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Local processing and social skills in children with Autism Spectrum Disorders: The role of anxiety and cognitive functioning

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ABSTRACT

The present study examined the relations between anxiety, cognitive functioning, local processing, and social skills in a group of 102 children diagnosed with an Autism Spectrum Disorder. The results indicated that children diagnosed with Asperger's Disorder had significantly higher cognitive functioning and enhanced local processing (i.e., Block Design scores) compared to those diagnosed with Autistic Disorder or PDD-NOS. Regression analyses results showed that anxiety and cognitive functioning moderated the association between local processing and social skills. For children with low cognitive functioning and high anxiety, greater local processing was associated with poorer social skills than those with high cognitive functioning, high anxiety, and greater local processing. For children with high cognitive functioning and high anxiety, enhanced local processing was associated with better social skills than those with high cognitive functioning and reduced local processing. Implications of these findings are discussed.

1. Introduction

The Centers for Disease Control and Prevention (2012) estimate that 1 in 88 children are affected by an Autism Spectrum Disorder (ASD; Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder – Not Otherwise Specified). The core features of ASDs include impairments in social interaction and communication and the presence of stereotyped behaviors and restricted interests (American Psychiatric Association, 2000). Whereas typically developing individuals tend to process information globally, individuals with ASDs tend to process information locally (Frith, 1989; Shah & Frith, 1993). That is, individuals with ASDs generally ignore global information and focus on the smaller details (local information). In the literature regarding ASDs, a detail-focused processing style is referred to as weak central coherence (Happé & Frith, 2006). Although individuals with ASDs generally process information locally, they do not have deficits in global processing (i.e., individuals with ASDs can process information globally when explicitly instructed to do so) (Happé & Frith, 2006). A

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preference for local processing can be beneficial. For example, a narrow focus can allow individuals to process information more efficiently. However, local processing may be impairing in instances in which the context (i.e., global information) is important. For example, social interactions are complex and involve a number of cues that need to be integrated in order to successfully navigate the social environment. Given that individuals with ASDs tend to have a narrow focus when processing information, they may miss important aspects of the social environment.

Over the past decade, there have been a number of studies that have examined the processing styles of individuals with ASDs. Most of these studies have shown that individuals with ASDs perform better than typically developing children on visuospatial tasks that favor local processing (e.g., the Embedded Figures Test, the Block Design subtest, Navon hierarchical figures). For example, Morgan, Maybery, and Durkin (2003) found that children with ASDs were faster than their controls (matched for age, gender, and nonverbal ability) on the Preschool Embedded Figures Test. Another study used two variations of the Navon hierarchical figures task (Navon, 1977) to examine the processing styles of children with ASDs and typically developing children (Plaisted, Swettenham, & Rees, 1999). The results indicated that there were no group differences in the selective attention condition. However, in the divided attention condition, the children with Autistic Disorder showed local advantage (i.e., responded more quickly and more accurately to local targets) and showed local interference (i.e., were slower when the target appeared at the global level when the letters were incongruent). On the other hand, the typically developing children responded more quickly and more accurately to global targets (i.e., global advantage) and were slower and made the most errors when the target appeared at the local level (i.e., global interference). Global processing may be beneficial when processing certain information. For example, studies have shown that global processing is advantageous when processing faces (Bartlett & Seacy, 1993; Diamond & Carey, 1986; Farah, Tanaka, & Drain, 1995; Rhodes, 1988). Therefore, it is possible that a local processing bias may affect social functioning in children with ASDs.

The effects of local processing on social functioning may be influenced by the child's level of anxiety and cognitive functioning. Studies have shown that emotion and mood affect perceptual processing (Fredrickson & Branigan, 2005; Srinivasan & Hanif, 2010). More specifically, anxiety and depression are associated with a preference for local rather than global processing (Basso, Scheffe, Reis, & Dember, 1996; Derryberry & Reed, 1998). As such, high anxiety may contribute to a local processing bias, which, in social interactions, would interfere with children's ability to perceive the more global aspects (i.e., overall context and meaning) of social interactions. For example, when conversing with others, children with ASDs and high anxiety may focus on details (e.g., certain words and regions of the face) and fail to integrate the details into a coherent meaning, which may lead to impairments in understanding verbal and nonverbal communication in social interactions.

To date, only one study has examined the possible association between anxiety and detail-focused processing (i.e., weak central coherence) in children with ASDs (Burnette et al., 2005). Consistent with previous findings, the study found that the children with ASDs reported significantly greater levels of social anxiety than the control group, which consisted of typically developing children and children with learning disabilities. The researchers did not find an association between anxiety and local processing. However, Burnette and colleagues proposed that a lack of an association between anxiety and local processing in this study may have been due to the use of self-report measures of anxiety, as the reliability and validity of self-report measures that assess psychiatric symptoms in children and adolescents with ASDs remains unclear (Mazefsky, Kao, & Oswald, 2011).

Additionally, the association between anxiety and local processing may be moderated by cognitive functioning. Specifically, there is evidence of a positive association between cognitive functioning (typically measured as IQ score) and anxiety in children with ASDs. For example, Sukhodolsky et al. (2008) examined anxiety in children and adolescents with high (i.e., IQ $\geq$ 70) and low functioning (i.e., IQ $<$ 70) ASDs. The results indicated that high functioning children were rated by their parents as more anxious than low functioning children. Furthermore, higher levels of anxiety were associated with higher IQ and greater social impairment. It is unclear what drives the relationship between cognitive functioning and anxiety but some researchers have hypothesized that compared to children with ASDs and cognitive impairments, high functioning children with ASDs may have more insight of their behavioral abnormalities, which may make them susceptible to heightened anxiety (Wing, 1992). Niditch, Varela, Kamps, and Hill (2012) examined the effects of cognitive impairment, social awareness, and aggression on anxiety in children with ASDs. Similar to previous studies, the researchers found that cognitive functioning was positively associated with anxiety in children with ASDs. Moreover, they found that higher aggression in the context of higher cognitive functioning and social awareness predicted anxiety. It may be possible that as cognitive functioning increases, so does the awareness that other people perceive one's limited social skills and maladaptive behavior, including engaging in aggressive behavior, as unacceptable, which may result in increased anxiety. Thus, high cognitive functioning may exacerbate the association between local processing and social functioning by amplifying the effects of anxiety on local processing.

The present study aimed to examine the potential moderating effects of anxiety and cognitive functioning on the relation between local processing and social skills in children with ASDs. We hypothesized that (1) enhanced local processing would be associated with poorer social skills, and (2) anxiety and cognitive functioning would moderate the association between local processing and social skills such that (a) at high levels of anxiety, enhanced local processing would be related to poorer social skills than at lower levels of anxiety and (b) at high levels of cognitive functioning and anxiety, enhanced local processing would be most strongly related to poor social skills.