

# Comparing Positive and Negative Beliefs About Worry in Predicting Generalized Anxiety Disorder Symptoms

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### Abstract

People with generalized anxiety disorder (GAD) hold both positive and negative beliefs about worry. Dugas and Koerner (2005) view positive beliefs as one of the maintaining factors in GAD. Wells (2005) argues that the positive beliefs regarding worry are not unique to GAD, and that it is the negative beliefs about worry that maintain GAD. Ruscio and Borkovec (2004) found that the negative beliefs that worry is uncontrollable and dangerous differentiated individuals with GAD and individuals who were high worriers without GAD. The current study aimed to extend the findings of Ruscio and Borkovec (2004) through the use of a mediation model in a non-clinical sample ( $N = 230$ ). Using subscales from the Why Worry-II (Holowka, Dugas, Francis, & Laugesen, 2000) and the Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004), the results confirmed that both positive and negative beliefs about worry were correlated with GAD symptoms and trait worrying. However, using sequential regression, only the negative beliefs that worry is uncontrollable and dangerous, and that thoughts should be controlled predicted GAD symptoms after controlling for trait worrying. These beliefs, particularly the beliefs that worry is uncontrollable and dangerous, were found to mediate the relationship between trait worrying and GAD symptoms. Implications for models of the development of GAD are discussed.

**Key Words:** Generalized anxiety disorder, worry, positive beliefs, negative beliefs, meta-cognition

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Excessive and uncontrollable worry is the defining feature of generalized anxiety disorder (GAD; American Psychiatric Association, 2000). Worry is a cognitive phenomenon of repetitive thought activity dealing with potential negative future events, and is accompanied primarily by anxiety (Gladstone & Parker, 2003). The frequency and severity of worry tends to be consistent within individuals, with state variations (Meyer, Miller, Metzger, & Borkovec, 1990). This trait level of worrying, most commonly measured by the Penn State Worry Questionnaire (Meyer et al., 1990), correlates strongly with GAD symptoms. However, as shown by Ruscio (2002), individuals can have high levels of trait worrying without experiencing GAD symptoms to a distressing and impairing degree. This distinction between individuals with GAD and high worriers without GAD will be further explored below.

In Canada, GAD has been previously found to have a lifetime prevalence of 11.5% and a 12-month prevalence of 2.1% (Fournier, Lesage, Toupin, & Cyr, 1997; Offord et al., 1996). In a more recent American epidemiological survey using updated criteria (Grant et al., 2005) the 12-month prevalence of GAD was unchanged at 2.1%, while the lifetime prevalence was reduced to 4.1%. The survey also found that GAD has a mean onset of 32.7 years old. There are currently five well-articulated theoretical models of GAD (for a review, see Behar, DiMarco, Hekler, Mohlman, & Staples, 2009), but the current study focuses on components of two of these models: the Intolerance of Uncertainty Model proposed by Dugas and colleagues (Dugas & Koerner, 2005) and the Metacognitive Model proposed by Wells and colleagues (Wells, 2005).

Since worry is the key feature of GAD, the beliefs that people with GAD hold about worry have been extensively researched. There is evidence that people with GAD hold both

positive and negative beliefs regarding worry (Borkovec & Roemer, 1995; Davey, Tallis, & Capuzzo, 1996; Wells & Carter, 1999). Dugas and colleagues (Dugas & Koerner, 2005) view positive beliefs as one of the maintaining factors in GAD. These researchers have found that high worriers and people with GAD are more likely than people from the general population to believe that worry is productive, that worry is beneficial, and that being a high worrier is a sign of having a good character (Dugas, Gagnon, Ladouceur, & Freeston, 1998).

However, Wells (2005) argues that the positive beliefs regarding worry are not unique to GAD, and rather that it is the negative beliefs regarding worry that maintain and exacerbate GAD symptoms. In Wells' (2005) Metacognitive Model, when people engage in *Type 1 worry*, (i.e., worrying about external possible events) the negative beliefs about worry are also activated, which engage *Type 2 worry* (i.e., worrying about the worry). Both *Type 1* and *Type 2 worry* are assumed to be a part of an individual's trait level of worry.

According to Wells (2005), the first general negative belief that people with GAD hold is that worry is uncontrollable. The second broad negative belief is that worry is dangerous. People with GAD fear that worry will cause a mental or physical breakdown, and the anxiety that accompanies worry is interpreted as a sign of danger and loss of control. People with GAD have been found to have more negative beliefs about worry than people diagnosed with social phobia, panic disorder, and non-patients, although the groups did not differ in terms of positive beliefs (Wells & Carter, 2001). There is also evidence that people with GAD hold the negative belief that they must control their thoughts (Wells & Carter, 2001). However, this third negative meta-cognition is also held by people with obsessive-compulsive disorder and may not be unique to GAD (Cartwright-Hatton & Wells, 1997).

Both positive (Francis & Dugas, 2004) and negative (Wells & Carter, 1999) beliefs about worry have been shown to relate to trait worrying, and the increase in trait worry caused by holding these beliefs is assumed to be one pathway in which these beliefs contribute to GAD symptoms. However, given that individuals can have high trait worry without developing GAD (Ruscio, 2002) some factors must mediate the relationship between trait worry and GAD. In addition to increasing trait worry, it is proposed that beliefs about worry mediate the relationship between trait worry and GAD symptoms. Ruscio and Borkovec (2004) examined this proposed relationship by comparing people diagnosed with GAD and high worriers who did not meet criteria for GAD. They found that compared to high worriers, individuals with GAD believed more strongly that worry is uncontrollable and dangerous, but the groups did not differ in their endorsement of the positive beliefs about worry. These results indicate that the beliefs that worry is uncontrollable and dangerous play a central role in GAD, rather than only increasing trait worry and anxiety.

The current study sought to extend on the findings of Ruscio and Borkovec (2004) by directly testing which beliefs about worry mediate the relationship between trait worrying and GAD symptoms. It is proposed that as trait worrying increases, a subset of individuals develop the beliefs that worry is uncontrollable and dangerous, which triggers the development of GAD. Although the findings of Ruscio and Borkovec (2004) lend support to this hypothesis, a mediation model has not been tested. To add to the existing literature, a mediation model was examined in the current study.

A secondary aim of the study was to determine if the findings of Ruscio and Borkovec (2004) extend to a non-clinical (i.e., university student) sample. Ruscio and Borkovec (2004) focused on a clinical population; thus, it is possible that the beliefs that worry is uncontrollable

and dangerous only became pathological after the onset of GAD. If the negative beliefs that worry is uncontrollable and dangerous mediate the relationship between trait worry and GAD symptoms in a young adult sample, this would indicate that these negative beliefs play a role in the development of GAD, since the majority of the sample would not meet criteria for GAD. This would weaken the argument that the differences found by Rusico and Borkovec (2004) exist only in clinical samples, and provide evidence that the negative beliefs that worry is uncontrollable and dangerous may lead to the onset of GAD. As well, since GAD symptoms and beliefs about worry are dimensional constructs that are assumed to be present in all people to greater or lesser amounts, a clinical sample may not always be required to examine the relationship between these constructs.

Using a primarily undergraduate sample, we examined if negative beliefs about worry were more closely related to GAD symptoms than positive beliefs about worry after controlling for trait worrying. Trait worrying was controlled to ensure that the significant predictors that remain are likely to have a direct influence on GAD symptoms, without having to influence GAD symptoms through trait worrying. Knowledge of the factors that are central to the development of GAD symptoms and do not increase GAD symptoms only by increasing trait worry will aid researchers and clinicians in determining which factors distinguish high chronic worriers from individuals with GAD.

Based on the previously discussed findings of Wells and Carter (2001) and Ruscio and Borkovec (2004), it was predicted that the negative beliefs that worry is uncontrollable and dangerous would be more strongly associated with GAD symptoms than positive beliefs about worry when trait worrying was controlled. In particular, it was predicted that the negative beliefs that worry is uncontrollable and dangerous would account for the greatest amount of unshared

variance in GAD symptom scores after controlling for trait worrying, and that these beliefs would mediate the relationship between trait worrying and GAD symptoms.

Since the current definition of GAD includes the criterion that worry is uncontrollable (American Psychiatric Association, 2000), this creates a conceptual overlap between the belief that worry is uncontrollable and the measurement of GAD symptoms. Therefore, to ensure that any results were not due to overlapping constructs, the main analyses were repeated with the item that measured the controllability of worry in the GAD symptom measure removed. This decision was also in line with the most recent proposal for revisions to the diagnostic criteria for GAD, where it is recommended that the criterion that worry is uncontrollable be removed in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (Andrews et al., 2010).

## Method

### Participants

The sample for this study was recruited from a university community and consisted primarily of undergraduate students. Recruitment posters were placed throughout the university campus and recruitment emails were sent out to all students and faculty. Introductory Psychology students were eligible to collect up to two bonus course marks by participating, while students in select higher level psychology courses could earn one bonus course mark.

A total of 233 participants were involved in this study, but three participants were removed due to missing data (see *Data Screening* section). The sample was 67.0% female, with a mean age of 22.97 years ( $SD = 8.76$ ), and an age range from 17 to 65 years. The sample was primarily White/Caucasian (88.2%), 50.4% of the sample were single, and 36.5% of the sample were dating. In terms of employment and education, the majority of participants indicated being



unemployed students (43.9%) or students who were employed part-time (38.7%), while 88.7% of the participants had received some university education.

### Measures

English Worry and Anxiety Questionnaire (WAQ; Dugas et al., 2001b). The WAQ is an 11-item self-report questionnaire that assesses the criteria for GAD as defined by the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 1994). It requires participants to list their six most common worry subjects, but uses nine-point Likert-type scales for items regarding worry, physical symptoms and the interference of anxiety or worry in the individual's life. Total scores can range from 0 to 80; however, the list of worries is not included in the total score. Higher scores indicate more GAD symptoms and impairment. The original French version (Dugas et al., 2001a) has shown known-groups validity and good test-retest reliability. The English translation also has good psychometric properties (Penney & Mazmanian, 2010).

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). The PSWQ is a 16-item self-report trait questionnaire of the intensity and frequency of worry an individual experiences in general (trait worry), with items scored on five-point Likert-type scales. Total scores can range from 16 to 80, with higher scores indicating more chronic and severe trait worrying. The PSWQ has been found to measure a single factor, have high scale score reliability (i.e., Cronbach's alphas range from .88 to .95 across different samples), and high test-retest reliability (Startup & Erickson, 2006). GAD clinical samples consistently score the highest on the PSWQ compared to samples of other mood and anxiety disorder clinical samples, student samples, and community samples (Startup & Erickson, 2006).

English Why Worry-II (WW-II; Holowka et al., 2000). The WW-II is a 25-item self-report questionnaire of positive beliefs about worry, with items scored on five-point Likert-type scales. Total scores can range from 25 to 125. Higher scores indicate that the individual holds the beliefs more strongly. It contains five subscales, which have scores ranging from 5 to 25. The beliefs measured are that: 1) worry aids problem solving; 2) worry motivates; 3) worry protects from negative emotions after negative events; 4) the act of worrying prevents negative events (magical thinking); and 5) being a high worrier is a good personality trait. In the present study, both the total score and subscale scores were used. The WW-II has high scale score reliability, good test-retest reliability, and both convergent and divergent validity (Holowka et al., 2000). The WW-II was used in the current study rather than using the positive beliefs subscale of the Metacognitions Questionnaire-30 because the WW-II measures the five unique positive beliefs independently, while the positive beliefs subscale of the Metacognitions Questionnaire-30 measures positive beliefs overall.

Metacognitions Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004). The MCQ-30 is a 30-item self-report questionnaire that measures beliefs about worry, memory, and thought awareness, with items scored on four-point Likert-type scales. Total scores can range from 30 to 120. Higher scores indicate that the individual holds the beliefs more strongly. It contains five subscales, which have scores ranging from 6 to 24. These scales measure: 1) a lack of confidence in memory; 2) positive beliefs about worry; 3) monitoring of thoughts; 4) beliefs about worry being uncontrollable and dangerous; and 5) beliefs about the need to control thoughts. The current study used the subscales that measure the beliefs that worry is uncontrollable and dangerous and the belief that thoughts need to be controlled as these subscales are implicated in Wells' Metacognitive Model of GAD (Wells & Carter, 2001). The

MCQ-30 shows good scale score reliability, a five factor structure, convergent validity and moderate test-retest reliability (Wells & Cartwright-Hatton, 2004).

#### Procedure

Ethical approval for this study was obtained from the university's Senate Research Ethics Board. After recruitment began, students were asked to attend a session to complete the questionnaires by scheduling a time with the primary researcher. At this time, students were fully informed of the nature of the study and given the choice to participate. Consenting participants received a demographic information form and six self-report measures to complete. As part of a larger study, the measures were given in the following order: the WW-II, the PSWQ, the MCQ-30, and the WAQ. Participants generally completed the questionnaires within 20 to 40 minutes. All participants received a debriefing form after they completed the questionnaires.

#### Statistical Analyses

Data were examined for missing values, outliers, accuracy of data entry, and fit to multivariate assumptions. Outliers were defined as scores greater than three standard deviations above or below the mean, following recommendations by Tabachnick and Fidell (2007). Skewness and kurtosis were examined. Multicollinearity and singularity were taken into consideration.

Pearson's product-moment correlations ( $r$ ) were computed between the WAQ, the PSWQ, the WW-II total score and subscales, and the MCQ-30 subscales. To test the findings of Ruscio and Borkovec (2004), a sequential regression was conducted using the WAQ as the dependent measure, and the PSWQ, WW-II total score, and MCQ-30 negative beliefs subscales as independent measures. The PSWQ was entered at the first step, with the WW-II total score

and MCQ-30 subscales entered at the second step. A sequential regression was selected rather than a stepwise or hierarchical regression because it was necessary to statistically control for PSWQ scores in the same manner that Rusico and Borkovec (2004) controlled for PSWQ scores via their participant selection. Following these analyses, a multiple mediator analysis was conducted with the PSWQ entered as the independent variable, the WAQ as the dependent measure, and the significant belief measures from the sequential regression analysis entered as possible mediators. The analyses were repeated with the item measuring the controllability of worry removed from the WAQ to remove the effects of overlapping constructs in the measurement of the belief that worry is uncontrollable and the measurement of GAD symptoms. Alpha was set to .05 for all analyses.

## Results

### Data Screening

Prior to data analyses, the raw data for all variables were examined for errors and possible outliers. It was discovered that three participants had excessive missing data and were removed from all analyses. For the remaining participants, if two or fewer items on a scale were missing, they were replaced using the average item score that was calculated from the total score of the remaining scale items. If more than two items were not completed, the missing data for that scale was not replaced. A total of six missing scores were entered.

Following recommendations by Tabachnick and Fidell (2007), any subscale or total scale scores exceeding three standard deviations above and below the mean of that subscale or total scale was replaced. A score on the WW-II magical thinking subscale met this criterion and was changed to one value higher than the next highest score.

Skewness and kurtosis were examined for all measures. All scales, except for the WW-II magical thinking subscale, were within acceptable limits and did not require transformation (Tabachnick & Fidell, 2007). To maintain interpretability, the WW-II magical thinking subscale was not transformed. Similarly, following the recommendations of Tabachnick and Fidell (2007), multicollinearity and singularity were not found with the scales used in this study.

#### Scale Score Reliability and Properties of Measures

Cronbach's alpha coefficients were calculated for all measures and their subscales. Table 1 presents the scale score reliabilities, and the means and standard deviations of measures and subscales. Overall the scale score reliabilities of all measures were strong, with only two subscales having alpha coefficients below .80. Table 1 also reveals that although the sample was non-clinical, the sample as whole were high trait worriers, with a mean PSWQ score of 52.05 ( $SD = 14.11$ ). This score is higher than most unselected and non-anxious selected groups, but lower than scores reported by GAD analogue samples (i.e., participants diagnosed using validated self-report measures rather than according to diagnostic criteria) and GAD clinical samples (Startup & Erickson, 2006). Using a cut-off score of 67.16 on the PSWQ, taken from the mean score reported by adult clinical GAD samples (Startup & Erickson, 2006), 40 participants in the current study had scores equivalent to or above this mean.

#### Main Analyses

Pearson product-moment correlation analyses. To determine the appropriate subscales to include in the regression analyses, Pearson product-moment correlations were conducted among all measures (see Table 2). Consistent with previous research, positive beliefs about worry, negative beliefs about worry, and the negative belief that thoughts need to be controlled significantly positively correlated with GAD symptoms and with trait worrying. The beliefs that

worry is uncontrollable and dangerous had the strongest correlation with the WAQ,  $r(229) = .76$ ,  $p < .001$ , and the PSWQ,  $r(229) = .75$ ,  $p < .001$ .

Further examination of Table 2 shows strong correlations between the WW-II subscales (generally near or above .5) and that the WW-II total score correlated with the WAQ and PSWQ as strongly as the WW-II subscales. Therefore, the decision was made to use the WW-II total score rather than specific subscales in all further analyses. In contrast, the MCQ-30 uncontrollability and danger subscale and need to control thoughts subscale had a relatively low correlation with each other,  $r(229) = .38$ ,  $p < .001$ . As well, while the uncontrollability and danger subscale correlated strongly with the WAQ and PSWQ, the need to control thoughts subscale only moderately correlated with the WAQ and PSWQ. Therefore, the decision was made to keep the uncontrollability and danger subscale and need to control thoughts subscale separate for all further analyses.

Sequential regression analyses. Next, sequential regressions were conducted to examine which beliefs about worry were associated with GAD symptoms after controlling for trait worrying (see Table 3). The PSWQ was entered at the first step, with the WW-II total score and MCQ-30 negative beliefs subscales entered at the second step. The addition of the positive and negative beliefs subscales improved the amount of variance explained by 10%,  $p < .001$ .

When trait worrying was controlled, the negative beliefs that worry is uncontrollable and dangerous was significantly associated with GAD symptoms,  $t(225) = 6.54$ ,  $p < .001$ . These beliefs accounted for 16.0% of the variance in GAD symptoms. As well, the negative belief that thoughts need to be controlled was significantly associated with GAD symptoms,  $t(225) = 2.04$ ,  $p < .05$ . This belief accounted for 1.8% of the variance in GAD symptoms. Positive beliefs about worry did not predict GAD symptoms after trait worrying was controlled. The PSWQ

continued to be significantly related to GAD symptoms,  $t(225) = 6.36, p < .001$ , when the beliefs subscales were entered into the equation. The PSWQ accounted for 15.2% of the variance in GAD symptoms.

Mediation model analyses. Since positive beliefs about worry did not relate to GAD symptoms after controlling for trait worrying, only the negative beliefs that worry is uncontrollable and dangerous and that thoughts need to be controlled were included as possible mediators between trait worrying and GAD symptoms in the mediation model analysis. Using macros for SPSS provided by Preacher and Hayes (2008), the bootstrapping method for testing for perfect mediation was conducted. As discussed by Preacher and Hayes (2008), the bootstrapping method can directly test a mediation model, unlike the Baron and Kenny (1986) method, and does not have the limitations of the Sobel test (Sobel, 1982). Bootstrapping is a nonparametric test that does not require the assumption of normality which involves taking thousands of samples from a data set and estimating the indirect effect in each resample. Estimates of the indirect effect are used to directly test the mediation. The indirect effect can be considered a subtraction of the direct effects of the independent on the dependent variable after controlling for the role of the proposed mediators from the direct effect of the independent variable on the dependent variable without controlling for the proposed mediators. Therefore, perfect mediation is defined by 95% bias corrected and accelerated confidence intervals for indirect effects that do not include zero. For additional information, readers are encouraged to read Preacher and Hayes (2004; 2008).

In the present analyses, 5000 bootstrap resamples was chosen, which is the maximum set value of bootstrap resamples that can be chosen in the macros for SPSS provided by Preacher and Hayes (2008). The uncontrollability and dangerous subscale had 95% bias corrected and

accelerated confidence intervals of .2551 to .4894. The need to control thoughts subscale had 95% bias corrected and accelerated confidence intervals of .0048 to .0630. Since the 95% confidence intervals did not include zero, this defines a perfect mediation. Therefore, the analyses revealed that the effects of trait worrying on GAD symptoms are perfectly mediated by the negative beliefs about worry and the need to control thoughts. In particular the beliefs that worry is uncontrollable and dangerous have the largest effect on this mediation.

When item #4, *Do you have difficulty controlling your worries*, was removed from the WAQ and the analyses repeated with the modified WAQ total, all findings were replicated. Since all correlations, *t*-tests, and 95% bias corrected and accelerated confidence intervals had values change by nominal amounts, the results are not reported here for simplicity of presentation.

### Discussion

The present study investigated the role of positive beliefs and negative beliefs about worry and the need to control thoughts in predicting GAD symptoms after controlling for trait worrying in a primarily undergraduate sample. The results extended the findings of Ruscio and Borkovec (2004) to a non-clinical sample. When controlling for trait worrying, the negative beliefs (in particular that worry is uncontrollable and dangerous) were associated with GAD symptoms. The beliefs that worry is uncontrollable and dangerous uniquely accounted for 16.0% of the variance in GAD symptoms. Positive beliefs about worry did not significantly relate to GAD symptoms after controlling for trait worrying. The present study also built on findings of Ruscio and Borkovec (2004). The negative beliefs were found to mediate the relationship between trait worrying and GAD symptoms. Again, the beliefs that worry is uncontrollable and dangerous appeared to contribute the most to this relationship. This



conclusion was supported even when the controllability of worry was removed from the definition of GAD in order to remove overlap in measurement.

The present findings add support to the Metacognitive Model of GAD (Wells, 2005). The beliefs that worry is uncontrollable and dangerous had the largest zero-order correlation with GAD symptoms and trait worrying and had the strongest association with GAD symptoms after controlling for trait worrying. In addition, these beliefs, and the belief that thoughts need to be controlled, perfectly mediated the relationship between trait worrying and GAD symptoms. Ruscio and Borkovec (2004) had previously found that the beliefs that worry is uncontrollable and dangerous differentiated individuals with GAD, high worriers, and unselected university students. Taken together, these findings suggest that the negative beliefs that worry is uncontrollable and dangerous has a unique relationship to GAD symptoms, providing support for Wells' (2005) Metacognitive Model.

The findings of the mediation model analyses indicate that in general, when compared to low trait worriers, high trait worriers are more likely to believe that worry is uncontrollable and dangerous and that thoughts must be controlled. Further, the results indicate that high trait worrying, when combined with a strong belief that worry is uncontrollable and dangerous, is related to experiencing GAD symptoms. However, it is important to note that for chronic worriers without GAD, there is high trait worrying without the negative beliefs or GAD symptoms co-occurring (Ruscio, 2002; Ruscio & Borkovec, 2004). Future research might investigate what factors could make an individual susceptible to believing that worry is uncontrollable and dangerous and that thoughts must be controlled. For example, one possible factor could be early exposure to anxious beliefs from parents (Creswell, O'Connor, & Brewin, 2006; Francis & Chorpita, 2010; 2011). Given the cross-sectional nature of the present study,

future research should follow individuals longitudinally to determine how trait worry, negative beliefs about worry, and GAD symptoms develop over time.

Although the positive beliefs about worry significantly correlated with GAD symptoms and trait worrying, holding strong positive beliefs about worry did not predict GAD symptoms after controlling for trait worrying. These results are in line with those of Dugas et al. (2007) who found that positive beliefs about worry did not significantly correlate with trait worry or the somatic symptoms of GAD in a clinical sample.

While the results of this study offer support for the Metacognitive Model of GAD (Wells, 2005), one component of the model requires further examination. In other writings about this model, Wells (2004) argued that positive beliefs about worry are considered to be especially influential in the development of GAD through the increase in *Type 1 worry*, which leads to an increase in trait worrying. However, the current study found that the negative beliefs that worry is uncontrollable and dangerous had a stronger correlation to trait worrying than any other belief about worry. Since these negative beliefs are assumed to lead to *Type 2 worry*, or worrying about the worry, it is possible that *Type 2 worry* contributes to trait worry to a greater extent than *Type 1 worry*. It is possible that the beliefs that worry is uncontrollable and dangerous begins to develop before trait worrying reaches a severe level, and thereby increases both trait worrying and leads to an onset of GAD symptoms. These causal relationships are currently theoretical given the lack of longitudinal research to address this issue, and the present correlational study does not provide concrete evidence for these relationships. More controlled and longitudinal research, especially studies that include measures from multiple theories of GAD is needed. The nature of this relationship and the precise role these beliefs play in the onset of GAD requires more research.

While this study focused on the positive and negative beliefs about worry, it is important to recognize that trait worrying was a substantial contributor to GAD symptoms. When the beliefs about worry were included, trait worrying accounted for 15.2% of the variance in GAD symptoms. Reducing the amount of worrying an individual engages in has been shown to lead to a decrease in GAD symptoms (Borkovec, Wilkinson, Folensbee, Lerman, 1983), and is a component of the Emotional Avoidance Model treatment protocol (Borkovec, Alcaine, & Behar, 2004) and the Metacognitive Model treatment protocol (Wells, 2009). Future researchers may wish to consider the different symptoms and experiences associated with trait worrying, positive beliefs about worry, and negative beliefs about worry. For example, positive beliefs may lead to the onset of worry as a coping strategy, negative beliefs may lead to the onset of worrying becoming an emotionally distressing coping strategy, and high trait worrying may lead to the physiological symptoms in GAD. These three components are also likely to feed into each other in cyclic relationships.

### Limitations

A limitation of this study is that the sample consisted primarily of young adult Caucasian undergraduate students. While this type of sample is commonly studied in GAD research, it impedes generalizability to other ethnic and cultural groups. Although the study focused on a non-clinical sample, the use of an undergraduate sample may not be representative of the general community population. The results may also differ from a clinical sample. Specifically, given that the belief that thoughts need to be controlled is more related to obsessive-compulsive disorder than GAD (Cartwright-Hatton & Wells, 1997), this belief may not be found to mediate the relationship between trait worry and GAD symptoms in a sample of individuals diagnosed with GAD without any comorbid disorders. A second limitation of the current study is that the

questionnaires were given to all participants in the same order and validity measures were not included. These issues raise the possibility of carry-over effects from the questionnaires, and some participants may have responded in socially desirable sets. In addition, the reliance on self-report questionnaires introduces the potential issue of common method variance and method bias (for a discussion of these issues see Conway & Lance, 2003; Dotty & Glick, 1998; Lance, Dawson, Birkelbach, & Hoffman, 2010; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To examine this, an exploratory principal components analysis of the questionnaire items was conducted. A subsequent Horn's Parallel Analysis suggested a six-factor solution. Given the inherent difficulty of measuring constructs like beliefs or worry using behavioural measures or observer ratings, work in this area must rely primarily on self-report measures until novel methods are developed. Finally, it is possible that other unaccounted for constructs could play a role in GAD and be related to beliefs about worry. For example, measures of intolerance of uncertainty and negative problem orientation were not included. These constructs feature prominently in the Intolerance of Uncertainty Model of GAD proposed by Dugas (Dugas & Koerner, 2005). Previous research has shown that intolerance of uncertainty is more strongly related to GAD symptom severity than the positive beliefs about worry (Dugas et al., 2007). A recent study has found that the negative beliefs that worry is uncontrollable and dangerous and intolerance of uncertainty both predicted unique variance in GAD symptoms (Tan, Moulding, Nedeljkovic, & Kyrios, 2010).

### Conclusions

In line with the Metacognitive Model of GAD (Wells, 2005), and extending the findings of Ruscio and Borkovec (2004), this study found that the negative beliefs that worry is uncontrollable and dangerous was a strong predictor of GAD symptoms after controlling for trait

worrying. These negative beliefs about worry, along with the negative belief that thoughts need to be controlled, appear to mediate the relationship between trait worrying and GAD symptoms. It would appear that within chronic high worriers, a subset of individuals strongly believe that worry is uncontrollable and dangerous, and these individuals are more likely to experience GAD symptoms. Positive beliefs about worry, as specified in the Intolerance of Uncertainty Model of GAD (Dugas & Koerner, 2005), correlated with trait worrying but did not emerge as predictors of GAD symptoms after controlling for trait worrying. Future research could investigate developmental models of GAD to better understand how persons progress from being a high worrier without a diagnosis of GAD to developing the severe emotional distress and impairment associated with a diagnosis of GAD.

Conflict of Interest:

None of the authors in this study have any actual, perceived, or potential conflicts of interest.

The authors can supply a copy of the original data upon request.

APA Ethical Standards:

The authors have complied with APA ethical standards in the treatment of our sample.

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Table 1

*Scale Means, Standard Deviations and Scale Score Reliability (N = 230)*

Scale	Mean	Standard Deviation	Scale Score Reliability (95% Confidence Interval)
Worry and Anxiety Questionnaire	36.64	16.42	.90 (.87-.92)
Penn State Worry Questionnaire	52.05	14.11	.93 (.91-.94)
Why Worry-II	54.28	16.45	.92 (.91-.94)
Aids problem solving	11.34	4.02	.80 (.76-.84)
Motivates	12.89	4.52	.83 (.79-.86)
Protects from negative emotions	9.96	4.01	.81 (.77-.85)
Magical thinking	9.28	3.91	.76 (.70-.80)
Good personality trait	10.81	4.10	.81 (.77-.84)
Metacognitions Questionnaire-30	64.22	12.89	.87 (.84-.89)
Uncontrollable and dangerous	12.76	4.75	.87 (.84-.89)
Need to control thoughts	11.85	3.59	.70 (.64-.76)

Table 2

*Correlations Between Generalized Anxiety Disorder Symptoms, Trait Worrying, and Beliefs About Worry (N = 230)*

Scale	1	2	3	4	5	6	7	8	9
1. WAQ total score	-								
2. PSWQ total score	.74**	-							
3. WW-II total score	.33**	.40**	-						
4. WW-II aids problem solving	.32**	.41**	.85**	-					
5. WW-II motivates	.19**	.27**	.79**	.67**	-				
6. WW-II protects from negative emotions	.28**	.31**	.74**	.54**	.38**	-			
7. WW-II magical thinking	.29**	.33**	.79**	.57**	.46**	.57**	-		
8. WW-II good personality trait	.24**	.27**	.83**	.62**	.61**	.50**	.60**	-	
9. MCQ-30 uncontrollable and dangerous	.76**	.75**	.29**	.29**	.15*	.23**	.31**	.20**	-
10. MCQ-30 need to control thoughts	.35**	.24**	.35**	.21**	.19**	.30**	.34**	.36**	.38**

*Note.* WAQ = Worry and Anxiety Questionnaire; PSWQ = Penn State Worry Questionnaire; WW-II = Why Worry-II; MCQ-30 = Metacognitions Questionnaire-30.

\* $p < .05$ . \*\* $p < .01$ .

Table 3

*Summary of Regression Analyses Testing the General Beliefs About Worry that Predict GAD Symptoms when Controlling for Trait Worrying (N = 230)*

Variable	<i>R</i>	Adjusted <i>R</i> <sup>2</sup>	<i>R</i> <sup>2</sup> Change	<i>t</i>	<i>pr</i> <sup>2</sup>
Step 1	.74	.55	.55**		
PSWQ				16.77**	.552**
Step 2	.81	.64	.10**		
PSWQ				6.36**	.152**
WW-II total score				0.28	.0004
MCQ-30 uncontrollable and dangerous				6.54**	.160**
MCQ-30 need to control thoughts				2.04*	.018*

*Note.* *pr*<sup>2</sup> = squared partial correlation; PSWQ = Penn State Worry Questionnaire; WW-II = Why Worry-II; MCQ-30 = Metacognitions Questionnaire-30.

\**p* < .05. \*\**p* < .01.