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Test of the Metacognitive Model of Generalized Anxiety Disorder in Anxiety-Disordered Adolescents

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Abstract

The metacognitive model of generalized anxiety disorder (GAD) suggests that positive and negative beliefs about worry contribute to pathological worry. This study explores the relationship between metacognition and worry in youth aged 12–17 years. The sample consisted of 81 anxiety-disordered youth, with 70 mothers included, and 42 non-clinical controls, with 40 mothers included. Metacognitive beliefs were associated with emotional symptoms. Both GAD and non-GAD youth, and anxious and anxious/depressed youth, reported higher metacognitive beliefs compared to non-clinical controls, but there were no differences in metacognition between emotional disorders. There was no significant association between age and metacognition, and there were no gender differences in metacognition. These results provide partial support for using the metacognitive model of GAD to understand worry in young people.

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Keywords: metacognition, adolescent psychopathology, anxiety, generalized anxiety disorder

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Introduction

Worry has been found to be a common phenomenon in young people (Muris, Meesters, Merckelbach, Sermon, & Zwakhalen, 1998). Vasey and Daleiden (1994, p. 186) describe worry as “primarily an anticipatory cognitive process involving repetitive, primarily verbal thoughts related to possible threatening outcomes and their potential consequences”. Some young people will experience uncontrollable and excessive worry that meets Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV; American Psychiatric Association, 1994) criteria for generalized anxiety disorder (GAD), with point prevalence rates for GAD in children and adolescents ranging from between 0.16% (Ford, Goodman, & Meltzer, 2003) to 11.1% (Boyle et al., 1993). Childhood worry is an important yet under-researched area of study, so an understanding of this phenomenon is heavily reliant on downward extensions of cognitive theories developed using adult populations. However, the application of adult

models of worry to young people needs to be carefully evaluated, as a child's cognitive, social, and emotional abilities may impact on their experience of worry (Vasey, 1993).

In recent years there have been exciting new developments in the understanding of worry in adult populations, with research increasingly focusing on the role of metacognitive beliefs in anxiety disorders in adults. Metacognition has been defined as "the cognitive processes, strategies, and knowledge that are involved in the regulation and appraisal of thinking itself" (Wells, 2004, p.167). In essence, metacognition is the thoughts that an individual has about their thinking. Wells (1995, 2009) developed the metacognitive model of GAD, which suggests that positive and negative beliefs about worry contribute to the development and maintenance of pathological worry. In recent years the model has been expanded to address the role of metacognitive beliefs across several psychological disorders, including obsessive-compulsive disorder (OCD), social phobia, depression, posttraumatic stress disorder, hypochondriasis, and auditory hallucinations (Baker & Morrison, 1998; Papageorgiou & Wells, 1998; Wells, 2009). However, the main focus of the model has been on metacognitive beliefs regarding the benefits and dangers of worrying in adults with excessive worry (Wells, 1995, 2009).

According to the metacognitive model the worry process begins following a worry trigger, such as an intrusive thought or particular event. The individual engages in worry relating to physical, financial, or external issues, which is also known as Type 1 worry. Positive metacognitive beliefs are linked to the usefulness of worry as a coping strategy (e.g., "Worrying helps me cope"). This process is typical in clinical and non-clinical populations. Individuals with GAD are differentiated by the activation of negative beliefs about worry, specifically the uncontrollability (e.g., "My worrying thoughts persist, no matter how I try to stop them") and the danger (e.g., "Worrying will make me go crazy") of worry. These beliefs contribute to negative appraisals of worry, which is also known as Type 2 worry or meta-worry. Negative emotions associated with meta-worry, such as increased anxiety or tension, make it increasingly difficult for the individual to recognize that it is safe to stop worrying. This reinforces negative beliefs about worry and the need to continue worrying. Type 2 worry is then maintained by behaviours including reassurance seeking or avoidance of worry triggers, which prevents the individual from learning more helpful coping strategies and that worry is controllable and harmless. Thought suppression and failure to interrupt the worry sequence also maintain the worry process by inadvertently exacerbating the frequency of intrusive thoughts.

A growing body of evidence supports several aspects of Wells's metacognitive model of GAD in adult populations (for a review, see Wells, 2004). This includes significant correlations between positive and negative beliefs about worry and symptoms of worry and anxiety. Research has found that individuals with GAD, other anxiety disorders, and non-clinical controls endorse similar levels of positive beliefs about worry. Research has also found that compared to adults with other anxiety disorders and non-clinical controls, adults with GAD report a greater need to control their worry, and/or a belief that their worry was uncontrollable. Negative beliefs about worry have also been shown to be a better predictor of pathological worry than the frequency or content of worry. Studies have found that pathological meta-worry has several adverse consequences (see Wells, 2004). This includes a negative impact on self-regulation, unsuccessful patterns of thought control, and the ineffectiveness of worry as a coping strategy.

There is emerging research that examines whether adolescents are capable of forming beliefs about their worry (see Ellis & Hudson, 2010, for a review). Cartwright-Hatton et al. (2004) developed the Metacognitions Questionnaire for Adolescents (MCQ-A) to assess beliefs about worry using a sample of school students aged from 13 to 17 years. The MCQ-A examines metacognitive beliefs across five separate subscales, with the first two subscales measuring positive and negative beliefs about worry,

which are the main tenets of the metacognitive model of GAD. The remaining three subscales measure other aspects of metacognition that are thought to relate to intrusive thoughts, including cognitive confidence, negative beliefs about thoughts in general, and cognitive self-consciousness.

In their study, Cartwright-Hatton et al. (2004) found that adolescents reported the full range of problematic metacognitive beliefs identified in adult populations, and positive and negative beliefs about worry were positively associated with self-reported anxiety, depression, and obsessionality. The extent to which these beliefs were endorsed did not increase with age, suggesting that they are developed even by 13 years of age. Consistent with predictions of the metacognitive model of GAD, there were no significant differences between a small sub-sample of clinical and control participants on positive beliefs about worry, and clinical youth reported significantly higher levels of negative beliefs about worry compared to non-clinical youth. There were also no differences between clinical and control participants on cognitive self-consciousness, although clinical youth scored higher on cognitive confidence, total metacognition, and superstition, punishment, and responsibility. Analyses of gender effects found that there were no differences in the responses of boys and girls on the measure. Two additional studies exploring the role of metacognitive beliefs in OCD found that the full range of metacognitive beliefs were again endorsed in adolescent non-clinical populations, and these beliefs were associated with obsessive-compulsive symptoms (Mather & Cartwright-Hatton, 2004; Matthews, Reynolds, & Derisley, 2007).

A recent study by Bacow, Pincus, Ehrenreich, and Brody (2009) outlined the development of the Metacognitions Questionnaire for Children (MCQ-C), using a sample of clinical and non-clinical youth aged 7–17 years. The MCQ-C is based on the MCQ-A, but was modified to evaluate metacognitive beliefs across a broader age range. Bacow et al. (2009) found that positive beliefs about worry were associated with symptoms of worry, and negative beliefs about worry were associated with symptoms of worry and depression. Girls scored higher than boys on total metacognitive beliefs, and there were age-based differences in cognitive monitoring, with older children scoring higher than younger children. This study suggests that children as young as 7 endorse dysfunctional beliefs about their worry, and these beliefs are associated with symptoms of anxiety and depression. However, certain limitations make it difficult to draw conclusions regarding the veracity of the metacognitive model in anxiety-disordered youth. The non-clinical sample used in this study was small, with 60% of this sample having sub-clinical symptoms of psychological disorders. Also, except for the cognitive monitoring subscale, there were no significant differences between the clinical and non-clinical participants in endorsement of metacognitive beliefs, although it is not clear the extent to which these results are due to the large age range used in the study. Thus, questions still remain regarding the significance of the metacognitive model of GAD in anxiety-disordered adolescents, and age and gender differences in reporting of metacognitive beliefs (Ellis & Hudson, 2010).

It is important to also consider the role of metacognitive beliefs in young people who have comorbid anxiety and depression. Pathological worry has been likened to rumination in depression (Papageorgiou, 2006), and the metacognitive model has been developed to address the role of metacognitive beliefs in depression (Papageorgiou & Wells, 2001a). The model suggests that depressed mood is associated with the activation of positive beliefs about rumination, including the usefulness of rumination as a coping strategy (Papageorgiou & Wells, 2001a). For example, the individual may believe “If I dwell on my past mistakes, I can be a better person”. However, an over-reliance on rumination as a coping strategy activates negative beliefs about the uncontrollability and danger of rumination, such as “It’s impossible to stop myself from ruminating”, which reinforces feelings of helplessness and depression. Research has found support for this model in adult populations (for a review, see Papageorgiou, 2006). This includes the finding that positive and negative beliefs about rumination correlate with measures of rumination,

worry, anxiety and depression. Depressed adults have also been found to report significantly higher levels of positive and negative beliefs about rumination compared to adults with anxiety disorders and non-clinical controls. Although the studies conducted by Cartwright-Hatton et al. (2004) and Bacow et al. (2009) included anxious adolescents with comorbid depression, at the present time no research has examined the metacognitive beliefs of depressed young people.

The purpose of this study was to explore, using the MCQ-A, metacognitive worry and tenets of the metacognitive model of GAD (Wells, 1995, 2009) in adolescents with anxiety disorders, comorbid anxiety/depression, and non-clinical controls. Regarding positive and negative beliefs about worry, the following hypotheses will be tested: 1) There will be no differences between anxious adolescents and non-clinical controls in endorsement of positive beliefs about worry, 2) Anxious adolescents will report more negative beliefs about worry than non-clinical controls, 3) Adolescents with GAD will report more negative beliefs about worry compared to anxious adolescents without GAD, although no differences in positive beliefs will be expected, 4) As depressed mood is associated with metacognitive beliefs about rumination (Papageorgiou & Wells, 2001a), anxious adolescents with comorbid depression will have increased metacognitive worry compared to anxious adolescents without comorbid depression, and they will report greater positive and negative metacognitive beliefs compared to non-clinical adolescents, and 5) Endorsement of negative beliefs about worry will be associated with symptoms of anxiety, depression, and worry. According to the metacognitive model, endorsement of positive beliefs about worry will not be associated with these symptoms, although previous research has found significant correlations between these variables (Bacow et al., 2009; Cartwright-Hatton et al., 2004). Regarding other aspects of metacognition, it is hypothesized that there will be no differences between GAD and non-GAD anxiety-disordered adolescents in metacognitive beliefs relating to cognitive confidence, superstition, punishment, and responsibility, and cognitive self-consciousness, although anxious adolescents will endorse these beliefs more than non-clinical controls.

The association between age and metacognitive worry will also be evaluated, with an expectation that there will be no relationship between these variables. Although the MCQ-A has only previously been used with children aged 13 and above, 12-year-olds were included in the present study to evaluate metacognitive beliefs across a broader age span, and research suggests that there is an increase in cognitive and developmental abilities at this time (Vasey, 1993). Finally, gender differences will be evaluated, with an expectation that boys and girls will report similar levels of metacognition.

Method

Participants

A total of 123 participants aged between 12 and 17 years were included in the study, with 111 mothers also included. Although all mothers were invited to participate in the study, their involvement was on a voluntary basis. There were no differences between mothers who participated versus those who did not in sociodemographic variables or levels of worry, anxiety or depression. Of the sample, 81 were clinical participants aged from 12 to 17 years, with 71 mothers included. The clinical sample consisted of 35 boys (43%) and 46 girls (57%), with a mean age of 14.1 years ($SD = 1.5$ years). Non-clinical participants were 42 children, aged 12 to 17 years, with 40 mothers also included. There were 20 boys (48%) and 22 girls (52%), and the mean age of non-clinical participants was 13.7 years ($SD = 1.4$ years). Of the sample, 62% were Australian, 20% European, 9% Asian, and 9% "other". Five percent of families earned less than A\$20 000 a year, 12% earned A\$20 000–A\$40 000, 21% earned A\$40 000–A\$80 000, and 62% earned more than A\$80 000 a year. Regarding family make-up, 92% were two-parent families, 5% were single-parent families, and 3% were step/blended families.

The clinical sample was comprised of families seeking treatment for child anxiety problems. Participants included in the clinical sample met criteria for an anxiety disorder or anxiety disorder with comorbid depression (i.e., major depressive disorder or dysthymia) according to categories defined in the DSM-IV (American Psychiatric Association, 1994). The non-clinical sample was recruited separately via community advertisements and newsletters. Participants were included in the non-clinical sample if they did not meet criteria for a DSM-IV (American Psychiatric Association, 1994) disorder. Diagnoses were made using the Anxiety Disorders Interview Schedule for Children (Parent and Child versions; ADIS-C, ADIS-P; Silverman & Albano, 1996), which is a standardized semi-structured clinical interview that enables clinicians to make diagnoses based on DSM-IV (American Psychiatric Association, 1994) criteria. Each diagnosis was assigned a clinical severity rating (CSR), which is a clinician-rated indicator of the severity of the diagnosis, based on child and parent reports. Ratings ranged from 0 (*not at all*) to 8 (*very, very much*). Research has indicated that the ADIS-C and ADIS-P are reliable and valid instruments for measuring anxiety disorders in youth (Lyneham, Abbott, & Rapee, 2007). Post-graduate clinical psychology students conducted these assessments with the anxious youth and their parents, and received training to criterion. Research from our clinic has demonstrated interrater agreement of kappa = 1.00 for an overall diagnosis of anxiety disorder and ranging from .82 to .93 across anxiety subtypes, with a kappa of .80 for GAD (Lyneham et al., 2007).

To enable comparisons to be made between anxiety diagnoses and non-clinical controls, participants were grouped into one of three categories: 1) Participants with GAD anywhere in their profile ($n = 69$), 2) Participants with an anxiety disorder other than GAD (i.e., non-GAD, including specific phobia, social phobia, separation anxiety disorder, panic disorder, agoraphobia without panic, OCD, and anxiety disorder not otherwise specified; $n = 12$), and 3) Non-clinical controls ($n = 42$). To enable comparisons between anxiety/depression diagnoses, anxiety diagnoses, and non-clinical controls, participants were grouped into one of three categories: 1) Participants diagnosed with an anxiety and depressive disorder ($n = 28$), 2) Participants with anxiety and no comorbid depression ($n = 53$), and 3) Non-clinical controls ($n = 42$).

Measures

Meta-cognitions Questionnaire for Adolescents (MCQ-A; Cartwright-Hatton et al., 2004) is a 30-item measure of metacognition. As well as a total score, the MCQ-A measures five subscales, including: 1) Positive Beliefs (e.g., “Worrying helps me cope”), 2) Uncontrollability and Danger (e.g., “My worrying is bad for me”), 3) Cognitive Confidence (e.g., “I do not trust my memory”), 4) Superstition, Punishment, and Responsibility (SPR; e.g., “It is bad to think certain thoughts”), and 5) Cognitive Self-Consciousness (e.g., “I am constantly aware of my thinking”). Participants indicate how much they agree with each statement on a four-point Likert-type scale ranging from 1 (*do not agree*) to 4 (*agree very much*). The MCQ-A has good concurrent and discriminant validity, and internal consistency is good, with Cronbach’s alpha ranging from .66 to .91 (Cartwright-Hatton et al., 2004). In the current study, adequate internal consistency was demonstrated, with Cronbach alpha coefficients for each scale as follows: Positive Beliefs = .90; Uncontrollability and Danger = .87; Cognitive Confidence = .87; SPR = .77; Cognitive Self-Consciousness = .78; and the Total score = .92.

Data from clinical and non-clinical samples were combined and confirmatory factor analysis (CFA) was conducted using Analysis of Moment Structures (AMOS) 7. Data from nine participants were excluded from this analysis due to missing items on the MCQ-A. As data were shown to have skewness and kurtosis, data were analyzed using the unweighted least-squares estimation method, which allows for non-normal data distributions (Anderson & Gerbing, 1988). The structure of the MCQ-A suggested by Cartwright-Hatton et al. (2004) showed adequate fit, $\chi^2 = 270.09$, $df = 395$, goodness-of-fit index = .96,

adjusted goodness-of-fit index = .95, normed fit index = .94, relative fit index = .94, and the parsimonious normed fit index PNFI = .86 (Gerbing & Anderson, 1993).

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item measure designed to assess the tendency, excessiveness, and uncontrollability of worry. Each item is rated on a scale ranging from 1 (*not at all typical*) to 5 (*very typical*), and items 1, 3, 8, 10, and 11 are reverse scored. Research has found that the PSWQ has good internal consistency, with Cronbach's alpha reported as .93 (Brown, Antony, & Barlow, 1992). Convergent and discriminant validity has been demonstrated, with the PSWQ correlating with measures of anxiety, depression, and emotional control, and adults with GAD have scored higher on the PSWQ than those with other anxiety disorders (Brown et al., 1992). Cronbach's alpha coefficient in the present study was .77.

Spence Children's Anxiety Scale (SCAS; Spence, 1997) is a 38-item self-report measure of anxiety symptoms in children and adolescents, according to DSM-IV (American Psychiatric Association, 1994) criteria. Items measure specific symptoms of the following six subscales, in addition to a total score: 1) Generalized Anxiety/Overanxious Disorder, 2) Social Phobia, 3) Separation Anxiety, 4) Fears of Physical Injury, 5) OCD, and 6) Panic/Agoraphobia. Each item is rated on a 4-point scale ranging from 0 (*never*) to 3 (*always*). The measure has good internal consistency, with Cronbach's alpha coefficient reported to range between .60 and .92 (Spence, 1998). The measure has good convergent validity, as it correlates with a measure of anxiety, and discriminant validity, with scores on the measure discriminating between clinical and control participants (Spence, 1998). Internal consistency was good in the present study, with Cronbach's alpha coefficient for each subscale as follows: .84 for Generalized Anxiety/Overanxious Disorder, .83 for Social Phobia, .80 for Separation Anxiety, .85 for OCD, .85 for Panic/Agoraphobia, and .94 for the Total score. Internal consistency was less good for the Fears of Physical Injury subscale, with an alpha coefficient of .57. The Spence Children's Anxiety Scale for Parents (SCAS-P; Spence, 1999) is a 38-item parent measure of the SCAS. The measure has good internal consistency, and convergent and divergent validity, as it correlates with a measure of Internalizing, but not Externalizing, symptoms (Nauta et al., 2004). The measure has good discriminant validity, with scores discriminating between clinical and control samples, and youth with different emotional disorders (Nauta et al., 2004). Internal consistency was good in the present study, with Cronbach's alpha coefficient for each subscale as follows: .86 for Generalized Anxiety/Overanxious Disorder, .87 for Social Phobia, .88 for Separation Anxiety, .82 for OCD, .88 for Panic/Agoraphobia, and .94 for the Total score. Internal consistency was less good for the Fears of Physical Injury subscale, with an alpha coefficient of .67.

Center for Epidemiological Studies Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980) is a 20-item self-report measure of depressive symptoms. Sixteen items assess for the cognitive, affective, behavioural, and somatic symptoms of depression, and four items assess for positive affect. Each item is rated according to the frequency or duration that each symptom has been experienced during the previous week using a four-point Likert-type scale ranging from 0 (*not at all*) to 3 (*a lot*). Research has suggested that the CES-DC has good internal consistency, and it is a reliable and valid measure of depressive symptoms (Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986; Weissman et al., 1980). In the present study, internal consistency was good, with a Cronbach's alpha coefficient of .80.

Procedure

This study received approval from the Human Ethics Committee of Macquarie University. Clinical participants presented for treatment at the Centre for Emotional Health (CEH) following media publicity about child anxiety, referrals from professionals, or by word of mouth. A sub-sample of clinical

participants ($n = 37$) completed the ADIS-C and ADIS-P in person at the Centre. Prior to the interview, participants were sent the measures to complete, and these were returned to the interviewer on the day of the assessment. The remaining clinical participants ($n = 44$) completed the ADIS-C and ADIS-P via the telephone as part of a wider study examining therapy provided over the phone and Internet. Prior to this they were sent the child and parent measures to complete, which were returned by post before the interview was conducted. Research indicates good agreement between in-person and phone-administered ADISs in the diagnosis of anxiety disorders (Lyneham & Rapee, 2005). All clinical participants received treatment at reduced fees for their participation. Parental consent for participation in the research was obtained prior to commencement of the clinical interview, as was the consent of adolescents aged 14 years and over. Upon completion of the assessment and return of the questionnaires, clinical participants completed cognitive-behavioural treatment at the Centre.

Non-clinical participants were recruited through advertisements placed in community newspapers and school newsletters. Consent for participation was obtained from parents and adolescents aged 14 years and over prior to the commencement of an experimental session at CEH. All measures were completed prior to this session, and participants were reimbursed \$20 for their time and effort.

Results

Descriptive Statistics

Due to the large number of statistical tests conducted in this study, all statistical analyses used a p -value of .01. The clinical and non-clinical groups were compared to evaluate whether there were any demographic differences between the groups. There were no differences in child age between the clinical ($M = 14.15$, $SD = 1.54$) and non-clinical ($M = 13.69$, $SD = 1.40$; $t(121) = 1.61$, $p = .11$) groups. Similarly, there were no differences between the clinical and non-clinical groups based on gender, $\chi^2(1, N = 123)$, $p = .78$, socioeconomic status, $\chi^2(3, N = 109)$, $p = .33$, or ethnicity, $\chi^2(3, N = 111)$, $p = .06$. To determine whether there were differences between the clinical and non-clinical groups in levels of worry, anxiety and depression, independent samples t -tests were conducted comparing groups on these measures (see Table 1). Except for Fear of Physical Injury, the clinical group scored significantly higher on all of these measures. Finally, the anxious and anxious/depressed groups were compared to evaluate whether there were any differences in depression levels between these groups. The anxious/depressed ($M = 27.63$, $SD = 13.87$) group scored significantly higher than the anxious ($M = 18.82$, $SD = 12.32$; $t(69) = -2.79$, $p = .00$) group on the measure of depression.

Group Differences

Clinical versus non-clinical. Independent samples t -tests were used to determine whether there were differences between the clinical and non-clinical groups in endorsement of metacognitive beliefs. The clinical group scored significantly higher than the non-clinical group on Positive Beliefs, Uncontrollability and Danger, SPR, and Total metacognition (see Table 1). Although there were no significant differences between clinical and non-clinical groups on Cognitive Confidence or Cognitive Self Consciousness, there was a trend for clinical participants to score higher than non-clinical youth on these beliefs, $p = .01$ and $p = .03$, respectively.

GAD versus other anxiety. A one-way analysis of variance (ANOVA) was conducted comparing MCQ-A scores for anxiety-disordered adolescents with and without GAD, and non-clinical controls (see Table 2). There were statistically significant differences for the different sample types in Positive Beliefs, Uncontrollability and Danger, SPR and Total metacognition. Although there were no significant

differences between sample types in Cognitive Confidence, there was a trend for GAD youth to score higher on this belief compared to non-GAD and non-clinical youth.

Table 1: Means and Standard Deviations for Measures of Metacognition, Worry, Anxiety, and Depression, Comparing Clinical to Non-Clinical Participants

Measure	Clinical <i>n</i> = 81		Non-Clinical <i>n</i> = 42	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
MCQ-A				
PB	10.06 _a	4.51	7.95 _b	2.22
UD	15.82 _a	4.61	8.98 _b	2.02
CC	10.77 _a	4.4	8.93 _a	2.82
SPR	12.78 _a	4.32	10.41 _b	2.76
CSC	14.76 _a	4.31	13.02 _a	3.65
Total	64.24 _a	16.22	49.31 _b	8.27
PSWQ	57.78 _a	14.16	31.51 _b	7.94
Child SCAS				
P/A	5.66 _a	4.85	0.71 _b	1.15
SA	4.81 _a	3.68	1.24 _b	1.18
SP	8.20 _a	4.2	3.86 _b	2.18
PI	3.14 _a	2.85	1.95 _a	1.41
OCD	6.33 _a	4.34	1.73 _b	2.18
GAD	8.64 _a	3.56	3.26 _b	1.95
Total	36.75 _a	17.16	12.79 _b	6.76
Parent SCAS				
P/A	5.10 _a	5.31	.15 _b	0.43
SA	5.46 _a	4.08	.50 _b	0.72
SP	9.59 _a	3.89	2.75 _b	2.16
PI	3.87 _a	3.29	2.00 _b	1.68
OCD	4.04 _a	3.92	.23 _b	0.58
GAD	7.57 _a	3.51	1.31 _b	1.05
Total	35.63 _a	17.04	6.98 _b	3.76
CES-DC	22.17 _a	13.54	7.52 _b	5.57

Note. MCQ-A = Meta-cognitions Questionnaire for Adolescents; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment, and Responsibility; CSC = Cognitive Self-Consciousness; PSWQ = Penn State Worry Questionnaire; SCAS = Spence Children's Anxiety Scale; P/A = Panic/Agoraphobia; SA = Separation Anxiety; SP = Social Phobia; PI = Physical Injury; OCD = Obsessive-Compulsive Disorder; GAD = Generalized Anxiety Disorder; CES-DC = Center for Epidemiological Studies Depression Scale for Children. Means in the same row that do not share subscripts differ at $p < .01$.

Post-hoc comparisons using the Tukey HSD test indicated that there were no significant differences between GAD and non-GAD youth in endorsement of Positive Beliefs, SPR, or Total metacognitive beliefs. Adolescents with GAD scored significantly higher on these beliefs compared to non-clinical youth. There were no significant differences between GAD and non-GAD youth on Uncontrollability and Danger, although there was a trend for GAD participants to score higher than non-GAD youth on this

belief, $p = .06$. Non-GAD adolescents significantly differed from non-clinical adolescents only on beliefs relating to Uncontrollability and Danger.

Table 2: Means and Standard Deviations for MCQ-A Scores Comparing GAD, Non-GAD, and Non-Clinical Participants

MCQ-A	GAD <i>n</i> = 69		Non-GAD <i>n</i> = 12		Non-Clinical <i>n</i> = 42		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
PB	10.38 _a	4.61	8.25 _{a,b}	3.52	7.95 _b	2.22	$F(2, 120) = 5.69, p = .00$
UD	16.20 _a	4.62	13.67 _a	4.1	8.98 _b	2.02	$F(2, 120) = 46.38, p = .00$
CC	11.08 _a	4.58	9.00 _a	2.76	8.93 _a	2.82	$F(2, 120) = 4.52, p = .01$
SPR	13.13 _a	4.31	10.75 _{a,b}	3.98	10.41 _b	2.76	$F(2, 120) = 7.28, p = .00$
CSC	14.77 _a	4.37	14.67 _a	4.12	13.02 _a	3.65	$F(2, 120) = 2.45, p = .09$
Total	65.62 _a	16.58	56.33 _{a,b}	11.51	49.31 _b	8.27	$F(2, 120) = 18.44, p = .00$

Note. MCQ-A = Meta-cognitions Questionnaire for Adolescents; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment, and Responsibility; CSC = Cognitive Self-Consciousness. Means in the same row that do not share subscripts differ at $p < .01$ in the Tukey significantly different comparison.

Due to high levels of GAD comorbidity, the small sample size of the non-GAD group, and subsequent low power in detecting differences between groups, further analyses were conducted evaluating the relationship between metacognitive beliefs and subscale scores on the SCAS using Pearson product-moment correlation coefficients. Table 3 presents data for child report and Table 4 presents data for parent report. In addition to GAD, each type of metacognitive belief was significantly related to several DSM-IV (American Psychiatric Association, 1994) anxiety symptoms, including social phobia, separation anxiety, physical injury fears, OCD, and panic/agoraphobia.

Table 3: Correlations between the MCQ-A and Child Measures of Worry, Anxiety, and Depression (N = 123)

MCQ-A	PSWQ			SCAS				Total	CES-DC
	GAD	SP	SA	PI	OCD	P/A			
PB	.49**	.42**	.46**	.29**	0.14	.37**	.41**	.46**	.45**
UD	.84**	.72**	.58**	.50**	.30**	.59**	.64**	.72**	.66**
CC	.30**	.18*	.31**	.22*	0.08	.22*	.21*	.27**	.35**
SPR	.53**	.50**	.44**	.40**	.22*	.58**	.42**	.55**	.48**
CSC	.44**	.27**	.20*	.28**	0.09	.35**	.35**	.34**	.28**
Total	.73**	.59**	.55**	.47**	.24**	.58**	.57**	.65**	.62**

Note. MCQ-A = Meta-cognitions Questionnaire for Adolescents; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment, and Responsibility; CSC = Cognitive Self-Consciousness; PSWQ = Penn State Worry Questionnaire; SCAS = Spence Children's Anxiety Scale; GAD = Generalized Anxiety Disorder; SP = Social Phobia; SA = Separation Anxiety; PI = Physical Injury; OCD = Obsessive-Compulsive Disorder; P/A = Panic/Agoraphobia; CES-DC = Center for Epidemiological Studies Depression Scale for Children. * $p < .05$. ** $p < .01$.

To determine whether different types of metacognitive beliefs had differential links with anxiety symptoms, Fisher r -to- z transformations (Lowry, 2010) were used to test the significance of the difference between correlation coefficients on scales of the SCAS and SCAS-P according to each type of metacognition. For adolescent report, Positive Beliefs were more strongly related to symptoms of Social Phobia ($z = 2.76, p = .00$) and Total anxiety ($z = -2.76, p = .00$) than Fear of Physical Injury.

Uncontrollability and Danger was more strongly related to symptoms of GAD ($z = 4.63, p = .00$), Social Phobia ($z = 2.73, p = .00$), Separation Anxiety ($z = 2.78, p = .00$), OCD ($z = -2.85, p = .00$), Panic/Agoraphobia ($z = -3.48, p = .00$), and Total anxiety ($z = -4.63, p = .00$) than Fear of Physical Injury. Negative Beliefs were also more strongly related to Total anxiety symptoms than Separation Anxiety ($z = -2.78, p = .00$). Superstition, Punishment and Responsibility was more strongly related to symptoms of OCD ($z = -3.40, p = .00$) and Total anxiety ($z = -3.06, p = .01$) than Fear of Physical Injury. Total metacognition was more strongly related to symptoms of GAD ($z = 3.35, p = .00$), Social Phobia ($z = 2.89, p = .00$), OCD ($z = -3.24, p = .00$), Panic/Agoraphobia ($z = -3.12, p = .00$) and Total anxiety ($z = -4.11, p = .00$) than Fear of Physical Injury. There were no differences in Cognitive Confidence or Cognitive Self-Consciousness in how strongly they related to anxiety symptoms.

Table 4: Correlations between the MCQ-A and a Parent Measure of Anxiety ($N = 111$)

MCQ-A	SCAS						
	GAD	SP	SA	PI	OCD	P/A	Total
PB	.29**	.34**	0.19	.24*	.26**	.24*	.32**
UD	.62**	.56**	.46**	.38**	.48**	.56**	.65**
CC	.22*	.28**	0.17	0.13	.20*	.20*	.25**
SPR	.36**	.31**	.25**	.25**	.41**	.32**	.40**
CSC	.28**	.19*	.23*	0.18	.26**	.35**	.32**
Total	.50**	.48**	.36**	.34**	.44**	.47**	.55**

Note. MCQ-A = Meta-cognitions Questionnaire for Adolescents; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment, and Responsibility; CSC = Cognitive Self-Consciousness; SCAS = Spence Children's Anxiety Scale; GAD = Generalized Anxiety Disorder; SP = Social Phobia; SA = Separation Anxiety; PI = Physical Injury; OCD = Obsessive-Compulsive Disorder; P/A = Panic/Agoraphobia. * $p < .05$. ** $p < .01$.

For mother report, Uncontrollability and Danger was more strongly related to Total anxiety symptoms than Fear of Physical Injury ($z = -4.21, p = .00$). There were no differences in Positive Beliefs, Cognitive Confidence, SPR, Cognitive Confidence, or Total metacognition in how strongly they related to anxiety symptoms.

Anxious versus anxious/depressed. A one-way ANOVA was used to evaluate differences in mean MCQ-A scores, comparing anxious to anxious/depressed adolescents and non-clinical controls (see Table 5). There were significant differences in Uncontrollability and Danger, SPR and Total metacognition for the different sample types. Although there were no significant differences between these groups on Positive Beliefs or Cognitive Confidence, there was a trend for anxious/depressed participants to score higher than anxious and non-clinical youth on these beliefs.

Post-hoc comparisons were conducted using the Tukey HSD test. There were no significant differences between anxious and anxious/depressed adolescents in endorsement of Uncontrollability and Danger, SPR, and Total metacognitive beliefs. However, anxious and anxious/depressed adolescents reported significantly higher levels of these beliefs compared to non-clinical participants.

The Role of Age

The relationship between age and the MCQ-A was evaluated using Pearson product-moment correlation coefficients. There was no significant relationship between age and Positive Beliefs, $r = .16, p = .07$, Uncontrollability and Danger, $r = .16, p = .08$, Cognitive Confidence, $r = .07, p = .45$, SPR, $r = .04, p = .68$, Cognitive Self-Consciousness, $r = .10, p = .27$, or Total metacognition, $r = .15, p = .10$.

Table 5: Means and Standard Deviations for MCQ-A Scores Comparing Anxious, Anxious/Depressed, and Non-Clinical Participants

MCQ-A	Anxious <i>n</i> = 53		Anxious/ Depressed <i>n</i> = 28		Non-Clinical <i>n</i> = 42		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
PB	9.72 _a	4.57	10.71 _a	4.4	7.95 _a	2.22	$F(2, 120) = 4.68, p = .01$
UD	15.32 _a	4.93	16.77 _a	3.83	8.98 _b	2.02	$F(2, 120) = 43.83, p = .00$
CC	10.50 _a	4.39	11.29 _a	4.46	8.93 _a	2.82	$F(2, 120) = 3.38, p = .04$
SPR	12.58 _a	4.29	13.14 _a	4.45	10.41 _b	2.76	$F(2, 120) = 5.33, p = .00$
CSC	14.70 _a	4.48	14.86 _a	4.05	13.02 _a	3.65	$F(2, 120) = 2.46, p = .09$
Total	62.79 _a	16.85	67.00 _a	14.85	49.31 _b	8.27	$F(2, 120) = 16.58, p = .00$

Note. MCQ-A = Meta-cognitions Questionnaire for Adolescents; PB = Positive Beliefs; UD = Uncontrollability and Danger; CC = Cognitive Confidence; SPR = Superstition, Punishment, and Responsibility; CSC = Cognitive Self-Consciousness. Means in the same row that do not share subscripts differ at $p < .01$ in the Tukey significantly different comparison.

The Role of Gender

Gender differences were evaluated by conducting an independent samples t-test comparing scores for boys and girls. Consistent with predictions, boys and girls did not differ in their responses on the MCQ-A as follows: Positive Beliefs between boys ($M = 8.89, SD = 3.87$) and girls ($M = 9.71, SD = 4.09; t(121) = -1.12, p = .26$), Uncontrollability and Danger between boys ($M = 12.58, SD = 5.02$) and girls ($M = 14.21, SD = 5.06; t(121) = -1.78, p = .08$), Cognitive Confidence between boys ($M = 9.43, SD = 3.40$) and girls ($M = 10.72, SD = 4.40; t(121) = -1.79, p = .07$), SPR between boys ($M = 11.78; SD = 3.79$) and girls ($M = 12.12, SD = 4.21; t(121) = -.46, p = .65$), Cognitive Self-Consciousness between boys ($M = 14.32, SD = 4.18$) and girls ($M = 14.04, SD = 4.18; t(121) = .37, p = .71$), and Total metacognitive beliefs between boys ($M = 56.98, SD = 14.84$) and girls ($M = 60.89, SD = 16.24; t(121) = -1.38, p = .17$).

Discussion

The results of this study suggest that anxiety-disordered and non-clinical adolescents endorse a range of metacognitive beliefs, and endorsement of positive and negative metacognitive beliefs about worry are positively associated with symptoms of worry, anxiety and depression. Anxious adolescents reported more positive beliefs about their worry compared to non-clinical controls, although there were no significant differences between adolescents with GAD and those with another anxiety disorder, or non-GAD and non-clinical controls. That anxiety-disordered adolescents had more positive beliefs was inconsistent with predictions of the current study and research conducted by Bacow et al. (2009) and Cartwright-Hatton et al. (2004), who found no differences between these groups. Perhaps this discrepancy is due to methodological differences between the studies. Participants in the present study underwent more vigorous diagnostic assessment than participants in the study by Cartwright-Hatton et al. (2004), such that participants in their non-clinical sample may actually have met criteria for an emotional disorder. An evaluation of mean scores reported in their study suggests that their non-clinical sample reported, on average, greater positive beliefs than non-clinical participants in the present study.

However, the results of the present study are also discrepant to research in adult populations (Cartwright-Hatton & Wells, 1997; Wells & Carter, 2001), and the hypothesis proposed by Wells (1995, 2009), who suggests that it is relatively normal to have positive beliefs about worry. Thus, although non-clinical participants in the present study endorsed some positive beliefs about their worry, these results

do not support this aspect of the metacognitive model of GAD in an adolescent population. These results do suggest that greater positive beliefs may in fact be a clinical phenomenon.

The metacognitive model of GAD suggests that it is the activation of negative beliefs about worry that uniquely contributes to the development and maintenance of pathological worry (Wells, 1995, 2009). Consistent with predictions, anxious adolescents reported more negative beliefs about worry than non-clinical controls. However, the lack of differentiation between GAD and non-GAD adolescents in endorsement of negative beliefs does not support the tenet of the metacognitive model of GAD that suggests that those with pathological worry will report higher levels of these beliefs. Further analyses support the finding that negative beliefs are related to a range of anxiety symptoms, such as social phobia and separation anxiety. This is discrepant to research conducted in adult populations, which found that individuals with GAD reported more negative beliefs about worry than adults with other emotional disorders (Cartwright-Hatton & Wells, 1997; Wells & Carter, 2001). The present study utilized a small sample of non-GAD adolescents, which may have restricted the ability to detect differences between groups. However, these results suggest that even though uncontrollable and excessive worry is a core diagnostic feature of GAD, negative beliefs about worry are associated with childhood emotional disorders generally, rather than GAD specifically. Perhaps this is not surprising, given the prevalence of pathological worry across different childhood anxiety disorders (Perrin & Last, 1997; Weems, Silverman, & La Greca, 2000).

Although cognitive confidence, cognitive self-consciousness, superstition, punishment, and responsibility, and total metacognitive beliefs are not part of the metacognitive model of GAD, examining these beliefs determines additional metacognitive thought processes associated with pathological worry. The results suggest that beliefs relating to superstition, punishment, and responsibility, and total metacognitive beliefs are associated with anxiety disorders generally in young people, not just GAD specifically. These findings support research by Cartwright-Hatton et al. (2004), who also found that endorsement of greater total metacognitive beliefs and superstition, punishment, and responsibility, distinguished between anxious and non-clinical participants. Cartwright-Hatton et al. (2004) also found that clinical and non-clinical youth reported similar levels of cognitive self-consciousness, which suggests that awareness of one's own thought processes are unlikely to contribute to the worry process in anxious adolescents. Inconsistent with the findings of Cartwright-Hatton et al. (2004), the present study found that there were no differences between anxious and non-clinical anxious adolescents in cognitive confidence. This suggests that confidence in memory, reality monitoring, and keeping attentional focus are unlikely to be associated with problematic worry.

The evaluation of the metacognitive beliefs of anxiety-disordered adolescents compared to anxious/depressed adolescents supports the association between metacognitive thought processes and depressive disorders. Anxiety in the presence of comorbid depression was not associated with increased endorsement of metacognitive beliefs, compared to anxiety alone, although anxious/depressed adolescents did report more negative beliefs about worry compared to non-clinical controls. Research in adults has supported the overlap between worry and rumination (Papageorgiou, 2006), and these results raise the possibility that metacognitive beliefs that underlie pathological worry in adolescents may also underlie depressive rumination.

There were no significant differences between anxious, anxious/depressed and non-clinical youth in endorsement of positive beliefs about worry, which suggests that it is possible that positive beliefs about worry are common across these samples. Previous research has not evaluated the metacognitive beliefs of anxious compared to anxious/depressed adolescents or non-clinical controls, although the findings of this study are inconsistent with research conducted in adult populations. A study conducted by

Papageorgiou and Wells (2001b) found that depressed adults reported significantly higher levels of positive beliefs about rumination compared to adults with other emotional disorders and non-clinical controls. This suggested that positive beliefs about rumination in depression were abnormal in an adult population. It is important to note that the depressed group included in their study had no comorbid diagnoses, which may explain the discrepancies in findings between the studies. Future research would benefit from examining the role of metacognitive beliefs about depressive rumination, and how this relates to the development and maintenance of depression symptomatology in young people, consistent with the metacognitive model proposed by Papageorgiou and Wells (2001a).

The MCQ-A correlated highly with symptoms of worry, anxiety, and depression. In particular, there were strong correlations between the Uncontrollability and Danger subscale of the MCQ-A and the PSWQ. Although these correlations confirm the association between negative metacognitive beliefs about worry with severity of worry, there is overlap on some items of these measures, which suggests that the correlations may actually reflect conceptual overlap. Therefore, the use of the PSWQ may be redundant in assessing childhood worry, given that the Uncontrollability and Danger subscale of the MCQ-A is a more concise measure of a similar phenomenon.

There were no associations between age and metacognitive beliefs. This is consistent with research by Cartwright-Hatton et al. (2004), and provides further evidence that metacognitive beliefs about worry are formed by early adolescence, and perhaps even earlier as indicated by Bacow et al. (2009). The present study also found no significant differences based on gender, consistent with the findings of Cartwright-Hatton et al. (2004), suggesting that boys and girls report similar levels of metacognition. The metacognitive model of GAD does not predict gender differences, which is a potential weakness of the model as research suggests that girls worry more than boys (Muris et al., 1998). Although the model describes beliefs about worry rather than worry symptoms, further developments of the model to account for gender differences in worry may be of benefit.

A limitation of the present study is that, because of the cross-sectional design of the study, it is not possible to make causal statements about the direction of the relationship between metacognition and emotional symptoms. It is possible that metacognitive beliefs contribute to the development and maintenance of childhood anxiety disorders, although it is also possible that emotional symptoms impact on the development of metacognitive beliefs. Wells (2006) cites an unpublished longitudinal study (Nassif, 1999) that supports the causal role of negative metacognitive beliefs in the development of GAD. Longitudinal studies or cross-sectional designs that manipulate metacognitive beliefs are now required in adolescent populations so that causal statements can be made regarding the direction of the relationship between metacognitive beliefs about worry and emotional symptoms.

Results from this study have important implications for the conceptualization of pathological worry in adolescents. The findings are consistent with prior research indicating that metacognition is significant in the development and maintenance of emotional symptoms in children, adolescents, and adults. Results such as these may improve the ability to assess for positive and negative beliefs about worry in adolescent clinical populations, and improve the ability to treat worry through modifying these beliefs. Preliminary research in adults has found that treatment that reduces metacognitive beliefs about worry has a positive impact on cognitive-behavioural (CBT) treatment outcome (Wells & King, 2006). A study that examined the efficaciousness of metacognitive therapy in a sample of ten adolescents with OCD aged between 8–17 years found reductions in OCD symptoms, with these gains being maintained for periods up to two years (Simons, Schneider, & Herpetz-Dahlmann, 2006). It is important to continue this research in adolescent populations with a range of anxiety disorders, to better understand, assess, and treat worry in this age group.

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