avoidant behavior, under-eating, conduct disorder, or over-eating. These findings are not consistent with previous research measuring comorbid symptoms in children with differing levels of intellectual functioning (Mayes, Calhoun, Murray, Ahuja, & Smith, 2011; Tureck, Matson, Cervantes, & Konst, 2014).

Previous studies examining presence of comorbid symptoms in individuals with ID consistently report higher rates compared to those with higher intellectual functioning (Cherry, Paclawskyj, & Matson, 1997; Kozlowski et al., 2011; Matson, Cooper, Malone, & Moskow, 2008; Smith & Matson, 2010). Further, these results are at odds with research findings that the co-occurrence of ASD and ID is associated with an even greater rate of comorbid psychopathology in adults, with the exception of conduct problems (LoVullo & Matson, 2009). In a study by LoVullo and Matson (2009) examining comorbid psychopathology in adults with ASD and ID, scores were only not significantly higher for adults with ASD and ID for conduct problems. For all other comorbid symptoms measured, individuals with ASD and ID presented with greater impairment compared to those with ID alone (LoVullo & Matson, 2009).

One explanation for these findings may lie in the comorbid symptoms measured. The most common co-occurring disorders researchers have previously identified as presenting with both ASD and ID include depression, bipolar disorder, schizophrenia, and anxiety (Matson, Hess, & Bojsjö, 2010). None of these disorders were examined in the current study. Limitations in sample size may also contribute to the lack of differences found between the groups. The non-ID group was considerably larger than the ID group, likely leading to an underestimation of symptom presentation in the current analysis. Since it is estimated that 50–70% of individuals with ASD have ID, this line of research must be extended with larger sample sizes (Artigas-Pallares, Rigau-Ratera, & Garcia-Nonell, 2007; LaMalfa, Lassi, Bertelli, Salvini, & Placidi, 2004). The interaction between ASD and ID in children and adolescents can influence assessment approaches, treatment planning, and prognosis, and thus must be better understood.

It is well-established that accurately identifying and assessing the severity of comorbid symptoms is critical for the most effective intervention planning and implementation (Matson, Wilkins, et al., 2009; Matson, Gonzalez, & Rivet, 2008). Therefore, children and adolescents with ASD and those with both ASD and ID would benefit from tailored interventions for comorbid symptoms. Though this study did not find differences in the presentation of comorbid symptoms between the groups, level of intellectual functioning should be taken into account when designing interventions. Intervention programs may need to be adapted to account for cognitive impairments in order to best serve the child.

References


