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An analysis of reading abilities in children with autism spectrum disorders

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ABSTRACT

Background: This study examined the reading performance of a nationally representative sample of 110 children with autism spectrum disorder (ASD).

Method: The sample was divided into two groups by age; 3:10–5:10 years (Group 1) and 6:00–17:3 years (Group 2). Core reading components were assessed across both groups, which included: word reading, comprehension, phonological awareness, phonemic awareness, reading rate, vocabulary, accuracy and non-word reading.

Results: The data demonstrated impaired reading skills across reading components in both groups, with the exception of word reading pre-requisites for Group 1 and reading rate for Group 2. An analysis of the full sample found that many participants performed within the lowest possible range on standardized tests (standard score ≤ 55) in particular, comprehension (82%) and phonemic awareness (62%). Language abilities and autism symptomatology severity were assessed for relationships with reading outcomes. The largest relationships were in autism severity and vocabulary and multiple regression analyses indicated that autism severity was predictive of language scores suggesting that individuals presenting with more severe symptoms of autism demonstrated the most reading deficits.

Conclusion: These findings highlight the severe reading deficits present in this population and the need for reading assessments as well as the design of highly individualized reading interventions.

1. Introduction

Proficient reading ability is considered one of the single most important outcomes in a child's education (Anderson, Hiebert, Scott & Wilkinson, 1985). The Education for Persons with Special Educational Needs Act in 2004 specified that children with special educational needs should be educated, wherever possible, in an inclusive environment and as a result, an increasing number of children with Autism Spectrum Disorder (ASD) are educated within regular classrooms. Research investigating effective interventions with school-aged children with ASD tends to focus on improving central deficit areas associated with the disorder; namely, communication and social skills (Ramdoss et al., 2010; Schepis, Reid, Behrmann & Sutton, 1998). Independence into adulthood requires abilities beyond social and communication skills, specifically reading skills. Reading is a pivotal skill, which can expand learning opportunities, adaptive living skills, future employment, and improve general quality of life (Lyon, 2001; Grigorenko, Klin, & Volkmar, 2011).

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1.1. Reading development

A number of skills are required to read a sentence ranging from recognizing each individual letter, letter group, whole-word recognition, through to understanding the intended meaning of the text (Nation, Clark, Wright & Williams, 2006). In early school years, children typically learn to decode unknown words, recognize sight words, read connected text with some fluency and comprehend simple sentences (Kittel, 2013). In later years, reading becomes more complex, focusing on expanding vocabulary and grammatical concepts. In order to comprehend text, the reader requires certain pre-requisite skills. These are multi-faceted skills, which include the following; proficient oral language skills, adequate vocabulary, make inferences from text, relate text to prior knowledge, and the ability to integrate each of these skills together.

1.2. Emergent literacy

An important period for reading development is in early childhood (Newman, Coppel, & Bredekamp, 2000). Neurotypical children as young as two years-of-age demonstrate emergent or pre-reading behaviors. These emergent reading behaviors include print awareness (letters and words have meaning), oral language skills (recite rhymes and letters) and print conventions (knowledge of book orientation, turning pages of a book; Davidson & Weismer, 2014). Historically, reading instruction was not provided for individuals with ASD based upon the premise that pre-requisite skills were deficient within this population. However, more recently, research has begun to investigate emergent reading skills in this population (Davidson & Weismer, 2014; Dynia, Brock, Logan, Justice & Kaderavek, 2016; Dynia, Brock, Justice & Kaderavek, 2017; Lanter, Williamson, Erickson, & Freeman, 2012; Lanter, Freeman, & Dove, 2013). Westerveld, Trembath, Shell shear, and Paynter (2016) conducted a systematic review to investigate emergent literacy skills of preschool children with ASD. Results found three studies (Davidson & Weismer, 2014; Dynia, Lawton, Logan, & Justice, 2014; Lanter et al., 2012) which indicated that children with ASD tend to have comparable alphabet knowledge to their neuro-typical peers, however, they lag behind in print-concept knowledge, vocabulary, and phonological awareness (Dynia et al., 2014). The authors also noted that there seems to be a common subset profile of heterogeneity across emergent-literacy skills (Davidson & Weismer, 2014). Finally, they found that performances of emergent literacy seem to be associated with deficits related to ASD, such as language (Dynia et al., 2014; Lanter et al., 2012; McIntyre, Solari, Gonzales et al., 2017), cognition and social skills (Davidson & Weismer, 2014). Subsequent research has also emerged indicating that children with ASD are unlikely to acquire print concept knowledge at the rate of their neuro-typical peers (Dynia et al., 2016). Existing research show that prior to starting school, children with ASD already face difficulties in pre-reading skills (Ricketts, 2011; Westerveld et al., 2016), this highlights the importance of investigation in this area, however, relative to research in school-aged children, research is scant.

1.3. Variability and challenges in reading skills in ASD

Previous research in reading abilities in children with ASD have reported varied results (Griswold, Barnhill, Smith-Myles & Simpson, 2002; Jones et al., 2009; Mayes & Calhoun, 2006; Nation et al., 2006). Researchers have suggested that reading abilities are highly correlated with language skills (Bishop & Snowling, 2004; Catts & Kamhi, 2005, McIntyre, Solari, Gonzales et al., 2017), as well as with ASD symptom severity (Åsberg, Kopp, Berg-Kelly, & Gillberg, 2010; Estes, Rivera, Bryan, Cali, & Dawson, 2011; Jones et al., 2009; Norbury & Nation, 2011; Ricketts, Jones, Happé, & Charman, 2013; Westerveld et al., 2017). Since one of the core deficits associated with a diagnosis of ASD is a delay in language development, it is therefore not surprising that associations between poor language skills and poor reading skills have been demonstrated (e.g., Gabig, 2010, Kjelgaard & Tager-Flusberg, 2001; Lucas & Norbury, 2014; Miniscalco & Sandberg, 2010). Therefore, this population may be at considerable risk of reading delays or difficulties. Other challenges in acquiring reading skills may be associated with difficulties integrating information in context (Hill & Frith, 2003) and deficits in phonological skills (Gabig, 2010), all of which are necessary for reading. Conversely, other researchers have identified individuals with ASD as showing typical word reading skills (Gabig, 2010; Nation et al., 2006; Newman et al., 2007).

1.4. Comprehension difficulties in ASD

In general, decoding and comprehension skills develop simultaneously; however, this may not be the case for children with developmental disorders (Nation & Norbury, 2005). One of the most common reading profiles reported for the children with ASD is that of advanced word reading or decoding abilities but poor reading comprehension (Frith & Snowling, 1983; O'Connor & Klein, 2004). This has been referred to as a hyperlexic profile (Silberberg and Silberberg, 1967, 1968). Hyperlexia is the ability to recognize written words in advance of age and cognitive functioning (Richman & Kitchell, 1981; Silberberg & Silberberg, 1967). A number of studies indicate that this hyperlexic reading profile exemplifies children with ASD (Huemer & Mann, 2010; Newman et al., 2007; O'Connor & Klein, 2004; Williams, Goldstein, & Minshew, 2006) with approximately 5–10% of individuals with ASD being characterized as hyperlexic (Burd & Kerbeshian, 1985).

1.5. Factors that influence reading skills

Previous research has contributed to the understanding of reading abilities within this population (e.g., Leytham, Pierce, Baker, Miller, & Tandy, 2015; May, Rinehart, Wilding, & Cornish, 2015; Nation et al., 2006; Reutebuch, El Zein, Kim, Weinberg, & Vaughn, 2015). However, these studies consist of specific diagnostic inclusion criteria and relatively small samples sizes; thus narrowing the

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