

The Relationship Between Anxiety and Repetitive Behaviours in Autism Spectrum Disorder

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Abstract Children with Autism Spectrum Disorder are vulnerable to anxiety. Repetitive behaviours are a core feature of Autism Spectrum Disorder (ASD) and have been associated anxiety. This study examined repetitive behaviours and anxiety in two groups of children with autism spectrum disorder, those with high anxiety and those with lower levels of anxiety. Children with high anxiety had more repetitive behaviours than those without anxiety. Within the anxiety sample, higher levels of insistence on sameness were associated with more anxiety. No association was found between sensory motor repetitive behaviours and anxiety in this group. In the non-anxious sample, anxiety was associated with sensory motor repetitive behaviours. These findings indicate a differential relationship for repetitive behaviours in relation to anxious and non-anxious children with ASD.

Keywords Repetitive behaviours · Anxiety ·
Insistence on sameness · Autism spectrum disorder

Anxiety is a significant problem for many individuals with an Autism Spectrum Disorder (ASD). Parents, teachers and clinicians are increasingly seeking advice on ways to manage the distress that anxiety brings. Research evidence supports reports from families and professionals of the pervasiveness of anxiety for children and young people living with an ASD, with prevalence rates estimated at between 30 and 81 % (MacNeil et al. 2009; White et al. 2009). A recent meta-analysis suggested 40 % of young people with ASD meet criteria for an anxiety disorder (Van Steensel and Bogels 2011). Anxiety impacts on educational success, friendships and social participation, and on other members of the family (Reaven 2011). Research with typically developing populations highlights the long-term consequences of childhood anxiety. The presence of anxiety symptoms in adolescence is a significant predictor of the development of an anxiety disorder in adulthood (Pine et al. 2005), indicating the long-term psychological, social and economic significance of addressing childhood anxiety in ASD.

Not all children with ASD will develop anxiety, therefore there are potential benefits of understanding the mechanisms whereby anxiety develops and of identifying which young people are most vulnerable. Development of screening tools which can be used prospectively to identify those children and young people most at risk would enable early implementation of targeted programmes of intervention based on risk profiles and aimed at preventing the development of anxiety where possible. The individual, familial and societal implications could be profound; successful screening and early intervention will significantly reduce the emotional, social and economic burden into adulthood. ASD is however a heterogeneous condition; it is likely that there are a number of risk profiles for the development of anxiety, based on differing combinations

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of characteristics, implying adaptation and development of individualised therapeutic interventions.

Restricted and repetitive behaviours (RRB) are one of the most observable aspects of ASD in many children and are likely to inform early identification (Lewis and Bodfish 1998). The term “repetitive behaviour” is used to refer to the broad and often disparate class of behaviours linked by repetition, rigidity, invariance, and inappropriateness (e.g. stereotyped movements, rigid routines, repetitive language, resistance to change) (Turner 1999). Repetitive behaviours can pose a significant challenge to parents and carers and can often interfere with social functioning and learning. However, until recently repetitive behaviours have been the subject of far less attention than the social and communication deficits that constitute the other two major domains of ASD (Lewis and Bodfish 1998).

Raised levels of anxiety in ASD have been associated with a greater presence of RRBs (Tantam 2003; Rodgers et al. 2012). Sukhodolsky et al. (2008) found higher levels of anxiety were associated with higher levels of stereotyped behaviour in children with pervasive developmental disorders (PDD). However the relationship between RRB and anxiety in ASD is not well understood. Some researchers (Ooi et al. 2008; Spiker et al. 2011) suggest a high level of engagement in RRB, particularly circumscribed interests, may serve as a means to reduce anxiety and as such be consequence of anxiety in children with ASD. Alternatively anxiety may be regarded as a consequence of high levels of RRB, such as repetitive worried thoughts (Sofronoff et al. 2005; Rodgers et al. 2012). No studies to date have directly compared RRB between young people with ASD and anxiety and those without.

The aims of this study therefore were: (a) to examine and compare the degree and nature of RRB in two groups of young people with ASD, those with clinical levels of anxiety and those without, and (b) to compare the relationship between RRB and anxiety within each group, to begin to explore the role that RRB may play in the manifestation of anxiety symptoms in ASD.

Method

Participants

Participants were 67 young people with ASD diagnosed through multidisciplinary team assessment following the guidelines of the UK National Autism Plan for Children (Le Couteur 2003) and aged between 8 and 16 years (mean age 11.2 years); 58 (87 %) were male. Participants were recruited through health and education teams in the North East of England, and through the ‘Database of Children with Autism Spectrum Disorder Living in the North East’

(Daslⁿe) (McConachie et al. 2008). They were recruited into two studies: a descriptive study exploring the neuropsychological underpinnings of RRB; and a pilot trial of an intervention for high anxiety. Within the first study, all had scores above the suggested cut-off of 15 on the Social Communication Questionnaire (SCQ) (Rutter et al. 2003); within the second, all met criteria for ASD on the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000) or were above the cut-off on SCQ, or both .

Procedure

A positive ethical opinion was given by Newcastle and North Tyneside Research Ethics Committee. Families were visited at home by a researcher and asked to complete all measures.

Measures

Full Scale IQ was estimated using the Wechsler Abbreviated Scales of Intelligence (WASI; Wechsler 1999).

The Spence Children’s Anxiety Scale-Parent Version (SCAS-P; Spence 1998) was used to assess anxiety symptoms. The SCAS-P is a 38-item parent report questionnaire which provides a total anxiety score and six subscale scores (panic and agoraphobia, separation anxiety, social phobia, obsessive–compulsive disorder (OCD), and generalized anxiety disorder (GAD), and physical injury fears. It has good reliability and validity (Nauta et al. 2004) and has been used in previous research involving individuals on the autism spectrum (Chalfant et al. 2006; Russell and Sofronoff 2005, Rodgers et al. 2012). It has acceptable reliability and validity for use with children with ASD (Rodgers et al. submitted). A total score of 37 for boys and 44 for girls is recommended as an indicator of clinical caseness (<http://www.scaswebsite.com/>).

For the purposes of this study the children were allocated to one of two groups depending on their scores on the SCAS-P. Those children with a score below the indicative cut-off were allocated to the ‘non-anxious’ group ($n = 34$) and those above the indicative cut-off were allocated to the ‘anxious’ group ($n = 33$).

The Repetitive Behaviours Questionnaire (RBQ; Turner 1995) was used to assess RRB. The RBQ is a 33-item questionnaire short-form of the Repetitive Behaviour Interview (RBI; Turner 1995). Twenty-nine items examine specific RRB and parents are required to rate the behaviours for severity or frequency on a 3 or 4 point Likert scale depending upon the behaviour. A higher score indicates more severe or frequent RRB. Behaviours examined include repetitive movements, sameness behaviour, repetitive use of language and circumscribed interests. A recent validation study (Honey et al. 2012) identified two reliable

and valid factors (a ‘sensory motor factor’ and an ‘insistence on sameness/circumscribed interests’ factor) in ASD. For the sensory motor factors items would include, for example ‘rituals for everyday activities’ or ‘things in the house stay the same’; for the sensory motor factor example items include ‘repetitively fiddle with toys or other items’ or ‘spins around’. Here we report total RBQ score and the two factor scores.

Results

The anxious and non-anxious groups did not differ in terms of gender distribution, age or IQ (see Table 1).

Anxiety Scores

The mean SCAS-P total and subscale scores differed significantly between the anxious and non-anxious groups. Significant differences were found for all of the SCAS subscales, indicating that level of anxiety was not accounted for by higher scores on a specific anxiety subtype (see Table 2).

Comparing Repetitive Behaviours Across the Two Groups

According to parent report the anxious group had significantly higher total RBQ scores and also higher levels of both insistence on sameness/circumscribed interests and sensory motor RB factor scores (see Table 3). For all analyses Cohen’s *d* calculations revealed large effect sizes for the differences between the groups.

Exploring the Anxiety and Repetitive Behaviours Within the Groups

In order to determine whether the relationship between repetitive behaviours and anxiety differed according to anxiety status correlational analyses were undertaken within the two groups.

Table 1 Characteristics of the young people

	Anxious group	Non-anxious group	
Gender: male:female	29:4	29:5	
FSIQ mean (SD)	99.09 (18.1)	101.09 (16.7)	$t(66) = 4.60$ $p = .64$
Age mean (years) (SD)	11.6 (1.8)	12.2 (1.7)	$t(66) = 1.26$ $p = .21$

Table 2 Mean (SD) scores and *t* test results comparing the SCASP-P anxiety subscale scores of the anxious and non-anxious groups

Anxiety: sub-scales	Anxious group mean (SD)	Non-anxious group mean (SD)	<i>t</i> test (<i>p</i>)
Panic/agoraphobia	8.55 (4.6)	1.97 (1.7)	7.61 (.00)
Separation anxiety	9.94 (3.3)	3.24 (2.5)	9.19 (.00)
Social phobia	10.88 (3.2)	5.70 (2.7)	7.08 (.00)
OCD	8.58 (3.8)	3.30 (2.5)	6.62 (.00)
Physical injury fears	6.91 (3.0)	2.91 (2.4)	5.82 (.00)
GAD	9.45 (2.8)	4.48 (2.0)	8.19 (.00)
Total	54.3 (14.8)	12.61 (8.8)	10.80 (.00)

Within the anxious group, Pearson correlations showed a significant correlation between the RBQ insistence on sameness/circumscribed interests factor score and SCAS-P total anxiety score ($r = .36$, $p = .03$). No significant relationship was found between SCAS-P total score and RBQ sensory motor factor score ($r = .06$, $p = .36$).

In contrast within the non-anxious group, the correlation between the RBQ insistence on sameness/circumscribed interests factor score and SCAS-P total score ($r = .32$, $p = .07$) was in the same direction, but non-significant. No significant relationship was found between the SCAS-P total score and RBQ sensory motor factor score ($r = .21$, $p = .26$).

The Specificity of the Relationship Between Insistence on Sameness and Anxiety Subtype

Given the significant relationship between SCAS-P total score and the RBQ sameness/circumscribed interests factor score in the anxious group further analysis was undertaken to determine whether this relationship was associated with specific anxiety subtypes. Pearson correlations revealed that RBQ sameness/circumscribed interests factor scores significantly correlated with the separation anxiety subscale score ($r = .40$, $p = .01$) and fear of physical injury subscale score ($r = .36$, $p = .03$). No significant correlations were found between the sameness factor scores and panic/agoraphobia ($r = .23$, $p = .18$), social phobia ($r = .20$, $p = .25$), OCD, ($r = .18$, $p = .29$) or GAD ($r = .15$, $p = .40$). Furthermore RBQ sensory motor factor scores did not significantly correlate with any of the SCAS-P anxiety sub-scale scores.

Comparable analyses were undertaken in the non-anxious group. This analysis revealed that one anxiety subtype, OCD, significantly correlated with the sensory motor factor score ($r = .47$, $p = .00$). No other anxiety sub-scales correlated with the sensory motor factor scores. OCD was not significantly correlated with the RBQ sameness/

Table 3 Mean (SD) RBQ scores for the anxious and non-anxious groups, with *t* test results and cohens' *d* effect size indices

RBQ	Anxious mean (SD)	Non-anxious mean (SD)	<i>t</i> test (<i>p</i> =)	Cohen's <i>d</i>
RBQ total score	27.70 (10.5)	16.22 (9.5)	4.59 (.00)	1.14
RBQ insistence on sameness/circumscribed interests factor score	14.45 (6.1)	8.00 (5.12)	4.58 (.00)	1.14
RBQ sensory motor factor score	11.21 (5.6)	6.48 (4.9)	3.55 (.00)	0.89

circumscribed interests factor score ($r = .31$, $p = .08$). Indeed for the non-anxious group no significant correlations were found between the sameness factor score and any anxiety sub-type.

Discussion

This study aimed to compare RRB in two groups of young people with ASD, those with high levels of anxiety and those without. In addition we aimed to consider the relationships between RRB and anxiety within each group.

Despite no differences in age, gender distribution or ability our analysis revealed a significant difference in total RRB between two groups of children with ASD. Those children within the anxious group were reported by parents to have higher levels of total RRB, sameness behaviours/circumscribed interests and sensory-motor behaviours, than their counterparts with lower anxiety presentations. In addition to examining any potential differences between the groups we were also interested in exploring the relationships between the different forms of RRB and anxiety *within* the groups. This *within group* analysis revealed only one significant relationship. Higher levels of insistence on sameness/circumscribed interests were associated with elevated levels of anxiety in the anxious group only. No significant correlations were found between anxiety and RRB in the non-anxious group, and no significant relationship was found between sensory-motor behaviours and anxiety in the anxious group. Our finding of a relationship between levels of insistence on sameness/circumscribed interests and anxiety in the anxious group concurs with Spiker et al. (2011) who studied children with ASD and high anxiety. It is also consistent with Sukhodolsky et al. (2008) who report higher anxiety to be associated with greater frequency of stereotyped behaviours, including circumscribed interests, in a sample of children with average ability with a diagnosis of autism or PDD. Our findings also support the work of Joosten et al. (2009) who examined the extrinsic and intrinsic motivators for stereotyped and repetitive behaviours in children with ASD. They reported anxiety to be an intrinsic motivator for repetitive behaviours in children with ASD. Our findings build on this work by suggesting that anxiety may be a

strong motivator for repetitive behaviours characterised by insistence on sameness/circumscribed interests and support the conclusions of Spiker et al. (2011) who suggest that RRB, especially symbolic re-enactment of restricted interests through play, may be a form of maladaptive coping response to negative affect.

Our findings in relation to participants with lower levels of anxiety suggest that characteristics associated with OCD are related to sensory motor repetitive behaviours. This finding was not replicated in the participants with higher levels of anxiety. One explanation of this finding is that symptoms of OCD and features of ASD can be overlapping and difficult to differentiate (Tsai 2006; MacNeil et al. 2009). Indeed the repetitive and ritualistic behaviours inherent in ASD can be difficult to tease apart from the compulsive behaviours in OCD (Gjevick et al. 2010). There are overlaps between the types of behaviours elicited on the RBQ and features of the OCD subscale of the SCAS-P and it is possible, therefore, that the correlation between the OCD sub-scale and the RBQ factors scores in the non-anxious group is a consequence of reporting of features of ASD rather than pure symptoms of anxiety. This suggestion is supported by recent work examining the reliability and validity of the SCAS for use in ASD (Rodgers et al. submitted). In completing the RBQ and SCAS-P parents may not have differentiated between the compulsions (i.e. repetitive behaviours that reduce distress associated with clinical obsessions) which are a central feature of OCD (APA 2000) and the repetitive and ritualistic patterns of behaviour which may or may not be dysphoric and are inherent in ASD. Indeed previous studies have highlighted a difficulty distinguishing the two (e.g. Cath et al. 2008).

Cognitive models of anxiety developed for typical populations may help us to make sense of our findings in relation to the anxious group. Examination of the anxiety literature may also provide a theoretical framework within which to embed these data. A well established and robust model of anxiety is presented by Dugas et al. (1998). The model identifies four cognitive variables involved in anxiety: intolerance of uncertainty (IU), poor problem orientation, cognitive avoidance and positive beliefs about worry. *Intolerance of uncertainty* is an assumption that uncertainty is stressful and upsetting and unexpected events are negative and should be avoided at all costs. The

construct of intolerance of uncertainty shares some common features with aspects of insistence of sameness seen in ASD and provides a preliminary framework within which to understand our data. The neurocognitive deficits, sensory abnormalities and social impairments seen in ASD present a myriad of challenges for the young person with the disorder. Facing such difficulties on a day to day basis may contribute to the development of circumscribed interests, insistence on sameness, intolerance of changes in routine and extreme perfectionism (Greenaway and Howlin 2010) and ultimately anxiety which is characterised by intolerance of uncertainty. RRBs and particularly sameness behaviours may confer some short term amelioration of anxiety by reducing demand and restricting the environment. This in turn may result in the development of positive beliefs about the role and function of such behaviours maintaining their use and in the longer term leading to impoverished engagement with the wider environment and more reliance on RRB thus perpetuating the anxiety cycle. Clearly these preliminary data exploring the specificity of the link between anxiety and sameness behaviours and the hypotheses generated here require further investigation.

The present study has a number of limitations. Our assessment of anxiety was limited in that it was reliant on questionnaire based parental report and indeed a measure that was standardised on typically developing children, rather than young people with ASD. It is therefore important to be mindful when considering our findings that the nature of anxiety in ASD may differ in some important ways from anxiety in typically developing children, particularly perhaps in relation to the impact of sensory processing difficulties and/or neurocognitive atypicalities seen in ASD and the potential impact of these features on anxiety may not be detected using a measure developed with typically developing young people. The study would have been much improved by the application of a formal clinical assessment and/or a measure that has been validated for use in ASD. However recent work from our group indicates good agreement between the gold standard clinical interview (ADIS; Silverman and Albano 1996) and the SCAS-P in a large ASD sample, so we can have some confidence in our findings (Rodgers, Jamieson, McConachie, submitted). The cross sectional nature of the study does not enable us to understand the direction of the relationship between RRB and anxiety. Longitudinal research would be of significant benefit to enable us to tease apart these relationships fully. Furthermore parental understanding of child anxiety may be limited (Hurtig et al. 2009) and depend upon parental attributions regarding child behaviour problems (Sukhodolsky et al. 2008). This is especially key when symptoms of anxiety overlap with features of ASD (e.g. repetitive questioning or checking on something unusual) and may reflect the relationship reported here between OCD and RRB in the non-

anxious sub-sample. Finally due to the nature of the original studies to which they were recruited all participants had IQs within the average range. Clearly this impacts on the generalizability of the findings to those young people with ASD who have learning disabilities. Indeed there is a significant need for research to be undertaken examining the putative relationship between repetitive behaviours and anxiety in young people with ASD and learning disability.

There are a number of implications of our study. Our results confirm that children with ASD who experience anxiety also present with greater levels of RRB. The data suggest the children with ASD may utilise insistence on sameness to reduce demand in anxiety provoking situations and as such the continued use of such behaviours may serve to maintain anxious states, for example, by avoiding exposure to situations which trigger anxiety. Clearly these hypotheses are tentative and require further confirmation. However they indicate that professionals working with children with ASD who are experiencing anxiety may wish to explore with the child and their family strategies to increase tolerance of uncertainty and reduce insistence on sameness behaviours.

In summary our findings indicate that it may be beneficial for clinicians to consider the role of insistence on sameness behaviours and circumscribed interests in the assessment, formulation and treatment of anxiety in children with ASD. It is possible that, for some individuals, interventions focussing on a reduction in such behaviours, promoting flexibility and reducing repetitive play (Spiker et al. 2011), may consequently reduce anxiety.

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