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Sensory features as predictors of adaptive behaviors: A comparative longitudinal study of children with autism spectrum disorder and other developmental disabilities

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ABSTRACT

Background: Children with autism spectrum disorder (ASD) and other developmental disabilities (DD) exhibit sensory features that differ from their typically developing peers. Prior cross-sectional research has demonstrated significant associations between elevated sensory features and lower adaptive behavior scores, yet there is limited prospective research examining longitudinal associations.

Aims: To examine the longitudinal prediction of early sensory response patterns (i.e., hyperresponsiveness, hyporesponsiveness, and sensory interests, repetitions, and seeking behaviors) to later adaptive behavior outcomes in children with ASD and DD.

Methods and procedures: Children with ASD (n = 51) and DD (n = 30) were seen at two time points (Time 1: M(SD) = 5.6(2.5) years; Time 2: M(SD) = 9.0(2.2) years). We used a series of regression models with both observational and parent-report measures of sensory response patterns, and including group interactions.

Outcomes and results: All three sensory response patterns significantly predicted aspects of adaptive behaviors, with some differences based on assessment format and diagnostic group. Across groups and sensory patterns, we found some evidence that elevated sensory features early in childhood predicted lower adaptive behavior skills later in childhood.

Conclusions and implications: Sensory features may interfere with development of adaptive behaviors, suggesting a need for effective interventions addressing sensory features early in development.

What this paper adds?

As children age, development of adaptive skills is needed to perform daily life activities that become increasingly complex and demanding. Research indicates that children who exhibit unusual sensory responses to their environment (i.e., hyperresponsiveness,

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hyporesponsiveness, or intense sensory interests, repetitions, and seeking behaviors) also exhibit increased difficulty in communication, socialization, or completion of daily living tasks. However, research investigating the longitudinal prediction of later adaptive behaviors by sensory features early in childhood is currently lacking. This study expands on existing work by:

- conducting a prospective study examining the extent to which early sensory response patterns (i.e., hyperresponsiveness, hyporesponsiveness, sensory interests, repetitions, and seeking behaviors) predict later adaptive behaviors
- measuring and analyzing each sensory response pattern independently with each adaptive behavior domain
- including diagnostic group as a moderator to deepen understanding of identified associations
- providing evidence from both parent-report and observational measures in longitudinal design

Unique study findings indicate that early sensory features significantly predict later adaptive outcomes, and that these results vary by sensory response pattern. Diagnostic group is associated with some of these differential outcomes.

1. Introduction

Children with autism spectrum disorder (ASD) and those with other developmental disabilities (DD) are frequently reported to present with unusual behavioral responses to sensory stimuli (i.e., sensory features) compared to typically developing children (Baranek, David, Poe, Stone, & Watson, 2006). Cross-sectional studies suggest that sensory features may be an important factor affecting daily life activities (Baker, Lane, Angley, & Young, 2008; Dunn, 2007; Tomchek, Little, & Dunn, 2015; Watson et al., 2011) and quality of life (Ashburner, Ziviani, & Rodger, 2008; Cermak, Curtin, & Bandini, 2010) for children with ASD and DD, as well as the well-being of their caregivers (Kirby, White, & Baranek, 2015). Therefore, many therapeutic and educational services aim to target these issues for better functional outcomes. However, there is little prospective research depicting the impact of early sensory features on later adaptive behaviors in these two populations. The present study focused on the longitudinal prediction of three sensory response patterns (i.e., hyperresponsiveness, hyporesponsiveness, and sensory interests, repetitions and seeking behaviors) early in life to adaptive behavior outcomes for children with ASD and DD. We also explored the extent to which diagnostic group may influence these longitudinal effects.

1.1. Sensory features

Sensory features have been organized as multi-dimensional patterns of behavioral response to stimuli across modalities, including hyperresponsiveness (i.e., exaggerated, aversive or avoidant responses to stimuli), hyporesponsiveness (i.e., muted, delayed or absent responses to stimuli), and sensory interests, repetitions, and seeking behaviors (i.e., intense fascination or repeated engagement with specific sensory qualities of stimuli or sensory-based actions with the body). These behavioral patterns manifest very early in development (Baranek, 1999a; Green, Ben-Sasson, Soto, & Carter, 2012), and persist throughout childhood (McCormick, Hepburn, Young, & Rogers, 2016).

Sensory features are well-characterized in the literature for children with ASD and DD (Baranek et al., 2006; Ben-Sasson et al., 2009; Cheung & Siu, 2009; Kern et al., 2006). Cross-sectional studies indicate that many children with ASD experience both higher rates of sensory features (Baranek et al., 2006; Tomchek & Dunn, 2007; Wiggins, Robins, Bakeman, & Adamson, 2009) and more complex responses than those with DD (Ben-Sasson et al., 2009) or typical development (TD; Ahn, Miller, Milberger, & McIntosh, 2004; Ben-Sasson, Cermak, Orsmond, & Tager-Flusberg, 2007; Dunn, Myles, & Orr, 2002). Individuals with DD are also reported to have elevated levels of sensory features compared to the TD population (Cheung & Siu, 2009; Ermer & Dunn, 1998), thereby suggesting that developmental delay may be a contributing factor to the behavioral manifestation of sensory features across many disability groups.

1.2. Adaptive behaviors

Adaptive behaviors comprise age-appropriate abilities for living and functioning in daily life including socialization, communication, daily living skills, mobility and community participation. Studies of children with ASD have found a pattern of relative deficits in socialization and communication compared to daily living skills (Carter et al., 1998; Freeman, Del'Homme, Guthrie, & Zhang, 1999; Rodrigue, Morgan, & Geffken, 1990; Volkmar et al., 1987), whereas the opposite trend has been reported for children with DD (Ditterline, Banner, Oakland, & Becton, 2008; Dykens, Hodapp, & Evans, 1994). Furthermore, deficits in adaptive behaviors for individuals with ASD may be disproportionately large relative to their cognitive abilities or verbal IQ (Klin et al., 2007), indicating particular importance in addressing these skills through various services.

The results of longitudinal studies tracking changes in adaptive behaviors in children with ASD and their comparison to children with DD are mixed. While some have shown adaptive behaviors to be stable from preschool to adolescence (e.g., Schatz & Hamdan-Allen, 1995), others have reported a decline in standard scores as children age (e.g., Fisch, Simensen, & Schroer, 2002). Some studies indicate that children with ASD showed mild to moderate gains in their skills over time, but have a slower rate of growth compared to their peers with DD or TD (Anderson, Oti, Lord, & Welch, 2009; Di Nuovo & Buono, 2007; Howlin, Mawhood, & Rutter, 2000; Matson, Dempsey, & Fodstad, 2009; McGovern & Sigman, 2005). Furthermore, children with ASD tend to show more gains in adaptive skills during early childhood compared to later years (Shattuck et al., 2007). Likewise, individuals with higher IQ scores appear to show more gains in adaptive skills than those with lower IQ scores (Baghdadli et al., 2012; Kanne et al., 2011). It is

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