*Behavioural and Cognitive Psychotherapy*, 2013, 41, 243–248
First published online 9 August 2012 doi:10.1017/S1352465812000641

# The Role of Metacognition, Intolerance of Uncertainty, and Negative Problem Orientation in Children's Worry

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**Background:** Although worry is common in children, empirical models of worry remain largely untested in youth. A small number of studies have established preliminary links between cognitive variables and worry in children younger than 12 years old. These cognitive variables include positive and negative beliefs about worry, intolerance of uncertainty, and problem orientation. **Aims:** The current study examined these variables concurrently and their association with worry. We also examined the extent to which intolerance of uncertainty mediated the association between worry and beliefs about worry. **Method:** Eighty elementary school children aged 8 to 12 years completed a battery of self-report measures. **Results:** As a group, the cognitive variables significantly predicted worry scores; negative beliefs about worry was the only significant individual predictor. As a group, the four cognitive variables discriminated clinical from nonclinical levels of worry; positive beliefs about worry and intolerance of uncertainty were the only significant individual predictors. Finally, intolerance of uncertainty mediated the association between worry and both positive and negative beliefs about worry. **Conclusions:** Components of a cognitive model of worry are largely applicable to children. Negative beliefs about worry were associated with worry across the continuum, while intolerance of uncertainty and positive beliefs about worry were more strongly associated with clinical levels of worry. Intolerance of uncertainty accounted for a significant portion of the association between metacognition and worry and may be a particularly effective target for treatment. Further implications for conceptual models and treatment interventions are discussed.

*Keywords*: Worry, child, cognitive, metacognition, intolerance of uncertainty.

## Introduction

Relatively little is known about etiological or maintaining factors in worry or Generalized Anxiety Disorder (GAD) in youth. Testing the extent to which cognitive models of worry

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and GAD apply to children would increase understanding of symptom development and also provide potential targets for treatment interventions.

Compared to adults and adolescents, the applicability of conceptual models to children is understudied; however, a small number of studies have established preliminary links between cognitive variables and worry in children younger than age 12 years. First, studies of metacognition in adolescents and children suggest that both positive and negative beliefs about worry are relevant to worry in youth (see Ellis and Hudson, 2010, for a review). Notably, findings with children have been less consistent than with adolescents, particularly as they relate to positive beliefs about worry (Ellis and Hudson, 2010; Fialko, Bolton and Perrin, 2012; Wilson and Hughes, 2011). Other studies have linked intolerance of uncertainty with worry. Intolerance of uncertainty has shown positive associations with worry in children as young as 7 years (Fialko et al., 2012) and discriminated clinically anxious from community samples in ages 7 to 17 years (Comer et al., 2009). Finally, low problem solving confidence, a component of negative problem orientation, has shown positive relations with worry in community children as young as 6 years old (Parkinson and Creswell, 2011).

While several studies have linked cognitive variables with worry, the "how" of the worry process remains understudied. Few studies have tested hypotheses about potential mediators. A recent randomized controlled trial for GAD in adults suggests that intolerance of uncertainty may be an important mediator of the association between metacognition and worry. Results showed that a metacognitive therapy protocol resulted in larger decreases in intolerance of uncertainty compared to an intolerance of uncertainty protocol (van der Heiden, Muris and van der Molen, 2012). This suggests that altering metacognitions may have also decreased intolerance of uncertainty; as such, positive and negative beliefs about worry might have both a direct effect on worry and an indirect effect through an association with intolerance of uncertainty.

The literature is also limited in that few studies have examined several cognitive variables simultaneously in children. A notable exception is Fialko et al. (2012), who included positive beliefs, intolerance of uncertainty, and cognitive avoidance in children aged 7 to 12 years; however, they were unable to include a measure of negative problem orientation and did not examine negative beliefs about worry. The current study is the first to examine the association between both positive and negative beliefs about worry, intolerance of uncertainty, and negative problem orientation concurrently in children younger than age 12 years.

The current study tested three hypotheses. First, we predicted that positive and negative beliefs about worry, negative problem orientation, and intolerance of uncertainty would significantly predict worry. Second, we hypothesized that the cognitive variables would discriminate clinical from nonclinical worriers. Third, we predicted that intolerance of uncertainty would mediate the association between worry and both positive and negative beliefs about worry.

## Method

### *Participants and procedure*

The study was approved by the University of Louisville's Institutional Review Board and both parental consent and child assent were required for study participation. Children were recruited through elementary schools and flyers placed throughout the community. Packets

https://doi.org/10.1017/S1352465812000641 Published online by Cambridge University Press

were distributed to children at school, completed at home, and returned to the teacher. Packets were distributed and returned through the mail for those recruited with flyers. The response rate was approximately 11.2%.

Participants were 80 children between the ages of 8 and 12 years ($n = 12$ 8-year-olds, $n = 21$ 9-year-olds, $n = 22$ 10-year-olds, $n = 12$ 11-year-olds, and $n = 3$ 12-year-olds, and 10 children did not indicate age). The average age was 9.6 years ($SD = 1.10$). Most children were female (71%; $n = 57$) and European American (74%). Preliminary analyses of sampling differences (each of the schools and flyer) indicated a difference in child age, $p < .05$, and worry/oversensitivity scores, $p < .05$, but not PSWQ-C scores. Recruitment site was used as a covariate in future analyses.

### *Measures*

Packets included a battery of self-report measures. The shortened (11-item) Penn State Worry Questionnaire-Child Version (PSWQ-C; Chorpita, Tracey, Brown, Collica and Barlow, 1997) and worry/oversensitivity subscale of the Revised Child's Manifest Anxiety Scale (RCMAS; Reynolds and Richmond, 1978) assessed worry. The positive and negative metaworry subscales of the Metacognitions Questionnaire for Children (MCQ; Bacow, Pincus, Ehrenreich and Brody, 2009) and the Intolerance of Uncertainty Scale for Children (IUSC; Comer et al., 2009) were also included. The negative problem orientation subscale of the Social Problem Solving Inventory (SPSI; D'Zurilla and Nezu, 1990) was modified for the current study for use with children. Items were reworded to a third grade Flesch-Kincaid reading level. Preliminary item changes were reviewed with three doctoral students in clinical psychology and the lab director and modified until consensus was reached. Cronbach's coefficient alpha of .86 suggested adequate internal consistency.

## Results

### *Descriptive statistics*

The sample reported slightly higher than expected worry based on the PSWQ-C scores, $M = 19.55$, $SD = 7.63$. In a previously published study a community sample of children aged 6 to 11 years reported a mean score of 16.12 ($SD = 6.43$) (Chorpita et al., 1997). Partial correlations, controlling for recruitment site, indicated that PSWQ-C scores correlated moderately with negative beliefs, $r = .53$, intolerance of uncertainty, $r = .51$, and negative problem orientation, $r = .53$, all $p$s $< .001$. Interestingly, positive beliefs were not correlated with PSWQ-C scores, $r = .14$, $p > .05$.

### *Hypothesis testing*

To test the first hypothesis that the cognitive variables would significantly predict PSWQ-C worry scores, recruitment site was entered into Block 1 to control for sampling effects. Positive and negative beliefs, intolerance of uncertainty, and negative problem orientation were entered into Block 2. The regression was significant, $F(5, 74) = 10.32$, $p < .001$, $R^2$ change $= .33$, $p < .001$, and overall explained 41% of the variance in PSWQ-C scores. Of the individual predictors, only negative beliefs about worry was significant, $t = 2.36$, $p = .02$.

https://doi.org/10.1017/S1352465812000641 Published online by Cambridge University Press

**Table 1.** Path estimates and bootstrapped Confidence Intervals for IU as a mediator of the association between beliefs about worry and worry

| | Direct paths from predictor to IU | | | Direct paths from IU to worry | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Predictor variables | B | SE | *t* | B | SE | *t* | Point estimate | Product of coefficients | Bootstrap 95% CI |
| Positive beliefs | 1.56 | .54 | 2.90** | .08 | .04 | 2.06* | .14 | .08 | .008, .34 |
| Negative beliefs | 2.65 | .36 | 7.36** | .09 | .04 | 2.06* | .23 | .12 | .004, .48 |

*Note:* Models were estimated with k = 1000 bootstrap samples and 95% confidence intervals around the mediation effect. A 95% CI that does not include 0 indicates a significant indirect effect at the level of $p < .05$.
** $p < .01$; * $p < .05$

The second hypothesis that the cognitive variables would distinguish clinical level from nonclinical level worriers was tested with a binary logistic regression. Recruitment site was entered in Block 1 and the four cognitive variables in Block 2. For the dependent variable, worry/oversensitivity scores were dichotomized using a clinical cut-off score of T > 60. The clinical cut-off score resulted in $n = 27$ clinical level and $n = 43$ nonclinical level worriers. Variables were standardized to facilitate interpretation of odds ratio results. Recruitment site and the cognitive variable blocks were both significant, $X^2$ ($df = 4$) = 13.46, $p = .01$ and $X^2$ ($df = 3$) = 30.05, $p < .001$, respectively. The cognitive variables as a block accurately classified 86% of children as clinical or nonclinical level worriers, compared to 71% classified by recruitment site. Intolerance of uncertainty and positive beliefs about worry were significant individual predictors, *Wald* = 5.55, $p = .02$, exp $b = 8.45$, and *Wald* = 6.49, $p = .01$, exp $b = .20$, respectively. This indicates that a child who scores 1 standard deviation above the mean on intolerance of uncertainty is more than eight times likely to be in the clinical worry group. A score of 1 standard deviation above the mean on positive beliefs increases the odds of being a clinical worrier by 20%.

The third hypothesis that intolerance of uncertainty mediates the association between PSWQ-C worry and positive and negative beliefs about worry was tested with an SPSS macro, which uses bootstrapping to estimate the indirect effect (Preacher and Hayes, 2008). Two models were estimated, one for positive beliefs and one for negative beliefs, controlling for the other proposed independent variable, as suggested by Preacher and Hayes (2008). Direct and indirect effects are presented in Table 1. The positive beliefs model explained 35% of the variance in worry and the negative beliefs covariate was significant, $t = 2.82$, $p = .01$. The 95% CI on the indirect effect did not include 0, indicating a significant indirect effect at the level of $p < .05$. The negative beliefs model explained 35% of the variance in worry, and the positive beliefs covariate was non-significant, $t = .24$, $p = .81$. The 95% CI indicated a significant indirect effect. These findings indicate that intolerance of uncertainty significantly mediates the effect of both positive and negative beliefs about worry on worry.

## Discussion

Overall, results suggest that negative beliefs about worry are a robust predictor of worry across the continuum, while intolerance of uncertainty and positive beliefs about worry are

https://doi.org/10.1017/S1352465812000641 Published online by Cambridge University Press

linked with clinical levels of worry. Support was also found for the hypothesized meditation model, indicating that the association between metacognition and worry is explained in part by intolerance of uncertainty.

These results have important implications for the treatment and prevention of worry in children. Because the cognitive processes associated with worry in adults and adolescents are also present in children, adapting adult treatment protocols to developmentally appropriate levels may be effective intervention tools. For example, results from this study suggest that modifying negative beliefs about worry would be beneficial in reducing worry for children at all levels of worry severity. For clinical level worriers and children with GAD, a focus on positive beliefs and intolerance of uncertainty might provide additional benefit. The finding that the association between metacognition and worry is explained in part by intolerance of uncertainty suggests that intolerance of uncertainty may be a particularly effective target for treatment. For example, learning skills to tolerate uncertainty or to challenge negative thoughts about uncertainty may be especially useful in reducing worry.

Conceptual models of worry in children might also be adapted in light of these findings. Given that the influence of the cognitive variables differed in the prediction of continuous worry compared to worry severity, it may be beneficial to incorporate moderator variables, such as worry severity or child age, into theoretical models. Cognitive models might also be refined by considerations of the role of potential mediator variables, such as intolerance of uncertainty, and empirical tests of such models.

This study has several limitations, including a sample that appeared to over-represent high worriers, the use of an adapted measure of negative problem orientation, and an inability to investigate the specificity of the findings to worry compared to related constructs, including anxiety and depression. We were also limited by the cross-sectional design of the study, particularly as it relates to the mediation analyses. Despite these limitations, these data provide an important step toward better understanding cognitive models of worry in youth. There are several potentially valuable areas for future work, including testing the model in clinical samples, considering the moderating role of child age and worry severity, and using longitudinal studies to understand when these cognitions develop and how they become problematic.

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