



ADHD symptom prevalence and risk factors in a sample of toddlers with ASD or who are at risk for developmental delay



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ABSTRACT

Individuals with attention deficit/hyperactivity disorder (ADHD) experience difficulties with inattention, hyperactivity, and impulsivity which significantly interfere with their daily functioning. Symptoms of the disorder occur in children, but the developmental trajectory of ADHD symptoms is not known. The present study examines the prevalence of ADHD symptomatology in a sample of 2956 children who were determined to be at risk for developmental delay. Prevalence rates for ADHD in the overall sample was 4.50%, and prevalence rates by gender, race, and presence of autism spectrum disorder (ASD) were comparable. The prevalence was not significantly different in children with an ASD diagnosis. No significant effects of gender or ASD diagnosis were observed. ADHD should be considered as a diagnosis among young children who present to clinics for children at risk for developmental delay, and future researchers should further study its developmental trajectory, beginning at an early age.

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Attention-deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder diagnosed at increasingly high rates among young children (Bruchmuller, Margraf, & Schneider, 2012; Miller, Nielsen, & Schoen, 2012; Scituito & Eisenburg, 2007). Researchers report a wide range of prevalence estimates for ADHD, ranging from as low as 2% to as high as 17.8% of the general population (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Froehlich et al., 2007) with similar findings worldwide (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007; Skounti, Philalithis, & Galanakis, 2007). Children with ADHD exhibit hyperactivity, impulsivity, and difficulty with sustained attention (Barkley, 1981, 1997; Burns, Boe, Walsh, Sommers-Flannagan, & Teegarden, 2001; DuPaul, Anastopoulou, & Reid, 1998).

Hyperactivity and impulsivity are considered problematic when they occur at higher levels than would be expected based on developmental level (Barkley & Cunningham, 1979; Luk, 1985). Inattention involves an inability to sustain attention and filter out distractions (Barkley, 1997; Seguin, Boulerice, Harden, Tremblay, & Pihl, 1999). Hyperactivity and impulsivity involve the inability to sit still, interrupting, and being constantly “on the go”. Children with ADHD also commonly exhibit functional impairments including poor motor coordination (Barkley, DuPaul, & McMurray, 1990; Szatmari, Offord, & Boyle, 1989), academic difficulties (Hinshaw, 2002), and poor social skills (Cunningham & Siegel, 1987; DuPaul, McGoey, Eckert, & VanBrakle, 2001; Erhardt & Hinshaw, 1994). Symptoms of ADHD can emerge in early childhood and often persist into adulthood (Wilens, Biederman, & Spencer, 2002).

Research on ADHD has focused primarily on school-age children. Conversely, there is a dearth of research about the emergence of symptoms in toddlers (Abdekhodiaie, Tabatabaei, & Gholizadeh, 2012; Price et al., 2005). The research that has

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been conducted provides evidence that hyperactive and impulsive symptoms typically emerge first at around 3–4 years of age (Barkley, 1997). The inattentive symptoms tend to emerge later between the ages of 6 and 7 (Price et al., 2005). Evidence from research indicates that the some symptoms of ADHD are present prior to age 4; however, diagnosis in toddlers is unreliable to date (Gurevitz, Geva, Varon, & Leitner, 2012; Tynan & Nearing, 1994). Regardless of when symptoms emerge, individuals with ADHD exhibit high rates of comorbidity and substantial role impairment (Kessler et al., 2006). The overlap between ADHD and autism spectrum disorders (ASDs), for example, has been a main focus of recent research on comorbidity as there are many similarities between the two disorders including poor social skills, and difficulties with motor coordination.

ASDs are a group of pervasive developmental disabilities characterized by impairments in socialization, communication, and the presence of restricted, repetitive behaviors or interests (Matson & Wilkins, 2009; Matson, Hess, Neal, Mahan, & Fodstad, 2010; Venuti, de Falco, Esposito, Zanninelli, & Bornstein, 2012). These symptoms are present from an early age and a large amount of research has focused on developing measures that can correctly identify toddlers with ASD (Fodstad, Matson, Hess, & Neal, 2009; Matson, Wilkins, & Gonzalez, 2008; Matson, Wilkins, et al., 2009). The most recent epidemiological research on ASD indicates that ASD occurs in about 1% of the total population with higher rates in males than females (Kim et al., 2011; Kocovska et al., 2012; Nygren et al., 2012).

In recent years, researchers have focused on identifying comorbid psychopathology in individuals with ASD (LoVullo & Matson, 2009; Matson & LoVullo, 2009; Matson & Nebel-Schwalm, 2007; Poon, 2012; Smith & Matson, 2010a,b,c). The rates of associated symptoms and disorders are much higher than among typically developing children (Leyfer et al., 2006; Simonoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008). For example, Leyfer et al. (2006) assessed 109 children diagnosed with ASD and found that 72% had at least one comorbid disorder. The most common disorder was Specific Phobia at 44.3% followed by Obsessive Compulsive Disorder at 37.2% and ADHD at 30.6%. Simonoff et al. (2008), similarly, found that 70.8% of children with ASD had a comorbid disorder. In their sample of 112 children, the most common comorbid diagnosis was Social Anxiety Disorder at 29.2% followed by ADHD at 28.2%. Additionally, of those children with ADHD, 84% received another comorbid diagnosis. The behavioral features of ASD and ADHD often overlap, increasing diagnostic uncertainty (Clark, Feehan, Tinlin, & Vostanis, 1999; Efstratopoulou, Janssen, & Simons, 2012; Lovell, Moss, & Wetherell, 2012). Children with ASD often display significant symptoms of inattention, impulsivity, and hyperactivity, while children with ADHD often display deficits in communication and socialization (Carpenter, Loo, Yang, Dang, & Smalley, 2009; Goldstein & Schwabach, 2004).

This conceptualization of ASD and ADHD as separate disorders comorbid versus subsuming the symptoms under one diagnosis is supported by recent research. For example, children with ASD and significant ADHD symptoms exhibit significantly higher rates of externalizing behaviors than children with ASD only (Lin, Lai, & Gau, 2012; Lovell et al., 2012; Shimoni, Engel-Yeger, & Tirsosh, 2012; Yerys et al., 2009). Further, despite both disorders involving impairments in executive functioning, the specific pattern of impairments is distinct for each disorder (Hanson et al., 2013). Geurts, Verte, Oosterlaan, Roeyers, and Sergeant (2004), for example, found that individuals with ADHD exhibited impairments in working memory, verbal fluency, and response inhibition. Conversely, individuals with ASD exhibited impairments in planning and cognitive flexibility. Further, those individuals meeting criteria for both disorders demonstrate more profound impairments across all aspects of executive functioning (Sinzig, Morsch, Bruning, Schmidt, & Lehmkuhl, 2008).

To date, few researchers have focused on the identification of ADHD symptoms in toddlers with ASD or at risk for developmental delay. Researchers evaluated symptoms of inattention and impulsivity in toddlers with ASD and found that severity of ASD symptoms was positively related to number of ADHD symptoms (Matson, Fodstad, Mahan, & Sevin, 2009). Further, Matson, Mahan, Hess, and Fodstad (2010) found that attentional abilities significantly differentiated between low and atypical developmental quotient (DQ) in toddlers with ASD, such that these inattentive symptoms were much more common in those with low DQ.

Both symptoms of ASD and ADHD are thought to emerge in early childhood (Barbaro & Dissanayake, 2009; Rapley et al., 1999). Ronald, Edelson, Asherson, and Saudino (2010) assessed the covariance of ASD and ADHD symptoms in 2-year-old twins and found some common genetic and environmental factors contributing to the development of both disorders. Nonetheless, despite the increased interest in early identification of comorbid symptoms, there is a scarcity of research on prevalence of ADHD in individuals at risk for developmental delay under the age of 5. The goal of the current study was to evaluate prevalence and determine what characteristics were related to a possible ADHD diagnosis in toddlers with ASD or at risk of developmental delay.

1. Methods

1.1. Participants

Participants were all toddlers and their caregivers in Louisiana's EarlySteps program who provided consent for participation in research studies. EarlySteps is a state-run program for children with developmental delays and their families, or children who have medical conditions associated with developmental delays. EarlySteps is available to all families of qualifying infants and toddlers up to 36 months of age in the state of Louisiana. This early intervention service provides assessment, diagnostics, and related services under the Individuals with Disabilities Education Act, Part C.

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