Abstract

Purpose: Metacognitive beliefs and processes have been found to perpetuate anxiety and depression in youth and adults. However, the presence of metacognitive beliefs in children with autism spectrum disorder (ASD) is somewhat unclear and has received limited research attention to date. The aim of the current research was to explore metacognitive beliefs in children with autism and associations with anxiety and depression. Design: Twenty-three high functioning participants (17 male and 6 female) between the ages of eight and 12 ($M = 10.38$) diagnosed on the autism spectrum completed the study. Participants completed the Revised Children’s Scale of Anxiety and Depression and the Metacognitions Questionnaire for Children. Findings: Correlation analyses revealed that positive and negative metacognitive beliefs were found, as hypothesised, to be prevalent in this sample. Originality: Despite methodological limitations, this is one of the first research evaluations to provide evidence for metacognitive beliefs in high functioning children with autism and comorbid anxiety or low mood.

Keywords: Metacognitive beliefs, autism spectrum disorder, anxiety, depression

Article Classification: Research Paper
A Preliminary Evaluation of Metacognitive Beliefs in High Functioning Children with Autism Spectrum Disorder

Introduction

The diagnosis of autism spectrum disorder (ASD) appears to be increasing, with rates climbing from 1:150 children in 2000 (Centers for Disease Control and Prevention [CDC], 2007), to 1:50 in 2013 (Blumberg et al., 2013), with the CDC reporting rates of 1:68 in 2014. Growing research has established that people with ASD may experience various co-occurring psychiatric comorbidities, with some studies reporting higher prevalence rates of comorbidity in ASD than in non-ASD populations (Mazzone et al., 2012; Roma and Mazurek, 2015). Further, the management of behavioural problems in children with ASD continues to be a challenge for those who care for and provide treatment for those with ASD, which is often complicated by comorbidity (Mazzone et al., 2012). Research has found that rates of worry, anxiety, and depression are prevalent and significantly elevated in individuals with ASD and substantially impacts their daily functioning and quality of life (Gillott et al., 2001; Jang et al., 2013; Kim et al., 2000; Matson and Nebel-Schwalm, 2007; Simonoff et al., 2008; Strang et al., 2012; Tantam, 2013; White et al., 2009).

A recent meta-analysis found that 39.6% of 2,121 children and adolescents with ASD had at least one comorbid anxiety disorder according to DSM-IV criteria (van Steensel et al., 2011); including specific phobia, obsessive-compulsive disorder (OCD), social anxiety disorder, generalized anxiety disorder (GAD), panic disorder, and separation anxiety disorder. Simonoff et al. (2008) found that 41.90% of 112 children with ASD meet DSM-IV-TR criteria for the following anxiety disorders: specific phobia (8.50%), OCD (8.20%), GAD (13.40%), panic disorder (10.10%), and social anxiety (29.20%). White et al. (2009), in a review of 11 prevalence studies, reported that 11-84% of 1,353 children with ASD experienced anxiety to an impairing degree. Depression rates have been estimated between 15% and 24% in children with ASD; notably higher than in children without ASD (Rieffe et al., 2014). Further, worry, anxiety and depression in ASD populations has been reported to be more prevalent in individuals with functional language and an IQ above 70 (Caamaño et al., 2013; De-la-Iglesia and Olivar, 2015; Hallett et al., 2013).
There is mounting agreement that anxiety and depression are common in ASD, however, there is limited understanding of the underlying mechanisms (De-la-Iglesia and Olivar, 2015; Mazefsky and Herrington, 2014; White et al., 2009). Further, it is likely that the relationship between anxiety and ASD is bidirectional, in that ASD exacerbates anxiety symptoms and vice versa (Mazefsky and Herrington, 2014; van Steensel et al., 2013). There has also been some debate in the research that the presence of both ASD and depression may exacerbate each other’s condition, as well as, increase symptoms of anxiety and OCD (De-la-Iglesia and Olivar, 2015).

Research contends that ASD is a heterogeneous disorder that may be associated with various etiological factors and that psychological treatment outcomes in ASD populations are notably variable in comparison to non-ASD populations (Damiano et al., 2014; Matson, 2016; Mazefsky et al., 2012; Zafeiriou et al., 2007; Zafeiriou et al., 2013). Therefore, it has been recommended that future research needs to explore the various mechanisms that may contribute to comorbid conditions, such as anxiety, in those with ASD; particularly since research to date into interventions has primarily focused on mechanisms identified to maintain psychological distress in children without ASD (Damiano et al., 2014). One such mechanism that has been identified as a transdiagnostic process that contributes to comorbidity in ASD, is poor emotion regulation (Damiano et al., 2014).

Metacognition

The metacognitive model of emotional disorder—the self-regulatory executive function model (S-REF; Wells, 2000; Wells 2009; Wells and Matthews, 1996) is a transdiagnostic model that asserts that emotional dysregulation and associated negative thoughts are maintained by four interacting constructs: the cognitive attentional syndrome (CAS); metacognitive beliefs; executive control; and mental modes (Wells, 2013). While a detailed account of this model is beyond the scope of this paper (see Wells 2009; 2013; Wells and Matthews, 1996), the S-REF model proposes that psychological disorder and emotional distress results from the CAS, which is controlled by metacognitive beliefs. The CAS comprises of repetitive and perseverative thinking, in the form of worry, rumination, focusing on threat, and the utilisation of maladaptive coping behaviours (e.g. avoidance, thought suppression) that fail, leading to a paradoxical impact on self-regulation and continued negative emotional experience (Wells, 2009, 2013).
Metacognitive beliefs, or beliefs about one’s thinking, are conceptualised to control and maintain the CAS and are categorised under two main domains; positive metacognitive beliefs and negative metacognitive beliefs (Wells, 2009). Positive metacognitive beliefs typically occur prior to the development of negative metacognitive beliefs. Positive metacognitive beliefs are concerned with the benefits or advantages of engaging in cognitive activities (worry, rumination); for example, “worrying helps me to stop bad things from happening” (Wells, 2009). Such beliefs may involve worry being viewed as a helpful strategy. This results in a reliance and increased use of worry as a coping strategy, for example, an individual with GAD may hold the positive metacognitive belief “worrying means I will be prepared” (Wells 2009). Negative metacognitive beliefs, which are more potent in psychological disorder, are concerned with either the harmfulness or uncontrollability of one’s thoughts (Wells, 2009, 2013). For example, “worrying is going to give me a heart attack” or “my worry is uncontrollable”. In turn, metacognitive beliefs result in the employment of maladaptive metacognitive strategies such as thought suppression and avoidance, which maintain worry or rumination and the associated anxiety or negative affect (Cartwright-Hatton and Wells, 1997; Spada et al., 2008; Wells and Butler, 1997).

Several studies have substantiated Wells’ metacognitive theory (Halvorsen et al., 2015; Normann et al., 2014; Wells, 2013). Davis and Valentiner (2000) found in a study of 175 adults that individuals with GAD demonstrated significantly higher levels of metacognitions than non-anxious and non-worried/anxious participants. Wells (2005), in a sample of 174 university students, found that metacognitions are not only evident in GAD, but that metacognitive strategies that result from negative metacognitive beliefs (e.g. thought suppression, avoidance) further perpetuated worry. More recently, research (N = 230) has suggested that negative metacognitive beliefs mediate the relationship between trait worry and GAD symptoms (Penney et al., 2013).

Further, Halvorsen et al. (2015) reported that metacognitive beliefs, in a sample of 168 adults, were endorsed more by currently depressed individuals than those who were previously depressed or those who had not experienced depression. Additionally, several studies that have examined the outcomes of treatment on metacognitive processes, including metacognitive beliefs, have demonstrated that changes in such beliefs were associated with reductions in worry and rumination and associated emotional distress (Papageorgiou, 2015;
Wells, 2013). The role of metacognitive beliefs in emotional disturbance in other forms of anxiety, such as OCD, social anxiety, panic, and health anxiety has also been demonstrated (Bailey and Wells, 2015; Cucchi et al., 2012; Vassilopoulos et al., 2015; Wells, 2000, 2013; Wells and Papageorgiou, 1998).

Metacognition in Children and Adolescents

Regarding metacognition in children and adolescents and its relationship with emotional difficulties, there has been limited research. Flavell et al. (1995; 2000) found metacognitive processes in children as young as five years of age, and reported that the capacity for introspection increases with age, and that children’s ability to hold metacognitive beliefs about anxiety may begin around ages seven to eight. Further research found that children and adolescents report metacognitive beliefs that are correlated with emotional distress (Cartwright-Hatton et al., 2004; Smith and Hudson, 2013). White and Hudson (2015), in a sample of 187 children, aged 7-12 years, reported that metacognitive beliefs were associated with levels of GAD, OCD, panic attacks, separation anxiety, and social anxiety. Research into 7-17 year olds (N = 98) demonstrated that metacognitive beliefs were also present in this age group and were associated with anxiety and depression symptoms, and levels of excessive worry (Bacow et al., 2009).

Only a small number of studies have explored the role of worry and rumination in children with ASD; demonstrating that such repetitive and perseverative thinking is associated with anxiety and depression (Mazefsky et al., 2014; Rieffe et al., 2014).

However, there appears to have been no published studies of the role of metacognitive beliefs in high functioning children with ASD.

Metacognitive Beliefs in Children with ASD

The role of metacognitive beliefs and processes in anxiety experienced by ASD populations currently remains unclear due to a lack of investigative research. Only one study to date appears to have specifically evaluated metacognitive beliefs in ASD (Grainger et al., 2014). This study (N = 18) found that high functioning adults with ASD endorsed higher levels of metacognitive beliefs about monitoring their own thoughts, than did matched adults without ASD; however, the study did not explore metacognitive beliefs in regard to emotional distress.
Considering the high prevalence of anxiety, including worry, and depression in ASD, it may be theorised that children with ASD have developed metacognitive beliefs in line with the findings in individuals who are not on the autism spectrum. Thus, the aim of the current research was to explore the presence of metacognitive beliefs in high functioning children with ASD and the associations of such beliefs with emotional distress. It was hypothesised that there would be a positive correlation between anxiety and metacognitive beliefs in children with ASD. Primarily, that elevated metacognitive beliefs would be associated with increased levels of anxiety symptoms. It was further hypothesised that metacognitive beliefs in this sample would be associated with depressive symptoms.

**Method**

**Sample**

Following ethical approval from the University of XXXX Human Research Ethics Committee, participants were recruited through the University of XXXX ASD Support Group, radio, and local newspapers. Consistent with research determining the development and presence of metacognitive abilities in children (Flavell et al., 1995; 2000), the age of 8 years was defined as the minimum age criteria for the current study. Because the focus of this study was children, the upper age limit of 12 years was established due to the onset of adolescence at 13 years. Thirty-five individuals expressed interest in participating in the study. Of these participants, 12 did not meet the inclusion criteria: that is, they did not have an ASD diagnosis from a psychiatrist or paediatrician, or were outside the age range, or had a co-morbid diagnosis of oppositional defiant disorder (ODD) or an intellectual disability. Participants were not excluded if they had comorbid diagnoses such as attention deficit hyperactivity disorder ($N = 6$), a diagnosed anxiety disorder ($N = 1$), Tourette’s syndrome ($N = 1$), or a hearing impairment ($N = 1$). Consequently, 23 participants (17 male and 6 female) aged between eight and 12 years ($M = 10.38$ years, $SD = 1.39$) voluntarily participated in the study. All participants had a confirmed diagnosis of ASD from a paediatrician or child psychiatrist. The process of confirming this included review of current diagnostic information (process of obtaining diagnosis, e.g., paediatrician/psychiatrist name) and confirmation of the State of Queensland (Department of Education and Training) verification status of the participant (name of school and relevant support information) from parent/guardian and review of the individual case to ascertain if further diagnostic
clarification was required. All diagnoses were made prior to the release of DSM-5 and as such included: Asperger Syndrome or pervasive developmental disorder–not otherwise specified (PDD-NOS). High functioning was determined by one of the researchers, an experienced clinical psychologist, with expertise in diagnosing ASD. High Functioning Autism is terminology used when referring to an individual on the spectrum who is deemed to be functioning at a higher cognitive level (in terms of a cognitive capacity [Intellectual Quotient {IQ}] greater than 70; Carpenter, Soorya, and Halpern, 2009; Sanders, 2009). An individual who is considered to be High Functioning, in the context of this study, is one who is, in cases, able to function with consistent adjustment plans, in a mainstream educational setting, without the requirement of further adjustments.

All children included in the study were currently attending mainstream schooling and were State of Queensland verified (requiring sign off of their diagnosis as being on the spectrum under the categories of Pervasive Developmental Disorder–Not Otherwise Specified or Asperger Syndrome [DSM-IV-TR]) under their categories entitling them to an Educational Adjustment Program) as signed off by a paediatrician or psychiatrist.

Measures

Demographic information was gathered prior to the commencement of the study. The study questionnaires were completed on an iPad using Survey Monkey® and included:

The Metacognitions Questionnaire for Children (MCQ-C30; Esbjørn et al., 2013) and the Revised Children’s Scale of Anxiety and Depression (RCADS; Chorpita et al., 2000).

**Metacognitions Questionnaire for Children.** The MCQ-C30 (Esbjørn et al., 2013) is a 30 item self-report questionnaire used to measure metacognitions in youth aged 7-17 years. It was adapted for children from the Metacognitions Questionnaire (MCQ; Cartwright-Hatton and Wells; 1997) and Metacognitions Questionnaire for Adolescents (MCQ-A; Cartwright-Hatton et al., 2004). Scores are measured on a 4-point Likert scale (1 = not at all, 2 = a little, 3 = very, 4 = totally) and There are five sub-scales. The Positive Metacognitions subscale (POS) measures the belief that worrying may be helpful in preventing or avoiding problems in the future (e.g. “if I worry now, then I will have fewer problems later”). The Negative Metacognitions subscale (NEG) measures beliefs that worry is harmful and uncontrollable (e.g. “worrying is bad for me”). The Cognitive Confidence subscale (CC) evaluates the confidence a person has in their memory and attention (e.g. “I think I am bad at remembering names”). The Need for Control subscale (NC) measures beliefs about needing to control one’s thoughts and being responsible for the
negative consequences of not doing so (e.g. “if I cannot control a worry, and it comes true, then it is my fault”). Lastly, the Cognitive Self-Consciousness subscale (CSC) assesses the extent to which a person is aware of, and focuses on, their thinking (e.g. “I think a lot about my thoughts”). The scores for each subscale are summed to provide the overall MCQ-C30 Total score, where higher sum scores of the total score and each of the five subscales indicate a greater number and strength of metacognitions (Esbjørn et al., 2013).

Esbjørn et al. (2013) found that the Cronbach alpha coefficient for the total scale was good (α = .87). In addition, the internal consistency of the total scale score and four of the five subscales scores was good with alphas ranging from .75 to .87. Some concerns were raised with the NC subscale which was found to exhibit an internal consistency of α = .60 (Esbjørn et al., 2013). It should be noted that consistency and reliability may be impeded by the child's metacognitive ability and understanding. Research has suggested that although children display metacognitive understanding from 5 years old, their understanding develops throughout middle and later childhood (Bolton, 2004). Consequently, metacognitive understanding varies with age and should be considered when interpreting this measure.

**Revised Children’s Scale of Anxiety and Depression.** The RCADS (Chorpita et al., 2000) is a 47 item self-report questionnaire used to measure symptoms corresponding to selected DSM-IV anxiety and major depressive disorders in children aged 6-18 years. Answers are recorded on a 4-point Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = always). There are eight scales, including Generalised Anxiety (GAD), Separation Anxiety (SA), Obsessive-Compulsive (OCD), Social Phobia (SP), Panic Disorder (PD), Major Depression (MDD), Total Anxiety (TOTA), and Total Anxiety and Depression (TOTAD).

Psychometric examination has revealed that the RCADS scales have good internal consistency and reliability in clinical and Australian samples, GADα = .84, MDDα = .87, SADα = .78, OCDα = .82, SOCα = .87 and PDα = .88 (Chorpita et al., 2005; de Ross et al., 2002). The RCADS has recently received support, including from a systematic review, for clinical and research use in young people with ASD (Kaat and Lecavalier, 2015; Sterling et al., 2015; Wigham and McConachie, 2014).

**Procedure**

Potential participants’ guardians responded by phone or email to local advertisements for children with ASD to participate in research on anxiety. Once contact
was made, a senior clinical psychologist (author two) invited the participants to attend a research appointment at the university’s clinical psychology clinic. Both the guardian and the child attended this appointment. At that time, the details of the research project were explained to all parties; separate and developmentally appropriate child and adult research project information sheets and consent forms were provided to the participants and were further verbally explained by the researcher. Consent was provided by both the child and the parent individually, ensuring both the child and parent understood that they could withdraw from the research at any time. The senior clinical psychologist then verified the participant had a formal diagnosis of ASD from a paediatrician or child psychiatrist. Following this, the self-report measures were completed by the child using Survey Monkey® on an iPad™. Participants completed the MCQ-C30 first, followed by the RCADS; completion of these questionnaires took approximately 20 minutes. The data was collected in an appropriately lit, well-ventilated therapy room at the university’s clinical psychology clinic at a time when the clinic was not heavily attended in order to reduce potential anxiety for the child. All ethical requirements granted by the university’s Human Research Ethics Committee were adhered to.

Statistical Analysis

As this was an exploratory study, with a limited sample size, a cross-sectional correlation design was utilised. We used IBM SPSS Statistics version 21 to compute descriptive statistics, internal consistency of scales, and correlation analyses. Preliminary analysis screened the data for outliers and missing values. Missing scores were established as random occurrences and replaced by substituting the mean score of that item (Somasundaram and Nedunchezhan, 2012). To explore the relationship between metacognitive beliefs and anxiety and depression conditions, a series of Pearson’s correlation coefficients (r) were calculated. The analysis included all RCADS and MCQ-C30 subscales and Total scores for both measures. In our data, the Cronbach alpha coefficients for the MCQ-C30 ranged from .65 - .87 across the subscales except for the Cognitive Self-Consciousness (CSC) subscale that had an internal consistency of α = .62. In relation to the RCADS, the Cronbach alpha coefficients...
ranged from .84-.92, except for the Obsessive-Compulsive (OCD) subscale that produced .63.

Results

Regarding our hypotheses that there would be positive correlations between anxiety, depression, and metacognitive beliefs in children with ASD the following was found. Correlational analysis identified seven significant, medium, positive correlations and 20 significant, large, positive correlations. (see Table 1). On the MCQ-C30 subscales, Negative Metacognitions (NEG), Need for Control (NC) and Total MCQ-C30 (TOT) were correlated with the full range of RCADS anxiety subscales. Further, Positive Metacognitions (POS) were significantly correlated with the RCADS Generalised Anxiety (GAD) and Obsessive-Compulsive (OCD) subscales; interestingly, it was the only MCQ-C30 subscale significantly related to the Major Depression (MDD) subscale. The less frequently correlated subscales of the MCQ-C30 in relation to the RCADS in descending order included the Positive Metacognitions (POS), Cognitive Confidence (CC), and Cognitive Self-Consciousness (CSC). Furthermore, from the RCADS subscales, it was evident that Separation Anxiety (SA), Generalised Anxiety (GAD), and Obsessive-Compulsive (OCD) were more frequently correlated with MCQ-C30 subscales than the remaining RCADS subscales. These trends suggest that metacognitive beliefs related to worrying, as measured by the MCQ-C30, are associated with anxiety and, less so, with depression in high functioning children with ASD. Further, specific types of metacognitive beliefs, Negative Metacognitions (NEG) and Need for Control (NC), were more prevalent than others in this ASD sample.

Discussion

The aim of the current research was to explore metacognitive beliefs in high functioning children with ASD and the relationship with anxiety and depression symptoms. It was predicted that a positive correlation between metacognitive beliefs and anxiety and depressive symptoms would be evident. The current study is one of the first to demonstrate
the presence of metacognitive beliefs, associated with anxiety and depressive symptoms, in
high functioning children with ASD.

Consistent with other research into metacognitive beliefs in children and adolescents
(Bacow et al., 2009; Benedetto et al., 2013), a positive correlation was found between
anxiety and metacognitive beliefs. Further, a positive correlation was found between the
metacognitive subscales Negative Metacognitions (NEG), Need for Control (NC), and the
Total MCQ-C30 and all the anxiety subscales on the RCADS. These findings provide further
support that young people with ASD experience metacognitive processes and monitor their
own thoughts, consistent with previous studies (Semrud-Clikeman et al., 2010; Wojcik et
al., 2014). Overall, a strong prevalence for Negative Metacognitions (NEG) and Need for
Control was found, which was coherent with the findings of the research of Smith and
Hudson (2013) into the occurrence of metacognitive beliefs in children and preadolescents
without ASD.

The large positive correlation found between Total Anxiety (TOTA; RCADS), Total
Anxiety and Depression (TOTAD; RCADS), and the Total MCQ-C30, provides further
support for the presence of metacognitive beliefs in the current sample and their relationship
with symptomology found in the comorbid anxiety and depression conditions. However,
when reviewed at a subscale level, it was observed that the Major Depression (MDD)
subscale yielded a moderate significant correlation with only the Positive Metacognitions
(POS) and Total MCQ-C30. It was interpreted that this is a result of the emphasis on the
measurement of worry-related metacognitions in the MCQ-C30 (consistent with the MCQ-
30), a core mental activity within anxiety related disorders, compared to the mental activity
of rumination as found more commonly in depressive related disorders (Papageorgiou,
2006). As such, future research into metacognitive beliefs in children with ASD would
likely yield findings of a stronger relationship between metacognitive factors and depressive
mood if a measure of metacognitive beliefs about rumination was utilised.

Importantly, our findings contribute to the empirical need identified by Damiano and
colleagues (2014), for research on the mechanisms that maintain anxiety in children with
ASD; that is, signifying that metacognitive beliefs are associated with anxiety and
depressive symptoms in those with ASD. An evaluation of the anxiety subscales in the
RCADS revealed that Generalised Anxiety (GAD) was the only subscale that yielded a
significant positive correlation with positive metacognitions. These findings provide preliminary support that the role of positive metacognitive beliefs may in fact be more prominent in GAD than other forms of anxiety, further supporting theories developed by Wells (2005). The finding that Positive (POS) and Negative Metacognitions (NEG), and the Need for Control (NC) metacognitions were correlated with GAD was consistent with Wells’ (1995) metacognitive theories of GAD and psychological disorder (Wells and Matthews, 1996). The finding that Positive Metacognitions (POS) was correlated with the Generalised Anxiety (GAD) subscale and lesser so to Obsessive-Compulsive (OCD) subscale was consistent with White and Hudson (2015), who noted that positive metacognitions in their sample of children without ASD was related to higher levels of GAD and OCD symptoms.

The Need for Control (NEC) subscale was found to be positively correlated to all the anxiety conditions. This finding was unsurprising when considering that ASD is often characterised by inflexible and rigid behaviour and thinking (APA, 2013). Research has found evidence of responsibility of thoughts in children and adolescents with GAD (Bacow et al., 2009). However, studies relating to the role of need for control of thoughts specifically in ASD are scarce. Nonetheless, research on the need for routine in children with ASD suggests that disturbances to routine outside of the child’s control is associated with more externalising behaviour problems and can cause significant distress (Henderson et al., 2011). This suggests that children with ASD may experience a need to control their internal cognitive events also, and that failure to do this results in anxiety; which would be consistent with our results regarding metacognitive beliefs about the need for control.

Interestingly, the Cognitive Self-Consciousness (CSC) subscale, which evaluates beliefs related to the tendency to be aware of, and to focus on, one’s thoughts was only significant in respect to the Obsessive-Compulsive (OCD) subscale. This was consistent with previous research that examined adults with anxiety and demonstrated that individuals with OCD tended to score higher on the Cognitive Self-Consciousness (CSC) subscale in comparison to other anxiety conditions and nonclinical controls (Cartwright-Hatton and Wells, 1997; Janeck et al., 2003). This suggests that in high functioning children with ASD, those with OCD symptoms, likely direct their attention to their thoughts excessively. Thus,
as Janeck et al. (2003) assert, such hyperawareness of thoughts may promote importance being placed on such thoughts, for example, thought-action fusion.

Limitations and Future Directions

Regarding limitations of the current research, the findings in this study need to be interpreted with caution given that individuals with ASD may have reduced capacity to use the meta-representational concepts that are required to organise their introspections (i.e., the capacity to have self-understanding of their own thoughts and feelings; Frith and Happé, 1999; Grainger et al., 2014; Schriber et al., 2014). Further to this, research has found that individuals with ASD often have alexithymia - “having no words for emotions” (Ben Shalom et al., 2006; Berthoz and Hill, 2005), thus, limiting their ability to accurately attend to the emotional content that is intertwined with their cognitive processes. Additionally, the study was cross-sectional in nature and the recruitment method of convenience sampling was required due to the rural location; consequently, only a small sample of participants was achieved, and they were generally comprised of Australian, Caucasian individuals from middle-class socioeconomic backgrounds. Therefore, the results of this study must be viewed as preliminary and may not necessarily be generalisable to individuals with ASD of other backgrounds or ages. Lastly, a comparison group of children without ASD was not utilised and, therefore, differences regarding metacognitive beliefs for children with and without ASD cannot be established from the current findings.

Based on the present findings, more evidence is required to gain a full understanding of the metacognitive processes in children with ASD; including utilising a larger sample with the addition of a comparison group of peers without ASD, as well as, longitudinal studies. Areas of research could include establishing the accuracy of self-reported metacognitions and the associated validity of psychometric measures for metacognitions in ASD populations. This could give greater insight into the role of metacognition in anxiety disorders, mood disorders, coping strategies and adjustment in those with ASD and could inform treatment modality.

Clinical Implications

The current findings that psychological distress in our sample was positively correlated with metacognitive beliefs were consistent with Wells’ metacognitive conceptualisation of psychological disorder, the self-regulatory executive function model.
Given that anxiety disorders have been found to endure over time (Esbjørn et al., 2015) and are frequently comorbid in children with ASD (van Steensel et al., 2011; White et al., 2009), our findings on metacognitive beliefs provide initial insight into potential maintaining factors that could be identified during clinical assessment and may be responsive to appropriate treatment. If future research establishes the present results in larger, more demographically diverse populations of children with ASD, this would further support the theoretical applicability of the metacognitive model of emotional disorder (the self-regulatory executive function model) for these individuals. Consequently, indicating the possible utility of metacognitive therapy for these individuals; however, such an intervention would need rigorous, clinical evaluation of its effectiveness.

Conclusions

This research explored the role of metacognitive beliefs in ASD. Metacognitive beliefs were found to be prevalent in this population, particularly associated with anxiety related conditions such as GAD, OCD, social phobia and separation anxiety. Specific metacognitions endorsed with these anxiety symptoms included Negative and the Need for Control metacognitive beliefs. Despite methodological limitations, the results of this study provide direction for future research, initial evidence for metacognitive beliefs in ASD, and revealed that different metacognitive beliefs were associated with various psychological symptoms. However, more research in this area is necessary to substantiate and elaborate the current research. This will ideally enhance knowledge in the area of ASD in terms of the processes and interventions that may be useful in reducing symptoms and improving quality of life.
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METACOGNITIVE BELIEFS AND ASD


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METACOGNITIVE BELIEFS AND ASD


METACOGNITIVE BELIEFS AND ASD


Table 1

Pearson R Correlation Coefficients MCQ-C\textsubscript{30} Subscales and the RCADS Subscales (N = 23).

<table>
<thead>
<tr>
<th></th>
<th>POS</th>
<th>NEG</th>
<th>CC</th>
<th>NC</th>
<th>CSC</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SP</strong></td>
<td>.301</td>
<td>.683*</td>
<td>.383</td>
<td>.528*</td>
<td>.281</td>
<td>.799*</td>
</tr>
<tr>
<td><strong>PD</strong></td>
<td>.168</td>
<td>.684*</td>
<td>.303</td>
<td>.667*</td>
<td>.004</td>
<td>.673*</td>
</tr>
<tr>
<td><strong>MDD</strong></td>
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<td>.386</td>
<td>-.052</td>
<td>.334</td>
<td>.214</td>
<td>.473*</td>
</tr>
<tr>
<td><strong>SA</strong></td>
<td>.274</td>
<td>.618*</td>
<td>.439*</td>
<td>.614*</td>
<td>.049</td>
<td>.727*</td>
</tr>
<tr>
<td><strong>GAD</strong></td>
<td>.507*</td>
<td>.516*</td>
<td>.229</td>
<td>.489*</td>
<td>.228</td>
<td>.714*</td>
</tr>
<tr>
<td><strong>OCD</strong></td>
<td>.467*</td>
<td>.468*</td>
<td>.142</td>
<td>.589*</td>
<td>.426*</td>
<td>.764*</td>
</tr>
<tr>
<td><strong>TOTA</strong></td>
<td>.356</td>
<td>.677*</td>
<td>.352</td>
<td>.641*</td>
<td>.196</td>
<td>.813*</td>
</tr>
<tr>
<td><strong>TOTAD</strong></td>
<td>.386</td>
<td>.661*</td>
<td>.288</td>
<td>.621*</td>
<td>.197</td>
<td>.785*</td>
</tr>
</tbody>
</table>

**Note.** MCQ-C\textsubscript{30}: Positive Metacognitions (POS), Negative Metacognitions (NEG), Cognitive Confidence (CC), Need for Control (NC), Cognitive Self-Consciousness (CSC); RCADS: Generalised Anxiety (GAD), Separation Anxiety (SA), Obsessive-Compulsive (OCD), Social Phobia (SP), Panic Disorder (PD), Major Depression (MDD), Total Anxiety (TOTA), and Total Anxiety and Depression (TOTAD).

**Correlation is significant at the .01 level (2-tailed)**

* Correlation is significant at the .05 level (2-tailed)

\textsuperscript{M} Medium strength effect size

\textsuperscript{L} Large strength effect size
Acknowledgement:

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