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A Preliminary Evaluation of Metacognitive Beliefs in High Functioning Children with Autism Spectrum Disorder

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1 **Abstract**

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

14

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

16

17 *Article Classification:* Research Paper

1 A Preliminary Evaluation of Metacognitive Beliefs in High Functioning Children with Autism
2 Spectrum Disorder
3

4 **Introduction**

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

18 A recent meta-analysis found that 39.6% of 2,121 children and adolescents with
19 ASD had at least one comorbid anxiety disorder according to DSM-IV criteria (van Steensel
20 *et al.*, 2011); including specific phobia, obsessive-compulsive disorder (OCD), social
21 anxiety disorder, generalized anxiety disorder (GAD), panic disorder, and separation anxiety
22 disorder. Simonoff *et al.* (2008) found that 41.90% of 112 children with ASD meet DSM-
23 IV-TR criteria for the following anxiety disorders: specific phobia (8.50%), OCD (8.20%),
24 GAD (13.40%), panic disorder (10.10%), and social anxiety (29.20%). White *et al.* (2009),
25 in a review of 11 prevalence studies, reported that 11-84% of 1,353 children with ASD
26 experienced anxiety to an impairing degree. Depression rates have been estimated between
27 15% and 24% in children with ASD; notably higher than in children without ASD (Rieffe *et al.*,
28 2014). Further, worry, anxiety and depression in ASD populations has been reported to
29 be more prevalent in individuals with functional language and an IQ above 70 (Caamaño *et al.*
30 *et al.*, 2013; De-la-Iglesia and Olivar, 2015; Hallett *et al.*, 2013).

1 There is mounting agreement that anxiety and depression are common in ASD,
2 however, there is limited understanding of the underlying mechanisms (De-la-Iglesia and
3 Olivar, 2015; Mazefsky and Herrington, 2014; White *et al.*, 2009). Further, it is likely that
4 the relationship between anxiety and ASD is bidirectional, in that ASD exacerbates anxiety
5 symptoms and vice versa (Mazefsky and Herrington, 2014; van Steensel *et al.*, 2013). There
6 has also been some debate in the research that the presence of both ASD and depression
7 may exacerbate each other's condition, as well as, increase symptoms of anxiety and OCD
8 (De-la-Iglesia and Olivar, 2015).

9 Research contends that ASD is a heterogeneous disorder that may be associated with
10 various etiological factors and that psychological treatment outcomes in ASD populations
11 are notably variable in comparison to non-ASD populations (Damiano *et al.*, 2014; Matson,
12 2016; Mazefsky *et al.*, 2012; Zafeiriou *et al.*, 2007; Zafeiriou *et al.*, 2013). Therefore, it has
13 been recommended that future research needs to explore the various mechanisms that may
14 contribute to comorbid conditions, such as anxiety, in those with ASD; particularly since
15 research to date into interventions has primarily focused on mechanisms identified to
16 maintain psychological distress in children without ASD (Damiano *et al.*, 2014). One such
17 mechanism that has been identified as a transdiagnostic process that contributes to
18 comorbidity in ASD, is poor emotion regulation (Damiano *et al.*, 2014).

19 ***Metacognition***

20 The metacognitive model of emotional disorder—the self-regulatory executive
21 function model (S-REF; Wells, 2000; Wells 2009; Wells and Matthews, 1996) is a
22 transdiagnostic model that asserts that emotional dysregulation and associated negative
23 thoughts are maintained by four interacting constructs: the cognitive attentional syndrome
24 (CAS); metacognitive beliefs; executive control; and mental modes (Wells, 2013). While a
25 detailed account of this model is beyond the scope of this paper (see Wells 2009; 2013;
26 Wells and Matthews, 1996), the S-REF model proposes that psychological disorder and
27 emotional distress results from the CAS, which is controlled by metacognitive beliefs. The
28 CAS comprises of repetitive and perseverative thinking, in the form of worry, rumination,
29 focusing on threat, and the utilisation of maladaptive coping behaviours (e.g. avoidance,
30 thought suppression) that fail, leading to a paradoxical impact on self-regulation and
31 continued negative emotional experience (Wells, 2009, 2013).

1 Metacognitive beliefs, or beliefs about one's thinking, are conceptualised to control
2 and maintain the CAS and are categorised under two main domains; positive metacognitive
3 beliefs and negative metacognitive beliefs (Wells, 2009). Positive metacognitive beliefs
4 typically occur prior to the development of negative metacognitive beliefs. Positive
5 metacognitive beliefs are concerned with the benefits or advantages of engaging in cognitive
6 activities (worry, rumination); for example, "worrying helps me to stop bad things from
7 happening" (Wells, 2009). Such beliefs may involve worry being viewed as a helpful
8 strategy. This results in a reliance and increased use of worry as a coping strategy, for
9 example, an individual with GAD may hold the positive metacognitive belief "worrying
10 means I will be prepared" (Wells 2009). Negative metacognitive beliefs, which are more
11 potent in psychological disorder, are concerned with either the harmfulness or
12 uncontrollability of one's thoughts (Wells, 2009, 2013). For example, "worrying is going to
13 give me a heart attack" or "my worry is uncontrollable". In turn, metacognitive beliefs result
14 in the employment of maladaptive metacognitive strategies such as thought suppression and
15 avoidance, which maintain worry or rumination and the associated anxiety or negative affect
16 (Cartwright-Hatton and Wells, 1997; Spada *et al.*, 2008; Wells and Butler, 1997).

17 Several studies have substantiated Wells' metacognitive theory (Halvorsen *et al.*,
18 2015; Normann *et al.*, 2014; Wells, 2013). Davis and Valentiner (2000) found in a study of
19 175 adults that individuals with GAD demonstrated significantly higher levels of
20 metacognitions than non-anxious and non-worried/anxious participants. Wells (2005), in a
21 sample of 174 university students, found that metacognitions are not only evident in GAD,
22 but that metacognitive strategies that result from negative metacognitive beliefs (e.g.
23 thought suppression, avoidance) further perpetuated worry. More recently, research ($N =$
24 230) has suggested that negative metacognitive beliefs mediate the relationship between
25 trait worry and GAD symptoms (Penney *et al.*, 2013).

26 Further, Halvorsen *et al.* (2015) reported that metacognitive beliefs, in a sample of
27 168 adults, were endorsed more by currently depressed individuals than those who were
28 previously depressed or those who had not experienced depression. Additionally, several
29 studies that have examined the outcomes of treatment on metacognitive processes, including
30 metacognitive beliefs, have demonstrated that changes in such beliefs were associated with
31 reductions in worry and rumination and associated emotional distress (Papageorgiou, 2015;

1 Wells, 2013). The role of metacognitive beliefs in emotional disturbance in other forms of
2 anxiety, such as OCD, social anxiety, panic, and health anxiety has also been demonstrated
3 (Bailey and Wells, 2015; Cucchi *et al.*, 2012; Vassilopoulos *et al.*, 2015; Wells, 2000, 2013;
4 Wells and Papageorgiou, 1998).

5 ***Metacognition in Children and Adolescents***

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

18 Only a small number of studies have explored the role of worry and rumination in
19 children with ASD; demonstrating that such repetitive and perseverative thinking is
20 associated with anxiety and depression (Mazefsky *et al.*, 2014; Rieffe *et al.*, 2014).
21 However, there appears to have been no published studies of the role of metacognitive
22 beliefs in high functioning children with ASD.

23 ***Metacognitive Beliefs in Children with ASD***

24 The role of metacognitive beliefs and processes in anxiety experienced by ASD
25 populations currently remains unclear due to a lack of investigative research. Only one study
26 to date appears to have specifically evaluated metacognitive beliefs in ASD (Grainger *et al.*,
27 2014). This study ($N = 18$) found that high functioning adults with ASD endorsed higher
28 levels of metacognitive beliefs about monitoring their own thoughts, than did matched
29 adults without ASD; however, the study did not explore metacognitive beliefs in regard to
30 emotional distress.

1 Considering the high prevalence of anxiety, including worry, and depression in ASD,
2 it may be theorised that children with ASD have developed metacognitive beliefs in line
3 with the findings in individuals who are not on the autism spectrum. Thus, the aim of the
4 current research was to explore the presence of metacognitive beliefs in high functioning
5 children with ASD and the associations of such beliefs with emotional distress. It was
6 hypothesised that there would be a positive correlation between anxiety and metacognitive
7 beliefs in children with ASD. Primarily, that elevated metacognitive beliefs would be
8 associated with increased levels of anxiety symptoms. It was further hypothesised that
9 metacognitive beliefs in this sample would be associated with depressive symptoms.

11 **Method**

12 ***Sample***

13 Following ethical approval from the University of XXXXX Human Research Ethics
14 Committee, participants were recruited through the University of XXXX ASD Support Group,
15 radio, and local newspapers. Consistent with research determining the development and presence
16 of metacognitive abilities in children (Flavell *et al.*, 1995; 2000), the age of 8 years was defined
17 as the minimum age criteria for the current study. Because the focus of this study was children,
18 the upper age limit of 12 years was established due to the onset of adolescence at 13 years.
19 Thirty-five individuals expressed interest in participating in the study. Of these participants, 12
20 did not meet the inclusion criteria: that is, they did not have an ASD diagnosis from a
21 psychiatrist or paediatrician, or were outside the age range, or had a co-morbid diagnosis of
22 oppositional defiant disorder (ODD) or an intellectual disability. Participants were not excluded
23 if they had comorbid diagnoses such as attention deficit hyperactivity disorder ($N = 6$), a
24 diagnosed anxiety disorder ($N = 1$), Tourette's syndrome ($N = 1$), or a hearing impairment ($N =$
25 1). Consequently, 23 participants (17 male and 6 female) aged between eight and 12 years ($M =$
26 10.38 years, $SD = 1.39$) voluntarily participated in the study. All participants had a confirmed
27 diagnosis of ASD from a paediatrician or child psychiatrist. The process of confirming this
28 included review of current diagnostic information (process of obtaining diagnosis, e.g.,
29 paediatrician/psychiatrist name) and confirmation of the State of Queensland (Department of
30 Education and Training) verification status of the participant (name of school and relevant support
31 information) from parent/guardian and review of the individual case to ascertain if further diagnostic

1 clarification was required. All diagnoses were made prior to the release of DSM-5 and as such
2 included: Asperger Syndrome or pervasive developmental disorder—not otherwise specified
3 (PDD-NOS). High functioning was determined by one of the researchers, an experienced clinical
4 psychologist, with expertise in diagnosing ASD. High Functioning Autism is terminology used
5 when referring to an individual on the spectrum who is deemed to be functioning at a higher
6 cognitive level (in terms of a cognitive capacity [Intellectual Quotient {IQ}] greater than 70; Carpenter,
7 Soorya, and Halpern, 2009; Sanders, 2009). An individual who is considered to be High Functioning, in
8 the context of this study, is one who is, in cases, able to function with consistent adjustment plans, in
9 a mainstream educational setting, without the requirement of further adjustments.

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

15 **Measures**

16 Demographic information was gathered prior to the commencement of the study.
17 The study questionnaires were completed on an iPad using Survey Monkey® and included:
18 The Metacognitions Questionnaire for Children (MCQ-C₃₀; Esbjørn *et al.*, 2013) and the
19 Revised Children’s Scale of Anxiety and Depression (RCADS; Chorpita *et al.*, 2000).

20 **Metacognitions Questionnaire for Children.** The MCQ-C₃₀ (Esbjørn *et al.*, 2013) is a
21 30 item self-report questionnaire used to measure metacognitions in youth aged 7-17 years. It
22 was adapted for children from the Metacognitions Questionnaire (MCQ; Cartwright-Hatton and
23 Wells; 1997) and Metacognitions Questionnaire for Adolescents (MCQ-A; Cartwright-Hatton *et*
24 *al.*, 2004). Scores are measured on a 4-point Likert scale (1 = *not at all*, 2 = *a little*, 3 = *very*, 4 =
25 *totally*) and There are five sub-scales. The Positive Metacognitions subscale (POS) measures the
26 belief that worrying may be helpful in preventing or avoiding problems in the future (e.g. “if I
27 worry now, then I will have fewer problems later”). The Negative Metacognitions subscale
28 (NEG) measures beliefs that worry is harmful and uncontrollable (e.g. “worrying is bad for me”).
29 The Cognitive Confidence subscale (CC) evaluates the confidence a person has in their memory
30 and attention (e.g. “I think I am bad at remembering names”). The Need for Control subscale
31 (NC) measures beliefs about needing to control one’s thoughts and being responsible for the

1 negative consequences of not doing so (e.g. “if I cannot control a worry, and it comes true, then
2 it is my fault”). . Lastly, the Cognitive Self-Consciousness subscale (CSC) assesses the extent to
3 which a person is aware of, and focuses on, their thinking (e.g. “I think a lot about my
4 thoughts”). The scores for each subscale are summed to provide the overall MCQ-C₃₀ Total
5 score, where higher sum scores of the total score and each of the five subscales indicate a greater
6 number and strength of metacognitions (Esbjörn *et al.*, 2013).

7 Esbjörn *et al.* (2013) found that the Cronbach alpha coefficient for the total scale was
8 good ($\alpha = .87$). In addition, the internal consistency of the total scale score and four of the five
9 subscales scores was good with alphas ranging from .75 to .87. Some concerns were raised with
10 the NC subscale which was found to exhibit an internal consistency of $\alpha = .60$ (Esbjörn *et al.*,
11 2013). It should be noted that consistency and reliability may be impeded by the child's
12 metacognitive ability and understanding. Research has suggested that although children display
13 metacognitive understanding from 5 years old, their understanding develops throughout middle
14 and later childhood (Bolton, 2004). Consequently, metacognitive understanding varies with age
15 and should be considered when interpreting this measure.

16 **Revised Children’s Scale of Anxiety and Depression.** The RCADS (Chorpita *et al.*,
17 2000) is a 47 item self-report questionnaire used to measure symptoms corresponding to selected
18 DSM-IV anxiety and major depressive disorders in children aged 6-18 years. Answers are
19 recorded on a 4-point Likert scale (0 = *never*, 1 = *sometimes*, 2 = *often*, 3 = *always*). There are
20 eight scales, including Generalised Anxiety (GAD), Separation Anxiety (SA), Obsessive-
21 Compulsive (OCD), Social Phobia (SP), Panic Disorder (PD), Major Depression (MDD), Total
22 Anxiety (TOTA), and Total Anxiety and Depression (TOTAD).

23 Psychometric examination has revealed that the RCADS scales have good internal
24 consistency and reliability in clinical and Australian samples, $GAD\alpha = .84$, $MDD\alpha = .87$, $SAD\alpha$
25 $= .78$, $OCD\alpha = .82$, $SOC\alpha = .87$ and $PD\alpha = .88$ (Chorpita *et al.*, 2005; de Ross *et al.*, 2002). The
26 RCADS has recently received support, including from a systematic review, for clinical and
27 research use in young people with ASD (Kaat and Lecavalier, 2015; Sterling *et al.*, 2015;
28 Wigham and McConachie, 2014).

29 **Procedure**

30 Potential participants’ guardians responded by phone or email to local
31 advertisements for children with ASD to participate in research on anxiety. Once contact

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

17

18 **Statistical Analysis**

19 As this was an exploratory study, with a limited sample size, a cross-sectional
20 correlation design was utilised. We used IBM SPSS Statistics version 21 to compute
21 descriptive statistics, internal consistency of scales, and correlation analyses. Preliminary
22 analysis screened the data for outliers and missing values. Missing scores were established
23 as random occurrences and replaced by substituting the mean score of that item
24 (Somasundaram and Nedunchezian, 2012). To explore the relationship between
25 metacognitive beliefs and anxiety and depression conditions, a series of Pearson's
26 correlation coefficients (r) were calculated. The analysis included all RCADS and MCQ-C₃₀
27 subscales and Total scores for both measures.

28 In our data, the Cronbach alpha coefficients for the MCQ-C₃₀ ranged from .65 - .87
29 across the subscales except for the Cognitive Self-Consciousness (CSC) subscale that had an
30 internal consistency of $\alpha = .62$. In relation to the RCADS, the Cronbach alpha coefficients

1 ranged from .84-.92, except for the Obsessive-Compulsive (OCD) subscale that produced
2 .63.

4 **Results**

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

23
24 _____
Insert Table 1 about here
25 _____
26

27 **Discussion**

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

1 the presence of metacognitive beliefs, associated with anxiety and depressive symptoms, in
2 high functioning children with ASD.

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

14 The large positive correlation found between Total Anxiety (TOTA; RCADS), Total
15 Anxiety and Depression (TOTAD; RCADS), and the Total MCQ-C₃₀, provides further
16 support for the presence of metacognitive beliefs in the current sample and their relationship
17 with symptomology found in the comorbid anxiety and depression conditions. However,
18 when reviewed at a subscale level, it was observed that the Major Depression (MDD)
19 subscale yielded a moderate significant correlation with only the Positive Metacognitions
20 (POS) and Total MCQ-C₃₀. It was interpreted that this is a result of the emphasis on the
21 measurement of worry-related metacognitions in the MCQ-C₃₀ (consistent with the MCQ-
22 30), a core mental activity within anxiety related disorders, compared to the mental activity
23 of rumination as found more commonly in depressive related disorders (Papageorgiou,
24 2006). As such, future research into metacognitive beliefs in children with ASD would
25 likely yield findings of a stronger relationship between metacognitive factors and depressive
26 mood if a measure of metacognitive beliefs about rumination was utilised.

27 Importantly, our findings contribute to the empirical need identified by Damiano and
28 colleagues (2014), for research on the mechanisms that maintain anxiety in children with
29 ASD; that is, signifying that metacognitive beliefs are associated with anxiety and
30 depressive symptoms in those with ASD. An evaluation of the anxiety subscales in the
31 RCADS revealed that Generalised Anxiety (GAD) was the only subscale that yielded a

1 significant positive correlation with positive metacognitions. These findings provide
2 preliminary support that the role of positive metacognitive beliefs may in fact be more
3 prominent in GAD than other forms of anxiety, further supporting theories developed by
4 Wells (2005). The finding that Positive (POS) and Negative Metacognitions (NEG), and the
5 Need for Control (NC) metacognitions were correlated with GAD was consistent with
6 Wells' (1995) metacognitive theories of GAD and psychological disorder (Wells and
7 Matthews, 1996). The finding that Positive Metacognitions (POS) was correlated with the
8 Generalised Anxiety (GAD) subscale and lesser so to Obsessive-Compulsive (OCD)
9 subscale was consistent with White and Hudson (2015), who noted that positive
10 metacognitions in their sample of children without ASD was related to higher levels of
11 GAD and OCD symptoms.

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

23 Interestingly, the Cognitive Self-Consciousness (CSC) subscale, which evaluates
24 beliefs related to the tendency to be aware of, and to focus on, one's thoughts was only
25 significant in respect to the Obsessive-Compulsive (OCD) subscale. This was consistent
26 with previous research that examined adults with anxiety and demonstrated that individuals
27 with OCD tended to score higher on the Cognitive Self-Consciousness (CSC) subscale in
28 comparison to other anxiety conditions and nonclinical controls (Cartwright-Hatton and
29 Wells, 1997; Janeck *et al.*, 2003). This suggests that in high functioning children with ASD,
30 those with OCD symptoms, likely direct their attention to their thoughts excessively. Thus,

1 as Janeck *et al.* (2003) assert, such hyperawareness of thoughts may promote importance
2 being placed on such thoughts, for example, thought-action fusion.

3 ***Limitations and Future Directions***

4 Regarding limitations of the current research, the findings in this study need to be
5 interpreted with caution given that individuals with ASD may have reduced capacity to use
6 the meta-representational concepts that are required to organise their introspections (i.e., the
7 capacity to have self-understanding of their own thoughts and feelings; Frith and Happé,
8 1999; Grainger *et al.*, 2014; Schriber *et al.*, 2014). Further to this, research has found that
9 individuals with ASD often have alexithymia - “having no words for emotions” (Ben
10 Shalom *et al.*, 2006; Berthoz and Hill, 2005), thus, limiting their ability to accurately attend
11 to the emotional content that is intertwined with their cognitive processes. Additionally, the
12 study was cross-sectional in nature and the recruitment method of convenience sampling
13 was required due to the rural location; consequently, only a small sample of participants was
14 achieved, and they were generally comprised of Australian, Caucasian individuals from
15 middle-class socioeconomic backgrounds. Therefore, the results of this study must be
16 viewed as preliminary and may not necessarily be generalisable to individuals with ASD of
17 other backgrounds or ages. Lastly, a comparison group of children without ASD was not
18 utilised and, therefore, differences regarding metacognitive beliefs for children with and
19 without ASD cannot be established from the current findings.

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

28 ***Clinical Implications***

29 The current findings that psychological distress in our sample was positively
30 correlated with metacognitive beliefs were consistent with Wells’ metacognitive
31 conceptualisation of psychological disorder, the self-regulatory executive function model

1 (Wells and Matthews, 1996). Given that anxiety disorders have been found to endure over
2 time (Esbjörn *et al.*, 2015) and are frequently comorbid in children with ASD (van Steensel
3 *et al.*, 2011; White *et al.*, 2009), our findings on metacognitive beliefs provide initial insight
4 into potential maintaining factors that could be identified during clinical assessment and
5 may be responsive to appropriate treatment. If future research establishes the present results
6 in larger, more demographically diverse populations of children with ASD, this would
7 further support the theoretical applicability of the metacognitive model of emotional
8 disorder (the self-regulatory executive function model) for these individuals. Consequently,
9 indicating the possible utility of metacognitive therapy for these individuals; however, such
10 an intervention would need rigorous, clinical evaluation of its effectiveness.

11

12 **Conclusions**

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

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1 **Table 1**

2 *Pearson R Correlation Coefficients MCQ-C₃₀ Subscales and the RCADS Subscales (N =*
 3 *23).*

<u>Metacognitions Questionnaire for Children: MCQ-C₃₀</u>							
	POS	NEG	CC	NC	CSC	TOT	
<u>Revised Children's Scale of Anxiety and Depression: RCADS</u>	SP	.301	.683** ^L	.383	.528** ^L	.281	.799** ^L
	PD	.168	.684** ^L	.303	.667** ^L	.004	.673** ^L
	MDD	.455* ^M	.386	-.052	.334	.214	.473* ^M
	SA	.274	.618** ^L	.439* ^M	.614** ^L	.049	.727** ^L
	GAD	.507* ^L	.516* ^L	.229	.489* ^M	.228	.714** ^L
	OCD	.467* ^M	.468* ^M	.142	.589** ^L	.426* ^M	.764** ^L
	TOTA	.356	.677** ^L	.352	.641** ^L	.196	.813** ^L
	TOTAD	.386	.661** ^L	.288	.621** ^L	.197	.785** ^L

4 *Note.* MCQ-C₃₀: Positive Metacognitions (POS), Negative Metacognitions (NEG),
 5 Cognitive Confidence (CC), Need for Control (NC), Cognitive Self-Consciousness (CSC);
 6 RCADS: Generalised Anxiety (GAD), Separation Anxiety (SA), Obsessive-Compulsive
 7 (OCD), Social Phobia (SP), Panic Disorder (PD), Major Depression (MDD), Total Anxiety
 8 (TOTA), and Total Anxiety and Depression (TOTAD).

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

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

11 ^M Medium strength effect size

12 ^L -Large strength effect size

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