



How are Sensory Features associated with seven anxiety disorders in boys with Autism Spectrum Disorder?



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ARTICLE INFO

Article history:

Received 18 February 2016

Received in revised form 8 March 2016

Accepted 9 March 2016

Available online 11 March 2016

Keywords:

Anxiety

ASD

Sensory Features

Parents

Children

ABSTRACT

The association between Sensory Features (SF) and seven anxiety disorders was investigated using self-reports and parental reports about 140 young males with an Autism Spectrum Disorder (ASD). Although there were significant correlations between SF and self- and parent-ratings of some of the seven anxiety disorders, overall, SF was found to have an inconsistent association across the seven anxiety disorders and this was also found for the 8 symptoms of Generalised Anxiety Disorder. These data challenge the practice of assessing SF and anxiety via global measures and argue for individualized disorder-specific assessments to develop more effective diagnoses and treatments for the effects of SF.

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1. Introduction

1.1. Anxiety in ASD

Children with Autism Spectrum Disorder (ASD) are also at greater risk of comorbid psychiatric disorders (Matson and Nebel-Schwalm, 2007), particularly anxiety (for reviews, see: Kim et al., 2000; MacNeil et al., 2009; van Steensel et al., 2011; White et al., 2009). For example, one study reported that children with ASD have a prevalence of 39.6% for Generalised Anxiety Disorder (GAD) (van Steensel et al., 2011), well over the rates of between .6% and 7.1% for non-ASD children (Costello et al., 2005). Such anxiety disorders can interfere with the delivery of ASD-focused interventions (White et al., 2009) and may contribute to overall lower functioning and life success (Kim et al., 2000). Consequently, a good deal of research effort has been focused upon identification of the correlates and predictors of anxiety in young people with ASD (see reviews by van Steensel et al., 2011; White et al., 2009; Kim et al., 2000), with a view to identifying correlates and potential causal links, although the current state of treatment for those anxiety disorders is relatively poor (Vasa et al., 2014).

1.2. Sensory Features and anxiety

Correlates of anxiety in children with ASD may include the interactions they have with their environment and/or the nature of their ASD symptomatology. One of the aspects of ASD that may contribute to anxiety is the particular profile of Sensory Features (SF) that these children exhibit. Now established as one of the key diagnostic criteria for ASD, SF has a greater affect upon functioning in children with ASD than in those without ASD (Ben-Sasson et al., 2009). Although the SF of children on the autism spectrum has not been found to consistently vary with cognitive ability, language levels, or stereotypical behaviour (Klintwall et al., 2011), several studies have linked SF with difficulties in independent functioning and managing daily life (Kern et al., 2006), lower participation in social, physical and related activities, (Hochhauser and Engel-Yeger, 2010) and challenging behaviour in school-age (Tseng et al., 2011) and preschool age children (O'Donnell et al., 2012) with ASD.

Almost all of these covariates are also linked with anxiety or represent outcomes of being anxious (APA, 2013). It is therefore not unreasonable to hypothesize that SF may be associated with anxiety, and some previous research supports that hypothesis. For example, Pfeiffer et al. (2005) observed significant positive correlations between parent-rated SF and parent-rated anxiety in children and adolescents with Asperger's disorder. In another study, aimed at defining the causality of the relationship between SF and anxiety, Green et al. (2012) performed a lag analysis of SF and anxiety

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in a sample of 149 toddlers with ASD. By collecting data from two annual time points, it was noted that SF emerged earlier than anxiety and that the SF scores at the first observation significantly predicted anxiety scores one year later. By contrast, anxiety did not significantly predict SF over the same time period.

2. Measuring anxiety in ASD

2.1. Subtypes of anxiety

Two methodological issues limit the generalisability of these previous findings. First, regarding the anxiety construct itself, in Pfeiffer et al.'s (2005) and other studies of SF in ASD (e.g., Green et al., 2013; Mazurek et al., 2013; Wigham et al., 2014), anxiety was measured via the total scores from the inventories used (e.g., The Revised Children's Manifest Anxiety Scale), thus preventing investigation of specific anxiety disorders that are relatively common comorbidities in children with an ASD but which have different prevalence rates (van Steensel et al., 2011; White et al., 2009). For example, a recent study (Bitsika and Sharpley, 2014), reported prevalence of anxiety disorders in boys with ASD to range from: GAD (43.6%) through Specific Phobia (32.1%), OCD (18.6%), Social Phobia, (15.7%), Separation Anxiety (7.1%), Panic Disorder (5.0%) to PTSD (2.1%). (Although no longer classified as anxiety disorders by the DSM-5 (APA, 2013), OCD and PTSD are considered to be closely associated with anxiety, particularly in people who have experienced an ongoing major stressor, such as children with ASD who also have SF.) This variability in prevalence across anxiety disorders suggests the possible presence of similar differences in the strength of correlations between these anxiety disorders and SF, an issue that was not investigated by previous studies of the association between SF and anxiety.

As well as this range of different anxiety disorders, overall anxiety may be examined in more detail by reference to the separate symptoms that comprise the diagnosis of GAD, which is the most common anxiety disorder reported in children with ASD (Bitsika and Sharpley, 2014; van Steensel et al., 2011). There are 8 diagnostic criteria for GAD (APA, 2013) and these are quite heterogeneous, including cognitive (excessive worry, difficulty controlling worry, loss of concentration), somatic (restlessness, easily fatigued, muscle tension, sleep disturbance) and emotional (irritability) symptoms. This heterogeneity of symptoms within GAD has made it a target for analysis of symptom profiles as a method of developing 'individualized' or 'personalized' medicine (Insel, 2013). In this study, that emphasis was operationalised by dividing GAD into its 8 symptoms in order to assess the associations between those different aspects of GAD and SF.

2.2. Source of assessment

The second methodological issue arising from the previous literature is concerned with the source of data. Although some studies have collected SF data from young people with ASD themselves (e.g., De la Marche et al., 2012), most studies of SF in children with ASD (including all 14 reports in Ben-Sasson et al.'s (2009) meta-analysis of SF), have used parents' reports exclusively. However, the SF scales that are completed by caregivers in these studies include items such as "Dislikes riding in a car", "Enjoys strange noises" and "Prefers to be in the dark", all of which make assumptions about the internal states of the children being assessed, which may be particularly difficult for a non-ASD caregiver to answer about a child with ASD. In addition, parents may also cope with their child's SF by becoming habituated to their specific sensory-related behaviours (Troy et al., 2007). Consequently, it has been suggested that collecting information on children's internal states via 'proxy' reports from

caregivers, siblings or peers could be a methodological limitation in research and clinical practice (Cappadocia et al., 2012) because such reliance upon others' reports about children's states brings with it a number of sources of potential bias. For example, elevated parental stress has been shown to correlate with parents' reports of greater severity of ASD symptoms in their children (Conner et al., 2013; Lerner et al., 2012), and parental anxiety has been shown to significantly correlate with the ratings they give of the anxiety states of their sons who have ASD (Bitsika et al., 2015). This may also occur with measures of SF, and lead to differences between parents' ratings of their child's SF and the child's own ratings of their SF. For example, some recent data suggested that boys with ASD can provide self-assessments of anxiety that are more strongly correlated with a physiological index of their arousal state (i.e., cortisol) than parents' assessments of their sons' anxiety (Bitsika et al., 2014). Although anxiety and SF are not the same construct, it is plausible that the same kind of disagreement between parents' and their children's ratings of the latter's anxiety might apply to ratings of SF. Therefore, comparison of the relative strength of the SF-anxiety relationships present in data collected from *both* parents *and* their children with ASD may provide an insight into the ways these two sources of information agree or disagree and thus better inform clinical decision-making.

3. Aims of the study

Therefore, this study was designed to extend the current literature regarding the association between SF and anxiety in a sample of children with ASD by (i) investigating the associations between SF and seven anxiety disorders plus the eight diagnostic criteria for GAD and (ii) comparing the relative strength of those associations when the children's SF and anxiety were assessed by their parents or by the children themselves. To reduce the possible sources of confounds upon the results, the sample was restricted to young males with ASD because of the differences in prevalence of ASD between males and females (APA, 2013).

4. Materials and methods

4.1. Participants

One hundred and forty young males with ASD who were recruited from a local parent support group and ASD service organizations on the Gold Coast, Queensland, Australia (M age = 11.2yr, SD = 3.3yr, range 6yr to 18 yr), plus one of their parents (15 fathers, 125 mothers), participated in this study, which was described as being about "how you feel" (no mention was made of anxiety in the recruitment material). Written informed consent to participate was provided by the parents and the participants with ASD also gave verbal assent to participate. All participants were Anglo-Saxon in ethnicity and over 97% had been born in Australia. The study was approved by the relevant Human Research Ethics Committee.

All the participants with ASD had received their original diagnosis from a 2-hour clinical interview with their parents and based upon DSM-5 criteria for ASD, plus family history. These interviews were conducted by either a registered paediatrician or psychiatrist, all of whom were specialists in the diagnosis and treatment of ASD in children and adolescents. These diagnoses were confirmed by a suitably qualified and registered clinical psychologist who had a PhD in the assessment and treatment of ASD, plus several decades' experience in the diagnosis and treatment of ASD in children and adolescents. These original diagnoses were confirmed by administration of the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 2012) by a research-competent staff member during recruitment for this study. All the participants with ASD had

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