



Characterising the relationship between theory of mind and anxiety in children with Autism Spectrum Disorder and typically developing children

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ABSTRACT

Background: Social communication impairments associated with Autism Spectrum Disorder (ASD) is a multi-faceted phenomenon that encapsulates a broad range of skills with Theory of Mind (ToM) as a key component. Early Theory of Mind (ToM) skills, such as joint attention, typically develop during infancy and provide a foundation for the co-emergence of affect regulation via social referencing. Children with Autism Spectrum Disorder (ASD) demonstrate delays and impairments in the development of ToM, and up to 40% of children with ASD also experience co-occurring symptoms of anxiety and poor affect regulation. **Method:** Using parent report, this cross-sectional study aimed to characterise the relationship between ToM competency and anxiety, and explore how specific ToM deficits may confer vulnerability to anxiety in children (4–8 years old) with ASD. **Results:** Early ToM skills, such as joint attention and social referencing, mediated the relationship between broader social communication impairments and anxiety symptom severity in children with ASD. **Conclusions:** Increasing competency of early ToM skills might provide additional therapeutic benefits for clinical interventions targeting anxiety in children with ASD.

1. Introduction

1.1. Anxiety in Autism spectrum Disorder

Many children with Autism Spectrum Disorder (ASD) demonstrate high co-occurring rates of anxiety and poor affect regulation (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Simonoff et al., 2008; White, Oswald, Ollendick, & Scahill, 2009a), which can place high levels of strain on quality of life in addition to existing symptoms of ASD (Ozsivadjian & Knott, 2011). A meta-analysis of thirty-one studies involving 2121 children and adolescents with ASD found that 39.6% experienced at least one co-occurring anxiety disorder by DSM-IV criteria (van Steensel, Bögels, & Perrin, 2011). Elevated anxiety has been associated with greater externalising behaviours (White, Oswald, Ollendick, & Scahill, 2009b), as well as social impairments such as reduced social responsiveness (Sukhodolsky et al., 2008) and greater social maladjustment (Bellini, 2004; Wood & Gadow, 2010). Recent literature have focused on adapting and evaluating intervention targeting anxiety in young people with ASD (Ozsivadjian & Knott, 2011; Reaven, 2011; Wood

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et al., 2015), as well as identifying key constructs that contribute towards conceptualisation of anxiety in adults with ASD, including intolerance of uncertainty, inability to recognise and identify emotions (alexithymia), and poor emotional acceptance (Maisel et al., 2016). Individuals with ASD may thus have difficulty in appropriately identifying and regulating their affect response when faced with uncertainty, and consequently experience high levels of anxiety.

Given that individuals with ASD have wide-ranging deficits in social communication skills, their reduced capacity to appropriately respond and react contingently upon social cues might contribute towards feelings of increased level of uncertainty during social situations, which may be highly anxiety provoking. It is important to acknowledge that social communication impairment associated with ASD is a multi-faceted phenomenon that encapsulates a broad range of skills, ranging from poor social awareness, to reduced social motivation (American Psychiatric Association, 2013; Chevallier, Kohls, Troiani, Brodtkin, & Schultz, 2012; Lerner, Hutchins, & Prelock, 2010). Identifying deficits in specific social skills that might significantly contribute towards anxiety symptom severity can thus help inform the development and adaptations of more focused intervention to better target and improve the efficacy of treatment for anxiety in individuals with ASD.

1.2. Social communication and ToM

One widely documented component of the broader social communication impairments in ASD is Theory of Mind (ToM) (Baron-Cohen, 1989a, 1989b, 1991, 2000; Kasari, Sigman, Mundy, & Yirmiya, 1990). ToM is an aspect of social cognition that refers to an individual's ability to impute, construct, and represent mental states of both self and others (Baron-Cohen, 1989a, 1989b, 1991; Premack & Woodruff, 1978). The wide scope of ToM skills range from early emerging joint attention and social referencing, to the ability to develop meta-representation and an understanding of false-beliefs, to higher order skills such as making complex social judgements (Hutchins, Prelock, & Bonazinga, 2011). The ability to attribute mental states to infer intentions of others can help individuals predict how social interactions might unfold and is an important social cognitive mechanism (Premack & Woodruff, 1978).

1.3. Social communication, ToM, and anxiety

Developmental delays and deficits in ToM competency is evident from a young age in children with ASD (Baron-Cohen, 1989a, 1989b, 1991, 2000). Children with ASD show impairments in the development of early ToM skills that typically emerge during infancy, such as the ability to monitor others' gaze in order to coordinate joint attention between self and other towards an object to share mutual interest (Hughes & Leekam, 2004; Hutchins et al., 2011; Kasari et al., 1990). The potential influence of early ToM competency on the development of affect regulation and social functioning is especially important to consider in ASD. Early ToM skills play an important role in the co-emergence of higher-level social cognition and affect regulation across typical development. Through joint attention and sharing a mutual interest, typically developing (TD) infants can initiate instances of highly affect-laden dyadic interactions with the caregiver. Such social exchanges allow them to learn to regulate and sustain mutual affective states shared between self and other, and can serve as an important gateway to developing early emotion regulation strategies (Kasari et al., 1990; Mundy, 1995; Mundy & Newell, 2007).

The co-emergence of the ability to regulate mutual attention and affective state between self and other is further highlighted by the development of social-referencing around 9–10 months in TD infants when faced with uncertainty in novel situations (Hughes & Leekam, 2004). During social-referencing, infants are able to refer back and make use of their caregivers' affective state to inform their own actions in novel settings, enabling them to learn to self-regulate during periods of uncertainty by making use of an external agent's affective state (Baldwin, 1992; Moses, Baldwin, Rosicky, & Tidball, 2001). Therefore, successful development and flexible use of early ToM skills such as joint attention not only serve as a mode of social communication, but also underpins the development of early affect regulation (Kasari et al., 1990).

For children with ASD, attention and affect sharing regulation mechanisms are weakly integrated (Kasari et al., 1990; Whalen & Schreibman, 2003; Whalen, Schreibman, & Ingersoll, 2006). Using the Early Social Communication Scales (ESCS), Kasari et al. (1990) found that children with ASD (aged 4–5 years) demonstrated significantly reduced ability to integrate positive affect and sharing attention during episodes of joint attention with their caregivers, compared to TD and mental-aged matched children with Down Syndrome. Weak integration of shared attention and affective states between self and other might further impair the ability of children with ASD to effectively make use of social referencing when faced with uncertainty and anxiety-provoking situations, as well as compromise the development of early affect regulation mechanisms.

Development of early ToM skills also provides a foundation for the later emergence of higher-level ToM, such as recognising the intentional stance of others, meta-representation, and making social judgements (Charman et al., 2000; Hutchins et al., 2011; Mundy, 1995; Mundy & Newell, 2007). In children with ASD, early competency in joint attention skills has served as a significant predictor of expressive language development and initiation of social interactions (Mundy, 1995; Sigman & Ruskin, 1999), as well as later social skills such as peer and group interaction (Charman, 2003; Sigman & Ruskin, 1999). Given that early ToM skills provide a foundation for development of higher level ToM skills such as meta-representation and making social judgements (Baron-Cohen, 1989a, 1989b, 2000; Hutchins et al., 2011), it is also important to characterise the relationship between competency at each level of ToM development and symptoms of anxiety, to better understand the range of ToM skills that may be associated with anxiety.

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