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Worry in children : proposal and test of a cognitive model.

Sarah Jane Kertz
University of Louisville

WORRY IN CHILDREN: PROPOSAL AND TEST OF A COGNITIVE MODEL

By

Sarah Jane Kertz
B.A., Truman State University, 2006
M.A., University of Louisville, 2008

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Sarah Jane Kertz
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By the following Dissertation Committee:

_____
Janet Woodruff-Borden, Ph.D.,
Dissertation Advisor

_____
Barbara Burns, Ph. D.

_____
Cara Cashon, Ph. D.

_____
Kathleen Rudasill, Ph. D.

_____
Paul Salmon, Ph. D.

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ABSTRACT

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Sarah Jane Kertz

September 10th, 2010

Although worry is common in children, little is known about its development and

maintenance. The current study reviews several areas of the literature to inform a

comprehensive cognitive model of clinical worry in children. Parental influences on child

anxiety broadly are reviewed, followed by a discussion of empirically supported

cognitive models of worry in adult samples. Next, the potential impact of cognitive

development on childhood worry is presented. A cognitive model is then proposed, and

empirical support for the model is reviewed. Finally, a portion of the model is identified

and tested empirically. Specifically, this study tests the hypothesis that cognitive

development will predict the cognitive variables of threat interpretation, beliefs about

worry, negative problem orientation, and intolerance of uncertainty (IU). It is also

hypothesized that the cognitive variables will predict worry and that this association will

be moderated by child development, such that the predictive power of the cognitive

variables increases with child development. It was also hypothesized that female children

will score higher than male children on the four cognitive variables and on measures of

worry. Finally, it was predicted that scores on the cognitive variables will discriminate

children with clinical levels of worry from those with nonclinical levels of worry. Children were recruited from public and private schools. A total of 80 children between the ages of 8 and 12 years completed the study. Overall, hypotheses were partially supported. Cognitive development, as measured by child age, explained variance in intolerance of uncertainty, negative problem orientation, and negative beliefs about worry. Intolerance of uncertainty, negative problem orientation, and negative beliefs about worry significantly predicted worry, and negative beliefs about worry emerged as the strongest predictor. Threat interpretation and positive beliefs about worry were not correlated with worry. Female children reported higher levels of negative beliefs about worry and negative problem orientation, but not worry. Finally, intolerance of uncertainty, negative beliefs about worry, and negative problem orientation discriminated clinical from nonclinical levels of worry. Exploratory analyses examined potential developmental trends in associations between the cognitive variables and worry. Findings are discussed in terms of theoretical and clinical implications and suggestions for future research are offered.

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INTRODUCTION

Worry is common in both children and adults. As many as 70% of children in a community sample report worry about a number of things (Orton, 1982) and 30% report subclinical levels of worry (Bell-Dolan, Last, & Strauss, 1990). Although childhood worry itself is not unusual, worry that is excessive, uncontrollable, and associated with distress is considered a clinical concern. Such worry is the cardinal feature of Generalized Anxiety Disorder (GAD) in both children and adults. Prevalence estimates of GAD in children suggest that the disorder is not uncommon, with rates ranging from .16% to 8.8% of community samples (Cartwright-Hatton, 2006). GAD has a chronic course, and many adults report that their worries began in childhood (American Psychiatric Association, 2000). The frequency, associated distress, and persistence of childhood worry highlight the importance of understanding this issue.

Although GAD is a chronic disorder frequently beginning early in life, little is known about specific etiological or maintaining factors of worry in children. To date most work has examined the content of child worry and patterns of associated symptoms described in DSM-IV (e.g., Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008; Muris, Merckelbach, & Luijten, 2002; Silverman, La Greca, & Wasserstein, 1995; Tracey, Chorpita, Douban, & Barlow, 1997; Vasey, Crnic, & Carter, 1994; Weems, Silverman, & La Greca, 2000). Exciting new work has examined the role of cognitive factors in

adolescents (Gosselinet al., 2007; Laugesen, Dugas, & Bukowski, 2003) and shed light on the applicability of adult cognitive models to younger populations. Still, work with children is rare and the impact of cognitive development on models of worry has yet to be fully explored (see Ellis & Hudson, 2010, for an exception). Currently, most researchers and clinicians borrow models from the adult literature, operating under the assumption that a downward extension of these models is appropriate for children.

Although downward extensions are common, applying adult models to children without empirical testing is problematic for several reasons. First, it has been suggested that childhood psychopathology is generally understood best in terms of the broader family interaction pattern (Dadds, 1987; Patterson & Reid, 1984). For children, a significant amount of time is spent in the home and with the family, where parents play an important role in shaping children's beliefs, perceptions, and experiences. A failure to consider the role of parents in childhood anxiety may lead to an incomplete understanding of the disorder. Second, children differ from adults in terms of their cognitive, emotional, and social development. Until late adolescence, children grow and develop cognitively. Whether such abilities impact the experience or expression of childhood worry is not well understood. For example, children's ability to conceptualize the future and elaborate on potential threat may impact their capacity for experiencing generalized anxiety (Vasey, 1993). Models of childhood worry should consider if the cognitive variables implicated in adult models are important for models of children's worry and test hypotheses to determine if development affects the extent to which such models apply.

Applying adult models to child anxiety without testing is also problematic because such models guide the development of treatment interventions. Without testing whether adult models accurately capture the experience of worry in children, treatments may be less effective. For example, some evidence suggests that current cognitive behavioral interventions are successful for only 60% of anxious children (Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004). To date, no cognitive-behavioral treatment targeted specifically at youth with GAD exists (Albano & Hack, 2004). A comprehensive and well-defined model of GAD and worry in children will provide clear targets for treatment and identify processes that may be altered. An understanding of the causal factors could allow for the prevention of clinical worry before it becomes problematic (Field et al., 2008). Incorporating the role of parenting in particular could contribute to such prevention or treatment.

This paper examines several areas of the literature in order to propose a model of clinical worry in children and an initial empirical examination of portions of the model. First, the influence of parenting on childhood anxiety disorders broadly is reviewed. Conceptual models of the process and maintenance of worry in adults are then briefly examined. Because no models of worry specific to children currently exist, adult models will be discussed. Drawing from these two literatures, a model of worry in children is proposed, integrating process and maintenance variables along with parental influences. To address the impact of children's emerging cognitive abilities on proposed associations, the influences of cognitive development on the model are also hypothesized. Existing empirical support for the model is then reviewed followed by specific hypotheses for the current study.

1. Parenting in Childhood Anxiety

Research has consistently shown that anxiety is familial (Schreier, Wittchen, Höfler, & Lieb, 2008; Torgersen, 1983; Turner, Beidel, & Costello, 1987). Genetics play an important role in the transmission of anxiety, and the genetic contribution explains approximately one-third of the variance in child anxiety (Eley, 2001). A substantial portion of variance remains unexplained by heritable characteristics, however, allowing for the exploration of environmental factors such as parenting. Craske (1999) has suggested that parenting contributes to child anxiety through both parenting styles broadly and parenting behaviors more specifically. Interestingly, reviews of the influence of parenting styles have not shown significant consistent relationships with child anxiety (Wood et al., 2003), and recent work has focused more specifically on parenting behaviors. Although the bulk of this literature is not focused explicitly on worry, it nonetheless informs our understanding of parental influences on children's anxiety across a variety of anxiety symptoms. In addition, it is also important to consider if certain aspects of parenting are uniquely related to childhood worry and this smaller literature specific to worry will be reviewed later.

1.1 Parental behaviors

The relationship between parenting behaviors and childhood anxiety has received significant attention in the literature over the last decade and several narrative reviews and meta-analyses have consolidated results from a range of studies using various methods and designs. Studies of parenting and child anxiety have mostly considered dimensions of warmth and control and have used three methods for assessing parenting: child report of parenting, parent report of parenting, and observation.. Wood et al.'s

(2003) comprehensive review included studies of 1) parental control, defined as

excessive regulation of children's activities, parental decision making, overprotection,

and instructions on how to think and feel, and 2) parental acceptance, defined as parental

warmth, responsiveness, and involvement with children. Overall, results showed the

most consistent effects for parental control and mixed support for acceptance, with

stronger associations found in studies using an observational methodology. Fourteen

studies of parent control using child report of parental behavior and parent report of their

own parenting yielded inconclusive results. Six studies using observational methods,

however, showed that parents of anxious or shy children were more controlling and

granted less autonomy than parents of nonanxious children. Most (8 of 10) tests revealed

were significant and all but one effect size was considered medium or large. The majority

of tests from studies using child or parent report of parental acceptance also failed to

show significant associations with child anxiety, although five observational studies (8 of

18 tests) showed significant effects. Another review of work published after Wood et

al.'s review focused on parental control, defined as excessive regulation of children's

activities, vigilance and intrusion, and discouragement of independent problem solving,

and negativity, characterized by the absence of warmth and acceptance, criticism, and

rejection (Bögels & Brechman-Toussaint, 2006). The authors identified additional

observational studies supporting the relation between parental control and child anxiety,

but results from observational studies of parental warmth were inconsistent.

Due to the difficulty in quantifying results and effects using narrative reviews,

several meta-analyses have also examined relationships between parenting behaviors and

child anxiety. A meta-analysis of 47 studies found a medium effect size for the

relationship between parental control and childhood anxiety (McLeod, Weisz, & Wood, 2007). The authors dismantled the construct of rejection, defined as low levels of warmth, approval, and responsiveness, and the construct of control, defined as excessive regulation, encouragement of dependence on parents, and instruction on how to think and feel. Resulting subdimensions included warmth, withdrawal, aversiveness, overinvolvement, and autonomy-granting. Results showed that autonomy-granting and overinvolvement explained the greatest proportion of variance in childhood anxiety This work underscores the importance of careful definition of constructs and examinations of specific elements of parenting that may related differentially to child anxiety. However, overall parental rejection and control explained only a small amount of variance in child anxiety (4% and 6%, respectively), prompting the authors to suggest that perhaps parenting plays a smaller role than many theories suggest. Another recent meta-analysis of 17 observational studies further examined the relationship between parenting constructs and child anxiety (van der Bruggen, Stams, & Bögels, 2008). They reported a medium to large effect size for the association between parental control and child anxiety. The authors also identified a number of moderator variables that resulted in larger effect sizes, including child gender, child age, socioeconomic status, and type of interaction task used to measure parenting. The authors conclude that their results do not support a direct parent-to-child transmission of anxiety through parental behaviors, as parental control was not strongly associated with parental anxiety.

1.2. Modeling of anxiety

Parental modeling of anxiety and fear related behaviors has also been identified as a risk factor for the development of childhood anxiety. Although the hypothesis is

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commonly discussed in theoretical terms, the role of social learning in the transmission of anxiety has received surprisingly little empirical attention. It stands to reason that exposure to a parent's anxious behavior will influence children's interpretation of threat, cognition about new or threatening situations, and preferred coping strategies.

Several methods have been used to examine parental modeling, including behavioral tasks, naturalistic observation, and discussion based tasks. In one behavioral study, researchers presented toddlers ages 15 to 20 months with a stimulus-maternal reaction pair (Gerull & Rapee, 2002). Stimuli were two toys paired with either a happy/encouraging maternal response or a fearful/disgusted maternal response. Children showed greater avoidance behavior of the toy paired with the negative maternal reaction and displayed more fearful affect after a negative maternal reaction trial. Children continued to display the fear response one minute and ten minutes after the initial modeling trial, suggesting that there is some lasting effect of exposure to parental behaviors and affect.

Naturalistic observations of sequential parent-child behaviors also support the modeling hypothesis. Mothers and their children ages 4 to 10 years were observed in the waiting room of a pediatric clinic (Greenbaum et al., 1988). Behaviors were coded for maternal emotion, maternal problem focused behavior, and child distress. Using sequential analysis, results showed that in dyads with high trait anxious mothers, maternal agitation was more likely to precede child distress, a result not found for low trait anxious mothers. In dyads with low trait anxious mothers child distress was more likely to be followed by maternal agitation.

Additional support for the importance of modeling comes from discussion based studies hypothesizing that parental language models an anxious cognitive style for children, increasing their risk for an anxiety disorder. In a study of mother-child interactions, anxious mothers used more catastrophizing language with their anxiety disordered children than nonanxious mothers (Whaley, Pinto, & Sigman, 1999). Another study found that anxious mothers were more likely to catastrophize than nonanxious mothers, regardless of the anxiety status of their children and for nonanxious mothers, having an anxious child increased the likelihood of maternal catastrophizing (Moore et al., 2004). However, a more recent study failed to find differences between anxious and nonanxious groups. Discussions between children 8 to 13 years, half of whom met criteria for an anxiety disorder, and their parents were analyzed for verbal content (Suveg et al., 2008). Families were instructed to discuss times when the child felt anxious, angry, and happy. Overall, results did not support thy hypothesis that parental language was related to child anxiety. The only significant anxiety related difference emerged for mothers with their sons, with nonanxious mothers engaging in more explanatory discussion of emotion in anxious situations compared to anxious mothers.

1.3   Discussion

Despite a large body of work investigating the influence of parenting behavior on child anxiety, unequivocal support has yet to emerge. Recent reviews and meta-analyses suggest that perhaps parents play a less prominent role in their children's anxiety than many theories would suggest (McLeod et al., 2007). There may be several explanations for these findings. First, methodological factors and sample characteristics may have not have been fully considered in the analyses, as several studies have found support for

these variables as moderators of the relation between parenting and child anxiety (McLeod, et al., 2007; van der Bruggen et al., 2008). For example, several authors have pointed out that when observational studies alone are considered, effects for parenting are greater than when all study types are considered together. Second, specific definition and measurement of parenting behaviors are needed. For example, although McLeod et al. (2007) found that parenting overall accounted for only 4% of the variance in childhood anxiety, parental autonomy-granting specifically accounted for 18%. This suggests that significant effects could be washed out by collapsing several types of behaviors into larger categories.

Given the overall inconsistent findings and stated limitations, there are some important findings to date. Parental control, and autonomy-granting in particular, shows stronger and more consistent relationships with child anxiety compared to parental warmth (Bogels & Brechman-Toussaint, 2006; McLeod, et al., 2007; van der Bruggen, et al., 2008; Wood, et al., 2003), suggesting that this is an important variable and worthy of further consideration. It has been hypothesized (Chorpita & Barlow, 1998) that controlling and intrusive parenting conveys negative messages to children about their abilities. Children could interpret parental intrusiveness as an indicator that they do not have adequate skills to cope. Alternatively, parental control could prevent children from engaging in novel or challenging experiences where coping strategies might normally develop.

More work is needed to fully understand the effects of parental modeling of behavior and verbal modeling of cognitions. The few available studies of modeling suggest that parent's negative behavior or negative verbalizations may be copied by

children. Although intriguing, these data need to be replicated and theoretical models for the impact of modeling on child anxiety specifically developed and tested. These results could have important implications for children of anxious parents who may deliver negative information or model negative and/or avoidant cognitions about novel experiences more frequently than nonanxious parents. Repeated exposure to parental anxious behavior could contribute to stable attributions and beliefs in children. The literature to date, however, on the effect of parental verbalization on children's anxiety is limited.

Finally, several issues must be considered when interpreting this work. First, the bidirectional nature of parent-child interactions cannot be ignored. Children undoubtedly influence their parent's behavior and affect, eliciting certain responses. The contributions of both members of the dyad will better inform our current understanding of the role of parents. Second, the design of future studies should give more consideration to potential moderators, such as parent and child gender, child developmental stage, and child temperament. As discussed, these factors could alter relationships between variables, and if not considered, mask potential effects. In addition, the influence of fathers on children's psychological well-being has been largely ignored. Understanding parental influences on children should include the unique contributions of both mother and father. Effects may differ for mothers and fathers, and the inclusion of both parent and child sex would provide a more comprehensive understanding of these relationships. Finally, most studies have included only traditional nuclear families. Many children today split their time between several households that include stepparents, stepsiblings, and half–siblings. Understanding the influence of parenting in environments when mothers and fathers are

not living together and when stepparents are involved in child rearing would be beneficial in understanding the modern parent-child dynamic.

2.   Adult models of GAD

Worry and GAD in adults have received increasing attention over the last 15 years. Worry has been conceptualized as a largely cognitive process. As such, most research, though not all, has emphasized the role of cognitive and metacognitive factors in worry and several theoretical models have been proposed. These models have been well supported empirically and in some cases have led to the development of specific interventions (see Behar et al., 2009 for a review). Although the child literature lags well behind the adult literature in this area, researchers are beginning to examine the role of cognitive factors and cognitive development in adolescent worry. By and large, however, the models remain untested in school age children. The next section reviews the empirically supported adult models of GAD and worry, with findings relevant to adolescents or children included when available.

2.1 Avoidance model

Borkovec's (1994) avoidance model was one of the earliest conceptualizations of worry. He defined worry as a verbal stream of uncontrollable, negative thoughts directed toward potential future threats. At the heart of Borkovec's model is the notion that worry functions as a form of avoidance. Individuals with GAD report that worry helps to avoid threat by making future negative events less likely or by preventing such events entirely (Borkovec, 1994). Because the likelihood of most feared events is relatively small to begin with, these beliefs about worry are negatively reinforced. Individuals with GAD also report that they use worry as a method of distraction and for avoiding deeper, more

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emotionally laden content or threat (Borkovec, 1994). Physiological studies provide additional support for patients' report that worry serves as avoidance. Work in this area has documented a restricted range of physiological activity associated with worry described as autonomic inflexibility, or a lower range of variability in physiological responses (Borkovec & Hu, 1990; Lyonfields, Borkovec, & Thayer, 1995; Thayer, Friedman, & Borkovec, 1996). Borkovec and colleagues (1998) suggest that it is the predominantly verbal nature of worry that results in reduced vagal activity, as verbal thoughts elicit lower cardiovascular response than images of the same content. The suppression of autonomic responses has important implications for the maintenance of worry. If worrying inhibits physiological response, habituation to feared stimuli cannot be achieved (Borkovec & Lyonfields, 1993), suggesting that worry works in much the same way as other avoidance strategies, preventing exposure and perpetuating anxious meanings (Borkovec, 1994).

2.2. Beliefs about worry and metaworry

Several models have posited that metacognition plays a fundamental role in development and maintenance of clinical worry. Wells (1995) emphasized the importance of metacognitive beliefs about both the process and content of worry. His model includes positive metabeliefs about the usefulness of worry, negative metabeliefs about the dangers of and uncontrollability of worry, and metaworry. He proposes that positive metabeliefs lead to Type 1 worry, or content based worries about events. This worry then becomes intrusive and bothersome, activating negative beliefs about the danger of worry, which in turn lead to metaworry, or Type 2 worry. Metaworry is reinforced by related changes in behavior, attempts to control the worry, and negative

emotion. He suggests that worry becomes problematic when metaworry develops, leading to perseveration and attempts to control the worry. An empirical examination of the model largely supported the hypotheses, showing that when both worry types and trait anxiety were used to predict worry or ratings of worry interference, trait anxiety and Type 2 worry emerged as significant predictors (Wells & Carter, 1999).

Other researchers have focused on positive and negative beliefs about worry. Freeston et al. (Freeston, Rhéaume, Letarte, & Dugas, 1994) developed a measure, the Why Worry? scale, to examine reasons people worry. Results revealed two factors, consisting of 1) beliefs that worry helps to facilitate cognitive avoidance, reduces the chance of negative outcomes, and reduces the consequence of negative outcomes, and 2) beliefs that worry helps to increase control and facilitate problem solving. Another study (Davey, Tallis, & Capuzzo, 1996) of beliefs about worry found two higher order factors of positive consequences, including two first order factors of "worry motivates" and "worry helps analytic thinking," and negative consequences, including three first order factors of "worrying disrupts effective performance," "worrying exaggerates the problem," and "worrying causes emotional discomfort." They also found that individuals who scored high on both the positive and negative consequences scales reported higher levels of worry and depression, more worry domains, poorer general health, and more negative automatic thoughts than those who scored lower on one or both scales. Beliefs about worry have also been shown to discriminate clinical from normal levels of worry (Freeston et al., 1994).

2.3 Intolerance of uncertainty

Intolerance of uncertainty (IU) is another cognitive variable that has been linked with worry in adults. Intolerance of uncertainty is defined as a negative response, including emotional, cognitive, and behavioral reactions, to situations or events interpreted as ambiguous (Buhr & Dugas, 2006). More specifically, intolerance of uncertainty reflects a set of beliefs that uncertainty is stressful, upsetting, interferes with functioning, and that being uncertain about the future is unfair (Buhr & Dugas, 2002). Intolerance of uncertainty has been shown to discriminate participants who, based on self-report, met full criteria for GAD, met the somatic criteria only, and met no GAD criteria (Buhr & Dugas, 2002). Intolerance of uncertainty also appears to have a unique relationship with worry. In a study with undergraduate students, Buhr and Dugas (2006) found that intolerance of uncertainty remained positively correlated with worry even after controlling for intolerance of ambiguity, perfectionism, and perceived control. This study also showed that intolerance of uncertainty explained additional variance in worry scores above and beyond demographics and other study variables.

2.4. Problem solving and problem orientation

In addition to work on metacognition and worry, others have examined relations between problem solving and worry. Davey (1994) defines worry as a continuous, unsuccessful attempt to solve a problem. Worry is associated with the information-seeking coping strategy of monitoring, characterized as vigilance for potential threat-related information (Davey, Hampton, Farrell, & Davidson, 1992). Davey (1994) suggests that a monitoring style of problem solving is particularly problematic when the threat is uncontrollable, and consistent monitoring likely contributes to worry

maintenance when the problem is not easily solvable. Early hypotheses suggested that worriers lacked adequate problem solving skills; however, later work found that worry was related to poor problem-solving confidence and lower perceived control over the problem solving process, but there was no relation with problem-solving effectiveness (Davey, 1994). Another study showed that participants who received poor feedback about their problem solving solutions (regardless of their true performance) reported lower problem solving confidence, which in turn was associated with more catastrophizing steps during a worry interview (Davey, Jubb, & Cameron, 1996). Based on these findings, the relation between worry and problem solving has less to do with actual skill set and more to do with beliefs and attributions about one's competence and ability to cope with problems when they arise.

Problem orientation, a closely related construct, also shows strong associations with clinical worry in adults. Ladouceur and colleagues (1998) define problem orientation as an individual's set of potential responses when confronted with a problem, as well as the metacognitive activity that characterizes an individual's approach to dealing with problems. One study found that nonclinical moderate worriers, nonclinical subjects meeting GAD symptom criteria by questionnaire, and GAD patients showed no difference in problem solving skills; however, the two GAD groups reported poorer problem orientation than the moderate worrier group (Ladouceur et al., 1998). Building on these results, Robichaud and Dugas (2005) investigatedworry and depression relation specifically to negative problem orientation, defined as beliefs about threat of problems to well-being, doubt about problem solving ability, and pessimism about the problem resolution. After controlling for pessimism, self-mastery, and neuroticism, negative

problem orientation predicted more variance in worry than depression and discriminated between high and low worriers. Another study included subdimensions of problem orientation, including emotional, cognitive, and behavioral orientation and found that of the three, only emotional problem orientation predicted worry (Dugas, Freeston, & Ladouceur, 1997).

2.5 Information processing

Another cognitive variable, information processing, has also been linked with worry in adults. Models of worry in adults have emphasized the importance of information processing, suggesting that it serves as a causal and/or maintaining factor in GAD. This work has used several different paradigms, and overall results suggest that GAD is associated with attentional bias and the tendency to interpret ambiguous information as threatening. Results from dot-probe tasks indicate that those with GAD show a bias toward threat compared to nonanxious controls, as indicated by faster reaction times to dots replaced by threatening versus non-threatening material (MacLeod, Mathews, & Tata, 1986; Mathews, 1990; Mathews & MacLeod, 1985). Work using a lexical decision making task, in which participants are presented with individual letters and asked whether the letters form a word, also support the finding of a bias toward threat in those with GAD (MacLeod & Mathews, 1991; Mogg, Mathews, Eysenck, & May, 1991) Results from studies using the Stroop task, in which threat and neutral words are presented in different colors and subjects are asked to name the colors while ignoring content, found that those with GAD are slower than nonanxious controls to name threat words (Mathews & MacLeod, 1985; Mogg, Mathews, & Weinman, 1989). Attentional interference is thought to occur due to word content, resulting in errors and longer

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response times. This work is not unequivocal, however, as at least one study failed to find differences in attentional bias associated with GAD (Dibartolo, Brown, & Barlow, 1997).

Individuals with GAD are also more likely than nonanxious individuals to interpret ambiguous stimuli as threatening. When presented with ambiguous scenarios, GAD participants described more threatening interpretations and rated the events as more likely to occur compared to nonanxious individuals (Butler & Mathews, 1983). A later study found similar results using homophones, with GAD participants reporting more threatening meanings (e.g., die rather than dye) than nonanxious participants (Mathews, Richards, & Eysenck, 1989).

2.6. Integrated models

Several cognitive variables have been studied in relation to worry, and the importance of avoidance, intolerance of uncertainty, beliefs about worry, and information processing in the process of worry in adults has been established. However, most models to date have focused on the association of only one of these variables with worry. The few studies that have incorporated multiple variables have increased our understanding of how these variables influence one another and their relative contributions to worry.

It is likely that the cognitive variables associated with worry are also related to one another. In particular, information processing, intolerance of uncertainty and problem orientation seem very closely related. Given that uncertainty is both distressing and interpreted as threatening, problem orientation and information processing are almost certainly also affected. A negative problem orientation might also lead to difficulty defining problems in concrete or specific terms, increasing the perception of ambiguity in everyday life. This could in turn present difficulty for individuals likely to interpret threat

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from ambiguous stimuli and for those with a high level of intolerance of uncertainty.

Dugas and colleagues (1997) were the first to examine the relations between intolerance of uncertainty and negative problem orientation in a sample of GAD patients. A hierarchical regression showed that the constructs made both unique and shared contributions to the prediction of worry. These results suggest that, although the two are highly related to one another, they also have individual associations with worry. Dugas et al. (2005) also investigated how intolerance of uncertainty affects information processing. When presented with neutral and uncertain words, undergraduate students high in intolerance of uncertainty recalled a greater proportion of words associated with uncertainty. A second study of undergraduates showed that individuals high in intolerance of uncertainty were more likely to interpret ambiguous information as threatening. Further, intolerance of uncertainty predicted threat interpretation above and beyond age, gender, anxiety, depression, and worry.

Given the importance of intolerance of uncertainty to worry, Dugas et al. proposed that intolerance of uncertainty is the central feature of worry (Dugas, Gagnon, Ladouceur, & Freeston, 1998). The model suggests that beliefs about worry, problem orientation, problem solving skills, and cognitive avoidance are also important to consider. Discriminant analyses found that all variables except problem solving skills contributed to the correct classification of GAD and nonanxious participants and intolerance of uncertainty played the strongest role in the classification. A second discriminant analysis approach comparing the utility of the cognitive variables to GAD symptoms in group classification found that cognitive variables correctly classified almost as many participants as the symptom measures (82% and 91% respectively).

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Cognitive variables also appear to be associated with clinical severity. A study of intolerance of uncertainty and beliefs about worry found that each factor varied according to symptom severity (Ladouceur et al., 1998). Results showed that both nonclinical subjects meeting GAD symptom criteria by questionnaire and GAD patients reported higher intolerance of uncertainty and more dysfunctional beliefs about the usefulness of worry compared to moderate worriers. Work by Ruscio and Borkovec (2004) examined several differences between high worriers with and without a GAD diagnosis. The groups showed several similarities, with both groups demonstrating difficulties with concentration, high levels of positive beliefs about worry, and an increased awareness of thoughts. However, negative beliefs about worry appeared to be unique to high worriers with GAD, and GAD worriers experienced more negative intrusions after a worry induction task. A later study by Dugas and colleagues showed that several cognitive variables were related to GAD severity in a clinical sample (Dugas et al., 2007). Intolerance of uncertainty and negative problem orientation correlated with three measures of GAD severity, cognitive avoidance correlated with two measures of GAD severity, and positive beliefs correlated with one measure of GAD severity. Moderate and severe GAD groups also reported higher intolerance of uncertainty and negative problem orientation compared to the mild GAD group. Overall, results of these studies are consistent, suggesting that intolerance of uncertainty is the most robust predictor of GAD severity.

2.7 Discussion

Several conceptual models of worry in adults have been proposed. Some emphasize the importance of the avoidant functions of worry, while others highlight the

importance of beliefs about worry and metacognition. Others have investigated the roles of intolerance of uncertainty, problem orientation, and information processing. Some studies have examined these factors alone while others have looked at interrelationships between them and their relative contributions to worry. Given that each conceptual model reviewed has empirical support, the time has come to incorporate these constructs and ideas into a more comprehensive model. Dugas' group has taken importantsteps toward this endeavor (Dugas et al., 1997; Dugas et al., 1998), including several cognitive variables in their designs to determine unique and shared contributions of the variables to worry.

There is still some conceptual confusion in understanding differences in various types of worry. Studies to date have investigated nonclinical worry, excessive but not clinical worry, worry in disorders other than GAD, and worry in GAD, but it is still not clear how these presentations of worry differ from one another in terms of the cognitive variables discussed. Understanding how worry differs in these groups has important implications for conceptualization and treatment. Identifying variables unique to clinical worry can inform our understanding of distress and interference associated and provide better targets for intervention.

3.   Worry in children

3.1 GAD diagnostic criteria

The GAD diagnosis in children is still somewhat controversial in the literature today. This is due in part to its somewhat recent addition to the DSM-IV-TR (American Psychiatric Association, 2004), replacing the previous diagnosis of Overanxious Disorder (OAD). The current diagnosis requires excessive worry about a number of events, more

days than not for a period longer than six months. Children must also report that the worry is uncontrollable and list one or more somatic complaints, such as restlessness, fatigue, difficulty concentrating, irritability, muscle tension, or sleep disturbance.

Studies investigating the reliability, validity, and factor structure of the present GAD diagnosis in children have found mixed results. Two studies have documented discrepancies in parent and child report of child symptoms (Kendall & Pimental, 2003; Tracey, Chorpita, Douban, & Barlow, 1997). Parent-child agreement was low for all symptoms and, for one-fourth of the children diagnosed with GAD, either parent or child reported no clinical worry at all (Tracey et al., 1997). The physical symptoms criterion (Criterion C) is especially problematic, and Tracey et al., (1997) found that parent-child agreement improved when this requirement was ignored. The muscle tension item in particular shows low clinical utility. Muscle tension was endorsed less frequently than any other symptom in Criterion C by both parents and children, in contrast to the high level of endorsement by adults with GAD (Tracey et al., 1997). Later work confirmed the problems with Criterion C, with parents and children failing to agree on symptoms 48-66% of the time (Kendall & Pimentel, 2003). Parents also reported significantly more physical symptoms than children. A recent factor analysis found that GAD symptoms in children factored into a worry factor and a somatic distress factor, and the somatic distress factor correlated similarly with social anxiety, major depressive disorder, and worry (Higa-McMillan, Smith, Chorpita, & Hayashi, 2008), casting additional doubt on the utility of somatic symptoms for diagnosing GAD in children.

3.2 Content of worry

Within the literature on childhood worry, issues related to worry content have been examined most frequently. In community samples of children ages 7 to 13 years, the most common worries include health (e.g., other people's health, operations, receiving medical care, bodily symptoms, contracting AIDS, or getting sick), school (e.g., tests and grades, being called on, and interacting with the teacher) personal harm (e.g., injury from other people and being attacked), and social contact (e.g., being teased and getting friends) (Muris et al., 2000; Silverman, La Greca, & Wasserstein, 1995). Work with clinic referred and community based samples of children ages 6 to 16 years showed similar worries across groups, including concerns about health, school, disasters, and personal harm (Weems, Silverman, & La Greca, 2000). Comparisons of children diagnosed with GAD/OAD and specific phobia showed that the two groups reported only slight differences, with GAD children endorsing more worry about the future and social concerns while children with specific phobia reported more worry related to health of others and family (Weems, Silverman, & La Greca, 2000). Results also suggest that intensity of worry, not content, discriminates the worry of clinical children from that of community children, and GAD/OAD children from specific phobia children.

3.3 Developmental considerations

3.3.1 Cognitive development implications for worry

Although both the cognitive development and child anxiety literatures are well developed, works bridging the two are uncommon. Mapping emerging cognitive abilities onto the expression of anxiety related symptoms would greatly improve our understanding of the underlying processes involved in worry in children, shed light on

symptom expression, and potentially explain developmental trends in anxiety prevalence and content. Such an understanding could also inform intervention strategies, ensuring that cognitive techniques to alleviate worry are applicable given the child's level of cognitive development. For example, techniques used effectively with adults, such as monitoring anxious thoughts, may not be appropriate for young children who lack awareness of their thoughts. Two related issues are relevant to children's cognitive development and worry, and both will be explored. First, the question of how child development influences the prevalence, expression, and experience of worry will be addressed, and second, the implications of cognitive development for adult models of worry and GAD will be discussed.

The prevalence of worry and GAD symptoms in children increases with age, suggesting that the development of cognitive skills facilitates worry. In a study of symptoms in clinically referred children ages 5 to 11 years and adolescents ages 12 to 19 years, results showed older children were more likely to present with six or more symptoms compared to younger children (66% and 35%), and more older children met all seven OAD diagnostic criteria than younger children (28% and 4%) (Strauss, Lease, Last, & Francis, 1988). One longitudinal study of community adolescents found that from early adolescence (average age of 12 years) to middle adolescence (average age of 16.6 years), GAD symptoms increased for girls and decreased for boys (Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008). Another study examined developmental changes in fears, nightmares, and worry in a group of school children (Muris, Merckelbach, Gadet, & Moulaert, 2000). Fears and nightmares were common in the youngest children ages 4 to 6 and increased in children ages 7 to 9. Fears and nightmares were least common in the

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10 to 12-year-olds. Worry, however, was more common in the two older groups (47% compared to nearly 80%). Westenberg and colleagues have shown associations between psychosocial development and separation anxiety and OAD. Psychosocial development was defined as ego development consisting of three related facets of impulse control, interpersonal style, and conscious preoccupations. The authors show that psychosocial development was a stronger predictor than child age in correctly classifying children into separation anxiety disorder and OAD diagnostic groups (Westenberg, Siebelink, Warmenhoven, & Treffers, 1999).

In addition to changes in worry prevalence with age, there is also evidence for developmental patterns associated with worry content. One study found that in younger children aged 3 to 6 years, the most frequent worry involved fear of imaginary creatures, a very uncommon concern in older children ages 7 to 14 years (Muris et al., 2002). Older children in this study worried more about school performance, a fear that increased steadily with child age. Other studies with children ages 5 to 12 years have found similar developmental patterns, with younger children describing more concern over threats to physical safety, which declines with age, and older children describing worries about behavioral competence, interpersonal and social issues, and psychological well-being, which generally increases with age (Muris et al., 2002; Vasey, Crnic, & Carter, 1994). However, results have not been entirely consistent. For example, in the previously discussed study, Vasey et al. (1994) failed to find increased worry about behavior competence in the 11 to 12-year-old children compared to 8to9-year-olds. In another study of a community sample of children ages 7 to 12 years, Silverman, La Greca, and Wasserstein (1995) found only that younger children experienced more intense worry

about disasters than older children. Other evidence for developmental trends in worry comes from a study of the nature of worry across child age. In a non-referred group of children ages 8 to 13 years, older children's worry was characterized by more problem solving and less rumination compared to younger children (Szabó & Lovibond, 2004).

One way to understand these developmental trends might be to identify precisely what skills and abilities are necessary to worry and to then relate these abilities to typical cognitive development. A focus on the most widely accepted definition of worry proposed by Borkovec (1994) provides a useful guide. Borkovec suggests that worry is a future oriented, primarily verbal stream of negatively valenced and threatening thoughts that are relatively uncontrollable. Several skills and abilities are required to engage in such a process. As Vasey (1993) points out, individuals must be able to conceptualize the future, elaborate on threatening thoughts, and possess language abilities adequate to represent threatening information. Also implied by this definition is an awareness of one's internal stream of consciousness and the experience that the thoughts are out of one's control.

Borkovec's (1994) definition implies that worry requires a fairly advanced conceptualization of the future. Vasey (1993) suggests that very young children's restricted ability to think about the future limits their ability to worry in a generalized way. For example, Povinelli, Landau, and Perilloux (1996) concluded that children younger than age four are unable to view themselves as an entity moving through time and cannot integrate past, present, and future versions of the self. Vasey (1993) proposes that even a vague notion of the near future, like that seen in children as young as 2 years old (Littenberg, Tulkin, & Kagan, 1971), may be sufficient for worry. However, the

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increase in ability to understand the future seen in children around age 8 years (Wallace & Rabin, 1960) likely results in an ability to experience truly generalized worry. Children's increasing ability to extend their understanding of the future further in time may provide more opportunities to consider potentially threatening situations, while younger children's narrow temporal understanding limits the possibility of threat (Vasey, 1993).

Worry also requires the production of a chain of negative thoughts depicting various threatening outcomes. Vasey (1993) has summarized work indicating that children's abilities to generate and reason about possible outcomes increases with child age. The cognitive literature also suggests that although young children have a basic ability to reason about causal events and consider alternative outcomes, this ability increases with age. For example, Flavell, Green, and Flavell (2004) reviewed work indicating that children as young as age three years can infer causal relationships in complicated conditions, and counterfactual reasoning, which involves making predictions about what could have happened but didn't, has been documented in children as young as three years (Harris, German, & Mills, 1996). Another important point related to worry was raised by German (1999), who suggested that counterfactual reasoning is more likely to occur in response to negative events than positive ones, so that children imagine what other possible courses of action could have prevented the undesirable outcome. Reflecting on past events and imagining how things might have gone under different circumstances suggests an ability to generate and understand the possibility of multiple outcomes, which may then lead to a consideration of future possible negative events. For example, in the study discussed above, (Harris et al., 1996) children were presented with

a story about Carol who wore muddy shoes in the house and got the floor dirty. When asked what would have happened if Carol had taken her shoes off, most children correctly responded that the floor would have remained clean. An ability to ask past "what ifs?" might also indicate an ability to generate future "what ifs?" If children were to reason similarly in their own lives, a reflection such as "If I remembered to take off my shoes last time I wouldn't have gotten in trouble" could lead to a reflections such as "What if I forget to take off my shoes next time?" In fact, others have argued that reasoning about future hypothetical situations may actually be easier than past hypothetical situations because children do not have to mentally "undo" actions or imagine contrary to their reality (Robinson, Beck, Mitchell, & Riggs, 2000). Other work (Lagattuta, 2007) suggests that young children draw from past experiences to explain or predict hypothetical future emotions and behavior. When discussing the future in response to vignettes, most 4-year-old children and all 5 and 6-year-old children were able to make at least one "definite past to future" connection, indicating that the future is definite. Further, 63% of 4-year-olds and 75% of 6-year-olds made at least one "hypothetical past to future" connection, suggesting that the future is hypothetical.

Adult models of worry presuppose an awareness of internal verbal thoughts. However, cognitive work suggests that children's awareness of their internal stream of consciousness and that of others varies as a function of cognitive development. For example, when asked if a person sitting in a chair and waiting was having thoughts, most 3 and 4-year-old children responded that the person was having no thoughts or ideas (15% and 35%, respectively) while 80% of 6 and 7-year-olds reported that the waiting individual was in fact having thoughts (Flavell, Green, & Flavell, 1993). Another study

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showed that young children are not aware that others must be having thoughts when doing mental activities, such as reading or talking (Flavell, Green, & Flavell, 1995). Flavell, Green, and Flavell (2000) found that at age 5 years children were able to report previous thoughts when instructed to imagine themselves doing something they enjoy; however, when instructed to have "no thoughts" children could not report their spontaneous ideation, denying having any thoughts at all during this time. Relatedly, Flavell, Green, Flavell, and Grossman (1997) found that 4 and 5-year-old children were significantly worse than adults at detecting inner speech, leading the authors conclude that preschool children have very little awareness of covert verbal thought. They suggest that this ability may develop in the early school years when children begin practicing inner speech in academic tasks, such as reading and writing.

Current definitions of worry also suggest that clinical worry is uncontrollable. However, children's awareness that thoughts are not entirely under their power may still be emerging in early childhood. Flavell, Green, and Flavell (1998) found that young children had little understanding that the mind's activity is somewhat uncontrollable. When presented with stories depicting children attempting to avoid specific thoughts (thoughts of an injection or the cause of a loud noise), 5-year-old children were more likely than older children (9 and 13-year-olds) or adults to report that children in the stories could control their thoughts and successfully avoid thinking about the injection or the loud noise. Surprisingly, more than half of the 9-year-old sample also incorrectly indicated (for at least one story) that children in the story could control their thoughts. Five-year-old children were also more likely than the two older groups to report that it is possible to avoid having any thoughts at all for three consecutive days. Finally, only half

of 5-year-olds reported experiencing unwanted thoughts compared to 95% of the 9-year-olds. Overall, results suggest that most development in metacognition occurs between the ages of 5 and 9 years, although 9-year-olds still lag behind 13-year-olds. These findings have important implications for the current diagnostic criteria for GAD in children which require that the worry is experienced as uncontrollable. The abilities of children younger than 9 years to determine the controllability of their thoughts may still be developing, preventing accurate report of worry controllability and possibly preventing a GAD diagnosis that may otherwise be appropriate.

Another related cognitive ability in children relates to children's use of mental representation of information, which may affect the expression or experience of worry. Borkovec's (1994) definition describes worry as primarily verbal stream of negative thoughts, and so the ability to capture meaning verbally is crucial for worry. Whether young children with less developed verbal skills worry in the way that Borkovec describes is not known. Vasey (1993) has described work indicating that young children rely on visual images and motor schemes in understanding and storing information about the world, and Szabó (2007) found that while adults' worries were closely related to the extent to which they think about their worries, children's worries were related more strongly to fear than to a verbal thinking process. Perhaps children's limited language skills protect them from adult-like worry or, alternatively, they may worry in a more simplistic way, using the verbal skills available at any given point in time.

Current definitions of worry also suggest that worry serves an avoidant function. Children's cognitive and language development may directly influence the extent to which worry results in avoidance of more distressing material. Borkovec (1994) has

suggested that it is worry's primarily verbal nature that allows for emotional avoidance, and such avoidance is thought to be a powerful maintaining factor in the worry process. It is not currently understood if children's worry is associated with a perception of avoidance or the autonomic inflexibility seen in worried adults.

Finally, metacognitive models of worry imply a number of cognitive abilities that vary with cognitive development. . Several models rest on an individual's ability to form relatively complex thoughts and judgments about both internal and external stimuli. The metacognitive model, if applied to children, assumes that children have the ability to reflect on their own worry and form opinions about its usefulness and threat to wellbeing. Models including intolerance of uncertainty assume the ability to recognize a situation as uncertain and evaluate its potential for threat, as well as the capacity to develop a set of negative beliefs about uncertainty. Problem orientation, described as metacognitive activity that characterizes an individual's approach to dealing with problems, also implies abilities to recognize and evaluate mental problem solving skills and outcomes. Work reviewed previously (Flavell et al., 1993; 1995; 2000) indicates that children may be unaware of or have difficulty identifying their own thoughts, suggesting that metacognitive models may have limited utility in young children (especially those younger than school age). With increasing cognitive abilities and metacognition capacity, these models are likely to become more accurate in explaining children's experience of worry. More work is needed in this area to fully understand the cognitive abilities underlying the worry process and at what age or developmental stage we would expect cognitive models to apply to children.

3.3.2 Empirical studies of cognitive development and worry

Few empirical studies have examined relations between cognitive development and worry, but results are generally consistent and show the predicted increase in worry with age and/or development. Vasey, Crnic, and Carter (1994) examined relations between cognitive development, self-concept complexity, and worry in a community sample of children ages 5 to 12 years. In response to a series of vignettes depicting worried children, older children (8 to 12 years) described more worries, a greater variety of worries, and longer worry elaboration chains than those of the 5 to 6- year- old children. The authors note that children as young as 5 years reported worries and were able to elaborate on them, although not to the extent of the older children. Results also showed positive correlations between self-concept complexity and proportion of physical threat and social evaluation/psychological worries. Muris et al. (2002) found similar results in their study of a community sample of children ages 3 to 14 years old. Personal worry and vignette worry elaboration scores correlated positively with child age and cognitive development, as measured by Piagetian conservation tasks. Interestingly, even the youngest group of children (ages 3 to 6 years) reported a significant amount of worry. Worry elaboration also mediated the association between age/cognitive development and personal worry. Another study comparing cognitive development (measured with one conservation task) and worry across samples of children with average and below average intelligence found that average children reported more worry and fear compared to children with below average intelligence, but there were no differences in worry content or severity (Muris, Merckelbach, & Luijten, 2002). For average children, passing the

conservation task was associated with an increased likelihood of worry, but no such relation was found for the children with below average intelligence.

3.3.3 Discussion

Considering children's cognitive capacity and the influence of emerging skills on the experience of worry is important for the development of testable models of worry in children. Generally, as Vasey (1993) concludes, young children seem to possess basic forms of the abilities needed for some form of worry, including a notion of the future, an ability to generate at least one negative outcome, and the ability to produce counterfactual "what if" statements. Perhaps these basic abilities are adequate for some form of worry, albeit different from that experienced by adults, but they are likely unable to experience generalized worry due to the still developing ability to recognize internal streams of consciousness or to recognize that their thoughts are at times uncontrollable or spontaneous. As these skills develop, however, children's basic worry may elaborate as they are able to consider a greater number of negative events extending more distantly into the future. Metacognitive awareness of internal verbal thoughts and their uncontrollable nature also allows children to interpret meaning from their internal experience. If children find the worried, uncontrollable thoughts threatening, this may lead to a type of metaworry as described by Wells (1999). Future work measuring relevant cognitive abilities, worry, and worry related variables (such as beliefs about worry and intolerance of uncertainty) will help to identify weaknesses or inaccuracies in applying current adult models of worry to children. Such work would also be beneficial in determining at what age or cognitive ability adult models become applicable to children. This in turn could be used to guide future treatment interventions.

4. A model of worry in children

The adult worry literature is far more advanced than the child literature. Because so little is known about worry in children, these adult models provide a basis for suggesting hypotheses that can then be tested. The model proposed here integrates several models of worry supported in the adult literature and also accounts for the influence of parenting, an important factor in the development of childhood anxiety. Before describing the model, several issues must be addressed. First, because of the lack of literature on childhood GAD and worry, many elements of the model are speculative at this point. The adult literature indicates that the elements are important for worry in adults; therefore, it seems reasonable to hypothesize that they also operate in children. Second, how the worry process unfolds is still unknown. No adult studies have investigated whether processing of information occurs first, followed by the activation of beliefs about worry or an attempt to problem solve. It is unclear how these processes occur, whether sequentially or in concert. The proposed model hypothesizes only that some variables are more likely linked with the onset of worry while others serve as maintaining factors.

The model begins with a potentially ambiguous trigger (Mathews (1990) has suggested that many everyday cues for danger are ambiguous), and details the contributions of the process variables of (a) intolerance of uncertainty, (b) information processing, (c) problem orientation, and (d) beliefs about worry (See Figure 1). First, the model suggests that intolerance of uncertainty, information processing and problem orientation are closely interrelated and predictive of worry. Previous work indicates that those high in intolerance of uncertainty find ambiguous situations distressing and have

difficulty functioning in them (Buhr & Dugas, 2006). Ambiguity is also associated with information processing patterns characterized by attentional bias toward threat and elevated threat interpretation, suggesting that intolerance of uncertainty may be related to the threatening meanings interpreted from ambiguity. When confronted with an ambiguous, threatening stimulus, it follows then that problem orientation suffers. Individuals may feel overwhelmed or less confident when presented with ambiguous information, hindering effective problem solving. Worry may provide the illusion of problem solving but without any decision making or plan of action (Borkovec, 1985). The fourth process variable in the model is beliefs about worry, both positive and negative. Positive beliefs such as "worrying helps me cope" and "worry prevents bad things from happening" may make worry an attractive coping strategy for handling threat. Both positive and negative beliefs about worry have been linked with worry and trait anxiety (Davey, Tallis, & Capuzzo, 1996). Negative beliefs that worry is harmful or dangerous may contribute to increased worry by leading to attempts to monitor, control, or suppress worry. These strategies, however, are likely increase rather than decrease intrusive worries. Whether negative beliefs are best conceptualized as a factor associated with the onset of worry or one more closely linked with the maintenance of worry over time remains an empirical question. Before teasing apart more specific relations, however, it should first be determined if there is in fact an association between negative beliefs and worry in children.
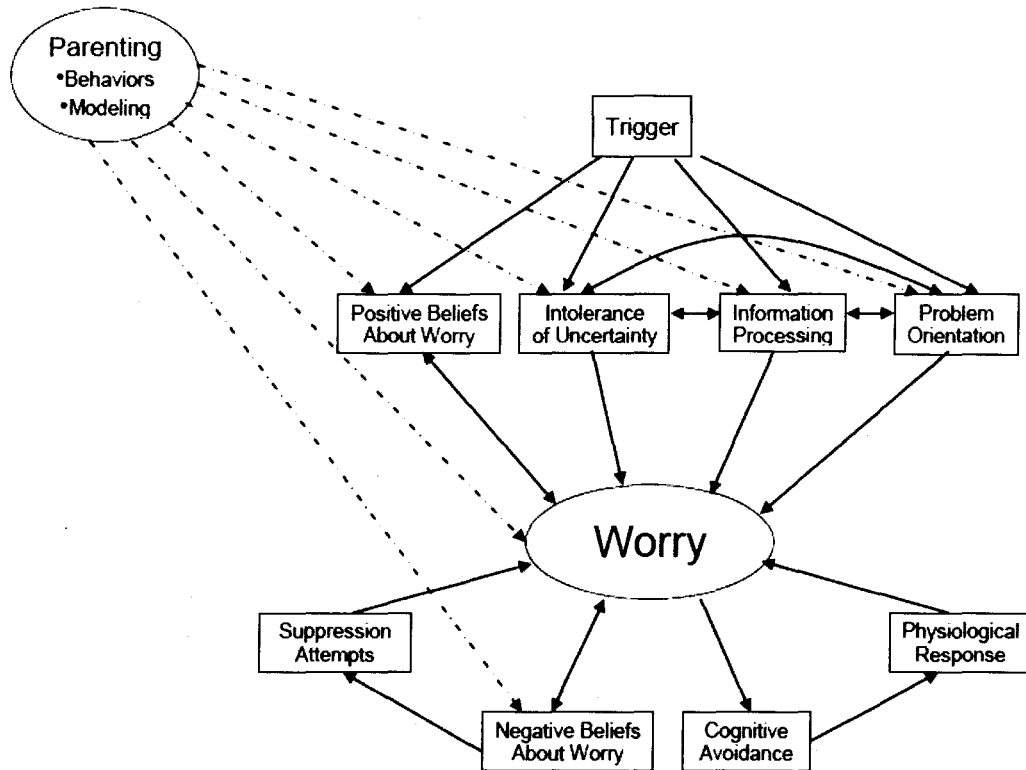
Figure 1. Hypothesized conceptual model of relevant process and maintenance variables in childhood worry.

The model also illustrates how worry is maintained by positive and negative beliefs and cognitive avoidance. First, worry reinforces positive beliefs about worry because of the perception that worry helps to avoid threat. Borkovec (1994) suggests that worriers believe worry (1) helps them to avoid potential danger by prompting a change in behavior, (2) preparing them to cope with potential future danger, and (3) reinforcing irrational beliefs that worry reduces the likelihood of danger. For instance, a person who thinks "I shouldn't drive after dark because I might get in an accident" is prompted to avoid driving after dark because she believes it is dangerous. This change in behavior is reinforced because the person believes that worry helped to avoid a potentially dangerous

situation. Beliefs about coping are reinforced because the worrier expects that, should a catastrophe occur, she will be more prepared than she would have if she hadn't worried beforehand. A worrier's superstitious belief that worrying prevents feared events is negatively reinforced by its non-occurrence. Secondly, negative beliefs about worry (including metaworry) maintain the process by increasing the likelihood of future worries. Beliefs that worry is dangerous or should be controlled will result in increased metacognitive awareness, prompting additional attempts to suppress or control worry. Paradoxically, such suppression attempts are likely to be associated with an increase in subsequent intrusive worries. Third, worry is maintained because it serves an avoidant function. Worry is conceptualized as a form of cognitive avoidance due to the primarily verbal nature of worry and reduction in fear provoking imagery (Borkovec & Lyonfields, 1993) as well as reduced processing of more emotional content (Borkovec & Inz, 1990; Borkovec & Roemer, 1995). This has been associated in turn with decreases in physiological responses, suggesting that worry results in avoidance of uncomfortable physiological symptoms as well (Borkovec & Hu, 1990).

Finally, the potentially causal influence of parenting on the process and maintenance of worry is hypothesized. Parents are expected to influence their children's beliefs about worry, both positive and negative. Further, it is predicted that parents will influence their children's approach to making sense of ambiguous information by impacting the child's problem orientation, intolerance of uncertainty, and information processing.

5.   Support for hypothesized model

Support for the hypothesized model is reviewed in three parts. First, support for

the model detailing the process and maintenance of worry in children will be reviewed.

Second, evidence for the direct association between parenting and worry will be

reviewed, followed by evidence for specific links between parenting and process and

maintenance variables.

5.1   Process and maintenance variables in childhood worry

Work detailing associations between cognitive variables and worry in children is

lacking. The largest body of work in this domain has linked child worry/GAD with biases

in information processing. Few studies have examined other potential cognitive variables,

such as intolerance of uncertainty, positive beliefs about worry, negative problem

orientation, and cognitive avoidance in adolescents or children. Work on the avoidant

function of worry in children is also lacking and children's physiological response to

worry is unknown. Although the literature is small, the few studies available will be

discussed here. In this section, work on information processing and GAD/worry will be

reviewed, followed by a discussion of the few studies of cognitive variables in

adolescents and children.

5.1.1.   Information processing,

Children with GAD display similar information processing styles to those found

in adults with GAD. These children tend to over estimate the likelihood of threatening

situations, show biased attention toward threat, and interpret ambiguity as threatening.

One study comparing children ages 9 to 18 years diagnosed with OAD, depression, and

nonclinical controls found that anxious participants reported that both future social and

physical threat were more likely to occur (Dalgleish et al., 1997). Interestingly, anxious children rated threats as more likely to happen to others than themselves. Higher threat interpretation in anxious children ages 8 to 17 years was also supported using a homograph task (Taghavi, Moradi, Neshat-Doost, Yule, & Dalgleish, 2000). When presented with homographs, children diagnosed with GAD were more likely to choose a threatening meaning compared to non-anxious controls. Another study examined both threat interpretation and estimates of likelihood of threat in a nonclinical sample of children (mean age= 10.71 years) (Suarez & Bell-Dolan, 2001). Children were categorized as high worriers or non-worriers and presented with threatening and ambiguous vignettes. Worried children provided higher threat ratings for both types of vignettes and rated future negative events as much more likely than non-worriers.

Childhood GAD has also been associated with attentional biases. When GAD, mixed anxious-depressed, and nonclinical children (ages 9 to 18 years) viewed threat and depression related stimuli, the GAD group showed bias toward threat-related, but not depression-related, material. (Taghavi,Neshat-Doost, Moradi, Yule, & Dalgleish, 1999). The mixed anxiety-depression group failed to show bias toward either material type. Taghavi et al. (2003) also found support for attentional bias in GAD children ages using the modified Stroop task (mean ages = 13.47 for the GAD group, mean age=14.50 for the control group). When participants were instructed to name the color of happy, neutral, threat or depression related words, GAD children showed significant interference, such that naming the color of the negative (combined threat-related and depression-related) words required more time than neutral words. This effect was not found for nonanxious children. A similar pattern of attentional bias was found when emotional face stimuli

were used as probes. Comparing children with GAD to nonanxious controls (ages 7 to 12 years) showed that only children with severe GAD, as measured by clinician severity ratings, displayed a bias toward both angry and happy faces (Waters, Mogg, Bradley, & Pine, 2008). Children with lower anxiety severity did not differ statistically from the control group, who showed no attentional bias. These results may be somewhat confounded, however, as more than half of the children in the GAD group also met criteria for social anxiety disorder.

Children with GAD also show higher threat interpretations of ambiguous situations. An initial sample of children ages 7 to 12 years was administered measures of GAD, separation anxiety, and social anxiety symptoms (Bögels, Snieder, & Kindt, 2003). Children who scored in the top and bottom 10% of each measure were then presented with nine ambiguous stories and asked to give interpretations and action plans. Results showed that anxious children described more negative interpretations compared to the control children. There was no difference, however, in coping plans. Further, children with GAD showed no specific dysfunctional interpretations compared to the other anxiety groups.

In an attempt to determine profiles associated with specific disorders Dalgleish et al. (2003) compared children with major depressive disorder, GAD, and post-traumatic stress disorder on multiple information processing variables, including memory, attention, and prospective cognition (mean child age for the groups ranged from 12.83 years to 15.58 years). Results showed that anxious children showed a bias toward threatening but not depression-related material, an effect driven by the GAD children, as the PTSD group showed no bias. GAD and PTSD groups did not differ in their estimation

of likelihood of threatening events, either for self or others. Anxious and depressed groups did not differ on the memory task.

5.1.2 Intolerance of Uncertainty

Work on intolerance of uncertainty has just recently begun with children, likely due to the fact that reliable and valid measures were not available. Comer et al. (2009) recently modified a measure of intolerance of uncertainty for use with children ages 7 to 17 years. Their results found support for the measure and its relation with worry, indicating that intolerance of uncertainty correlated positively with worry and showed adequate utility in distinguishing clinically anxious from community samples. There were no age or sex effects for the anxious sample, although interestingly intolerance of uncertainty decreased with child age in the community group. These initial findings suggest that intolerance of uncertainty may also be relevant for childhood worry, although much work is yet to be done in this area.

5.1.3 Beliefs About Worry

Studies of metacognition in children are just beginning to emerge. One group examining anxious and nonanxious children ages 8 to 13 years found that 30% of nonanxious children reported that their worry had some positive features compared to GAD/OAD children who reported no positive (Muris et al., 1998). Another study of adolescents aged 13 to 17 years found support for a five factor model of metacognition, including (1) positive beliefs, (2) uncontrollability and danger, (3) cognitive confidence, (4) superstition-punishment-responsibility, and (5) cognitive self-consciousness (Cartwright-Hatton et al., 2004). Each factor showed significant correlations with measures of anxiety, depression, and obsessions. Although no measure of worry was

included in the study design, results indicate that adolescents experience a range of metacognition similar to adults. Bacow et al. (Bacow, Pincus, Ehrenreich, & Brody, 2009) adapted a similar questionnaire for use with children ages 7 to 17 years. Results supported the hypothesized four factor structure including positive metaworry, negative metaworry, superstitious, punishment and responsibility beliefs, and cognitive monitoring. Each of the four subscales correlated positively with worry, even after controlling for worry content, and the cognitive monitoring subscale discriminated clinical from nonclinical children (with nonclinical children reporting higher levels of cognitive awareness). Child age and cognitive monitoring also correlated positively. Finally, a sex and age interaction was found, with adolescent girls scoring higher on the total score compared to adolescent boys. There were no sex differences for younger children.

In a recent review, Ellis and Hudson (2010) discuss the applicability of the metacognitive model of worry to child populations. Their review of the literature suggests partial support for the downward extension of metacognitive adult models to adolescents and children. They found that positive beliefs about worry were normal in children and adolescents with high and low levels of worry and mixed support for the association of worry and negative beliefs. The authors also found mixed results for the hypothesis that age is associated with changes in metacognitive development. The authors note that the use of different measures assessing worry and metacognition likely play a role in the contradictory findings to date.

5.1.4 Integrated Models

Integrated models, incorporating several the previously discussed cognitive variables, have tested the applicability of conceptual adult models to adolescent samples. One group examined associations of intolerance of uncertainty, positive beliefs about worry, negative problem orientation, and thought suppression in a sample of adolescents (Laugesen et al., 2003). Results showed that, after controlling for physical symptoms and gender, beliefs about worry, problem orientation, and intolerance of uncertainty significantly predicted worry scores. Thought suppression, however, did not contribute to the prediction. The study also used a discriminant analysis to predict membership of moderate or high worry groups, revealing that only intolerance of uncertainty and problem orientation contributed to the classification, while beliefs about worry and thought suppression did not. A later study by Gosselin and others (2007) examined associations between beliefs about worry, cognitive avoidance, and worry in a sample of high school students, ages 12 to 19 years. Participants were divided into high (>80th percentile) and moderate (40th-60th percentile) worry groups based on worry scores. After controlling for age and gender, high worriers endorsed stronger beliefs about worry, including that worry helps to solve problems and worry helps to avoid the worst. When predicting worry scores, the belief that worry helps to avoid the worst explained additional variance beyond age and gender, while the belief that worry helps to solve problems did not. Further, the high worry group reported using more avoidance strategies than the moderate worry group on all five avoidance domains, including avoidance of triggers, thought substitution, distraction, thought suppression, and transformation of images. The largest effect sizes were found for avoidance of triggers and thought

substitution. When predicting worry scores, all avoidance strategies expect "transformation of images" contributed to the regression equation.

5.1.5 Other process and maintenance variables

Two other studies have examined children's attempts to cope with their worry (Muris, Meesters, Merckelbach, Sermon, & Zwakhalen, 1998; Szabo & Lovibond, 2004). Both studies used an interview approach to gather information about children's worry. One study showed that children ages 8 to 13 years used distraction strategies (thinking about other things and engaging in some other activity) and seeking social support most frequently in their attempts to resists or control their worry (Muris et al., 1998). Children who met criteria for GAD/OAD attempted to distract themselves from their worries less frequently than nonclinical children (Muris et al., 1998). In another study, children ages 8 to 13 years reported using distraction most frequently to end their worry, followed by decision making (decided how to cope with stressor), and seeking social support (Szabo & Lovibond, 2004). Anxious and nonanxious groups did not differ in worry control strategies. Children in both clinic referred and non-referred groups reported that their worry consisted primarily of anticipation of future negative events (63% and 53% of worry, respectively). For the clinic referred group the second greatest percentage of worry consisted of rumination (17%) while the non-referred group reported problem solving (30%) (Szabó & Lovibond, 2004).

5.1.3 Discussion

Overall, work examining potential process and maintenance variables in childhood worry is lacking. Of all the potentially relevant variables, information processing has received the most attention. Generally, the data support the notion that

children with GAD process information differently from nonanxious children; however, additional evidence is needed to support the hypothesis that children process information differently from children with other anxiety disorders. In addition to information processing, there is a growing literature examining metacognition and intolerance of uncertainty in adolescents and children. Recent work (Cartwright-Hatton et al., 2004; Gosselin et al., 2007; Laugesen et al., 2003) in adolescent samples supports the importance of metacognition, beliefs about worry, problem orientation, intolerance of uncertainty and cognitive avoidance in worry. The recent validation of two measures, the MCQ-C (Bacow et al., 2009) and the IUSC (Comer et al., 2009), with children as young as age seven years provides new opportunities to study these variables in relation to worry. Preliminary findings suggest that intolerance of uncertainty and metacognition in children is similar to that in adults and is associated with anxiety and/or worry. Overall, however, these data are limited by a lack of comparison to other anxiety disorders as a control group. Whether these cognitive variables are unique to GAD and/or worry remains untested. Only one known study to date (Dalgleish et al., 2003) compared children diagnosed with GAD to children diagnosed with other anxiety diagnoses. It may be that cognitive processes function similarly across all anxiety disorders or across levels of worry severity; however, more work is needed before such conclusions are drawn.

5.2   Parenting and childhood worry

As previously discussed, several recent reviews have examined the links between parenting behaviors and childhood anxiety (Bögels & Brechman-Toussaint, 2006; McLeod et al., 2007; van der Bruggen et al., 2008; Wood et al., 2003). Particularly

relevant to the current discussion are several studies that have attempted to isolate specific parenting behaviors associated child GAD or worry.

5.2.1 Perceived parenting and self-report worry

Consistent with findings that parenting is associated childhood anxiety generally, studies of perceived parenting also show relations with worry specifically. Most work has used the EMBU-C (Egna Minnen Betraffende Uppfostran, My memories of upbringing: Perris, 1980), a retrospective self-report measure of perceived parenting, to measure parental behavior. One study of a community sample of children 9 to 13 years found that self-report worry scores correlated positively with both maternal and paternal anxious rearing and rejection, and maternal rejection (Muris, Meesters, Merckelbach, & Hülsenbeck, 2000). Another study using the same measure with an older sample of children ages 13 to 16 years found significant positive correlations between worry and anxious rearing and overprotection of both parents for girls, but only overprotection of both parents for boys (Muris, Merckelbach, Meesters, & van den Brand, 2002). Findings of these two studies were partially replicated with a clinic referred anxious sample of children ages 7 to 18 years (8 with a diagnosis of GAD), with significant positive correlations between parental rejection and worry, but not anxious rearing, overprotection, or warmth (Brown & Whiteside, 2008). Analysis of associations between parenting factors and worry for the GAD sample alone were not conducted.

5.2.2 Perceived parenting and self-report GAD symptoms

Parenting has also been linked with measures of GAD clinical symptoms in children. Results from a self-report study of primary school children ages 8 to 12 years showed that parental anxious rearing, mother's control, and father's emotional warmth

each correlated with GAD symptoms (Muris & Merckelback, 1998). Interestingly, this same pattern of results was also found for separation anxiety symptoms, but not for other anxiety disorders. Another study of nonclinical adolescents ages 12 to 19 years (Hale, Engels, & Meeus, 2006) found significant correlations between perceived parental alienation, rejection, and control with GAD symptoms, although only alienation and rejection made unique contributions to symptom prediction. A follow-up multi-group structural equation model of the relative contributions of parental alienation and rejection to GAD symptoms showed differences based on child gender and age (younger and older). Analyses showed that perceived parental alienation was significantly related to GAD in all four groups whereas rejection was related to all groups except the older male sample.

5.2.3   Self-report attachment and worry

Others studies have used measures of attachment to examine relations between parenting and worry. Two studies have shown that insecure attachment is associated with higher levels of worry in children ages 7 to 18 years (Brown & Whiteside, 2008) and 9 to 13 years (Muris et al., 2000), with no differences between ambivalent and avoidant attachment styles. A stepwise regression examining contributions of parenting and attachment status found that only parental rejection and insecure attachment explained significant variance in worry scores (Brown & Whiteside, 2008). A study with undergraduate students found that those who met criteria for GAD based on self-report questionnaires indicated less secure attachment than their normal counterparts (Eng & Heimberg, 2006). Cassidy and colleagues (1994) conducted two studies to further examine differences in attachment associated with GAD. In the first study a sample of

undergraduate students who met criteria for GAD using a self-report form reported higher

levels of rejection and role reversal/enmeshment (defined as the need to protect and fear

of losing a primary care giver) compared to those who reported no symptoms of GAD.

Students who reported GAD symptoms were also more likely to describe feelings of

anger and vulnerability toward their mother. In a second study, these researchers

examined clinically diagnosed adult GAD subjects and non anxious controls. Results

partially supported the previous study, with GAD subjects reporting more role reversal

and enmeshment, as well as feelings of anger and vulnerability toward their mothers

(Cassidy et al., 1994).

5.2.4   Discussion

Results from the previously reviewed work suggest an association between

parenting and worry/GAD in children, although methods and measures have been

inconsistent. One limitation of the literature is the reliance on self-report. No study to

date has used parent report or direct observation of parenting to examine relations with

child worry. Because children in these samples report high levels of worry or symptoms

of GAD, perceptions of their parents may be skewed by anxious cognitions or

interpretive biases. A lack of other clinical comparison groups also limits these findings.

Without comparison groups of children with depression or other anxiety disorders,

conclusions cannot be made about the uniqueness of the association between these

parenting behaviors and worry. The cross-sectional designs of these studies also limit the

directionality of our conclusions. It appears that parenting is related to worry and

symptoms of GAD, but precisely how the two are related remains speculative. Although

it is tempting to suggest that role reversal or enmeshed parent-child relationships cause

children to worry, the current data do not support this hypothesis. An alternative

hypothesis could be that worried children elicit certain types of parenting behaviors from

their caregivers. Future longitudinal work could address these methodological concerns.

5.3   Relations between parenting and worry related variables

Although associations between parenting and childhood anxiety are generally

well supported, links between parenting and specific worry related cognitive variables

have not been well studied. The next section examines potential parental influences on

children's cognition, specifically those cognitive variables hypothesized to relate to

childhood anxiety and/or worry. The association between parenting and child information

processing has received the most attention, although there are several studies examining

associations between parenting and child beliefs about worry and intolerance of

uncertainty.

5.3.1   Parent influence on information processing

The impact of parenting on information processing in children in the context of

GAD or worry has received limited attention. However, there is a small literature

demonstrating significant relations between parent and child information processing in

children with anxiety disorders broadly. Generally, these studies suggest that children's

interpretations of situations are associated with their parent's interpretation, although the

mechanisms for this are unclear. No studies to date have examined worry or GAD

specifically, and so work with children with anxiety disorders broadly will be reviewed.

Several studies have supported the hypothesis that parents influence children's

threat interpretations. A common method for testing this association examines parental

and child responses to ambiguous situations. One study compared anxious and

nonanxious mothers and their children, ages 7 to 15 years, on their responses to ambiguous situations (Cresswell, Schniering, & Rapee, 2005). Results showed that mothers of anxious children had higher threat interpretation scores and mother's threat interpretation scores correlated positively with their child's. Another study extended this work by including a clinical control group. Researchers compared interpretations of mothers and children, ages 7 to 12 years, with an anxiety disorder, externalizing disorder, and healthy controls (Gifford, Reynolds, Bell, & Wilson, 2008). Participants were presented with homographs and homophones and prompted to interpret the stimuli. Results showed that anxious children made more threatening interpretations than nonclinical children but not externalizing children. Mothers of anxious children did not make more threatening interpretations than other mothers, and contrary to Cresswell et al.'s (2005) findings, mother and child interpretations were not correlated. However, mother's interpretation bias was associated with child's anxiety and child's interpretation was associated with mother's anxiety. Although results did not support a direct association between mother and child threat interpretations, the correlation between maternal anxiety and child threat interpretation suggests an influence that warrants additional attention.

Other work has looked more explicitly at the mechanism by which parents influence their children. These studies have primarily used a procedure in which children are first asked to interpret ambiguous situations alone, followed by a family discussion task, to examine parental influences on children's responses. Barrett, Rapee, Dadds, and Ryan (1996) examined mothers and children, ages 7 to 14 years, who were diagnosed with an anxiety disorder, oppositional defiant disorder, or no disorder. Anxious and oppositional children were more likely than nonclinical children to interpret ambiguous

scenarios as threatening and anxious children were more likely than both comparison groups to choose avoidant coping plans. When parents were asked to predict their child's response, parents of anxious children responded similarly to their anxious children, making a higher number of threat interpretations and predicting avoidant responses by their children. After a discussion with their parents, anxious children increased their avoidant responses, while nonclinical children decreased avoidance responses. These data suggest that parents play a role in their children's responses by reinforcing threatening interpretations and modeling avoidant behavior by providing reassurance and sheltering their children from potentially anxiety provoking situations. The authors called this the Family Enhancement of Avoidant Responses effect, or the FEAR effect. Similar work by Chorpita, Albano, and Barlow (1996) hypothesized that parental verbalization contributes to the development of threat interpretations in children. They suggest that parental discussion of threat or danger primes children for future threat interpretation. Four anxious families and eight non-clinical families, with children ages 9 to 13 years, were presented with four ambiguous situations. Children first responded individually and then discussed the scenarios with their parents. Results showed that anxious expression by parents was related to changes in the child's interpretations and plans, although only the correlation for fathers was significant. The small sample size of this study and low power limit its generalizability, although the preliminary results are compelling.

These results have not been replicated consistently, however. Other studies have failed to demonstrate this effect (Logsdon-Conradsen, 1998, as cited in Shortt et al., 2001; Shortt et al., 2001). Results from one study with children ages 6 to 14 years suggest that the demands of the task, specifically whether or not the discussion would determine

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treatment eligibility for the child, influenced the FEAR effect (Shortt et al.., 2001). Their results indicated that families in the treatment irrelevant group were more likely to change to avoidant plans after a family discussion. Results also showed that maternal distress was associated with the FEAR effect.

Other work has examined the impact of parents on children's interpretations of ambiguity in terms of emotional reasoning and social referencing. Emotional reasoning is defined as drawing conclusions about the environment based on emotional states (e. g., "I'm anxious so there must be something to be fearful of") and social referencing refers to forming judgments about a stimulus based on the perceived reactions of others. (Morren, Muris, &Kindt, 2004). Children, ages 7 to 13 years, were first administered a self-report spider phobia questionnaire as a measure of anxiety and then read four stories describing situations of social, separation, generalized, or parent anxiety. Each story had four versions including objective/subjective danger information and positive/anxiety response information, so that each combination of danger and response information was presented. Results showed that children's interpretations of danger relied on both objective information as well as anxiety related signals from parents. Children rated the parent anxiety story containing parental anxiety response information (e.g., "It frightens your mum and her legs start to tremble" p. 8) as more dangerous than the parent anxiety story with positive response information (e.g., "Your mum looks happy and she smiles and waves to her friend in the car" p. 8). Interestingly, child anxiety was not a significant predictor of child response to the parent anxiety story. Also of note was a significant anxiety by age interaction for the parent anxiety story. In children with high trait anxiety, the parent-based reasoning effect decreased, while this effect increased in children with

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low trait anxiety. Although replication of this research is needed, this methodology contributes to the growing body of literature on parental influences on children's cognitive biases.

Other work has used the Stroop task to examine associations between parenting and child information processing. Moradi et al. (1999) examined the processing of threat related and neutral words in children of parents with posttraumatic stress disorder and control parents. Children were not diagnosed with any psychiatric disorder and groups did not differ in anxiety level. Children, ages 9 to 17 years, were presented with words of happy, neutral, depression-related, threat-related, and trauma-related content. A significant interaction of word type and group indicated that children of parents with PTSD were slower to name threat-related words compared to neutral words. In contrast, children of normal controls were faster to name depression-related words compared to neutral words.

5.3.2 Parent influence on beliefs

A number of theoretical models hypothesize that the behavior of anxious parents promotes the development of dysfunctional cognitions in their children, increasing their risk for anxiety disorders (Chorpita & Barlow, 1998; Vasey & Dadds, 2001). However, few empirical studies have examined these hypotheses. In terms of the proposed model, the influence of parenting on children's metacognition about worry is of particular interest. Only one study to date (Gallagher & Cartwright-Hatton, 2008) has examined the influence of parental behaviors on children's beliefs about anxiety. A community sample of adolescents, aged 16 to 18 years, completed measures of perceived parenting, anxiety, cognitive errors, metacognition about worry, and thought control. Results showed

correlations between metacognition and overreactive parenting, defined as punitive, harsh, or inconsistent discipline. Overreactive parenting also predicted trait anxiety, and metacognition partially mediated the association. Finally, children of overreactive parents reported more dysfunctional positive and negative beliefs about worry. Although not specific to clinical worry, a recent study of parents and children (mean age of 16 years) with Obsessive-Compulsive Disorder suggests that parents have some influence on their children's metabeliefs (Jacobi, Calamari, & Woodard, 2006). Cognitive models of OCD share some similarities with models of GAD in that thoughts are monitored, evaluated, and followed with suppression or control attempts. In a study of parental influences on child metabeliefs, adolescents and their parents completed self-report measures of anxiety, obsessional beliefs, and cognitive self-consciousness. Results showed small but significant correlations between parent and child report on subscales of the obsessional beliefs, including over-responsibility, threat estimation, and thought importance/control of thoughts. However, it should be noted that most parent and child variables showed no relation.

5.3.3 Parent influence on intolerance of uncertainty

The role of parenting in children's intolerance of uncertainty has yet to be fully explored. Only one known study has examined the influence of parenting on children's ability to cope with uncertainty. Zlomke and Young (2009) tested a meditational model proposing that children's intolerance of uncertainty mediates the relation between perceived parenting style and anxiety, depression, and worry. Results from a community sample of older adolescents and young adults (ages 18 to 23 years) showed that intolerance of uncertainty mediated the association of perceived anxious rearing with

worry and anxiety, but not depression. Although promising, this work is limited by its self-report nature. Future work with younger adolescents and school aged children, in addition to observational or other report measures of parenting, will be necessary to determine if these effects can be replicated and if they generalize to younger samples.

5.3.4 Discussion

Children rely on their parents for information about the world, which shapes their behavioral and cognitive approaches to internal and external stimuli. When parents display anxiety in response to a situation, children likely learn that there is something to fear. Parenting has also been hypothesized to influence child cognitions and metacognition. The previous section provides support for the idea that parenting is associated with worry in children, although how the two are linked remains unclear. There is some support for the association between parenting/parental beliefs and children's metacognition and intolerance of uncertainty, however, replication of these results is needed, as well as studies including younger children and clinical populations. Associations between parenting and worry related cognitive variables, such as problem orientation and cognitive avoidance, have yet to be examined. Given the importance of these variables to adult models of worry, this represents an area of potential growth for the future. The first step is to establish if such cognitive variables are in fact important in understanding worry in children. If this is indeed the case, work should then move forward to identify how parental factors influence these variables. Understanding how parents reinforce or model thoughts and behaviors, both positive and negative, could also inform the model and potentially provide targets for intervention. Future work should also consider the impact of parent and child sex when examining the influence of

parenting. At least two studies have reported that the relations between perceived parenting and worry depends on the sex of the parent or the child (Muris, Meesters, Merckelbach, & Hülsenbeck, 2000; Muris, Merckelbach, Meesters, & van den Brand, 2002). Continuing to investigate how mother's and father's influences differ from one another and how each parent impacts sons and daughters differently will be important.

6.   The current study

This review has summarized literature outlining theoretical models of clinical worry in adults and the role of parenting in childhood anxiety generally. These literatures were integrated and a conceptual model specific to the process and maintenance of clinical worry in children proposed. Literature supporting the hypothesized model was then reviewed. Although there is preliminary support for some relations proposed in the model, many remain speculative and rely, in the absence of information about childhood worry, on the adult worry literature.

The next step is to begin a systematic testing of the hypothesized associations while also examining the role of cognitive development and the potential effects of child sex. At each step of model testing, the relations between variables should account for the potential impact of the child's cognitive development. Ideally this would be done using a longitudinal design, although testing the applicability of the model using a cross-sectional design would be a more feasible first step toward justifying the increased costs associated with a long term longitudinal study. It will be especially important to test this model with children around the ages of 7 and 8 as it is most likely that the cognitive abilities emerging at this developmental stage allow for generalized worry (Vasey, 1994).

As the proposed theoretical model is large, it seems logical to distinguish three separate parts of the model, each building upon the previous. At the heart of the model are the process variables associated with child worry, hypothesized to be most closely involved in childhood worry based on work with adults and adolescents. Specifically, this includes testing associations between worry and the cognitive variables of beliefs about worry, intolerance of uncertainty, information processing factors, and problem orientation. Having established a central model, the role of maintaining factors, including negative beliefs about worry, suppression attempts, cognitive avoidance, and autonomic inflexibility can then be considered. Finally, the influence of specific parenting behaviors, parental modeling, and impact of parent sex on process and maintenance factors can be considered.

This study represents the first step in this model testing process and will examine relations between four cognitve variables and worry, while also examining effects related to cognitive development and sex (see Figure 2). Four cognitive variables of intolerance of uncertainty, beliefs about worry, negative problem orientation, and threat interpretation were included in this study, as well as two self-report measures of worry and two measures of cognitive development in addition to child age. Using two measures of worry allows for the replication of results and decreases the likelihood that effects may be specific to particular measures.
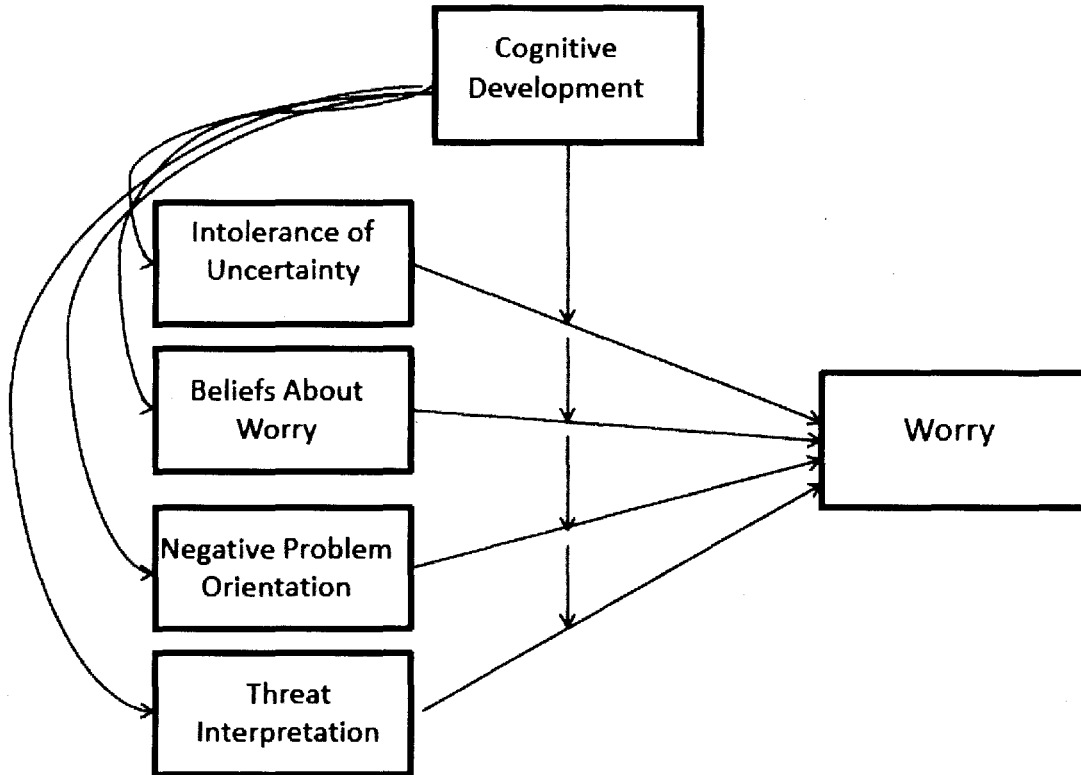
Figure 2. Hypothesized relations between cognitive variables, worry, and cognitive development.

Several related hypotheses will be tested. First, general measures of association between variables will be examined. It is hypothesized that cognitive development will correlate positively with cognitive variables and with worry and that cognitive variables will correlate positively with measures of worry. Next, the effect of cognitive development on the three cognitive variables will be examined. Specifically, it is hypothesized that cognitive development will predict scores on measures of beliefs about worry, intolerance of uncertainty, threat interpretation, and negative problem orientation, and that cognitive development will moderate this association. Relations between cognitive variables and worry will then be examined. Specifically, it is hypothesized that beliefs about worry, intolerance of uncertainty, threat interpretation, and negative

problem orientation will predict child worry and that cognitive development measures will moderate the association, such that the strength of the predictor variables increases with advanced development. To examine the effect of child sex, male and female children will be compared on the cognitive measures and measures of worry. It is expected that female children will report higher scores than male children on measures of beliefs about worry, intolerance of uncertainty, threat interpretation, negative problem orientation, and worry. Finally, it is hypothesized that the cognitive variables of beliefs about worry, intolerance of uncertainty, threat interpretation, and negative problem orientation will distinguish clinical from nonclinical levels of worry.

METHOD

Recruitment

This study was reviewed and approved by the University of Louisville's Internal Review Board (Approval #09.0612). Participants were recruited in two ways. First, local elementary schools were invited to participate. Three Catholic and one public school agreed to send home study materials with children in grades two through five. Participants were also recruited through flyers placed throughout the community. Efforts were made to include equal proportions of male and female children and children across the age range. Recruitment attempts were also directed toward including ethnic minority groups proportional to the ethnic composition of the Louisville metro area.

The required sample size was calculated a priori using G* Power 3.1, (Faul, Erdfelder, Lang, & Buchner, 2007). To detect a large effect size (.40) with a power of .80, a sample size of 34 is necessary for a correlation analysis. In order to detect a large effect size (.35) with power of .80 in a regression model with a total of 10 predictors, a sample of 54 is required. To detect a large effect size (.80) with power of .80 with a t-test, a sample of 46 is necessary. Thus, a total of 54 children were required for this study.

Procedure

Study participation included completing self-report forms at home and a short telephone interview with the researcher or a research assistant at a date and time selected by the participant and his or her parent(s). Children recruited through schools were sent

home with an informational letter, parental consent and child assent forms, and study self-report forms. Parents also received a form explaining the purpose and content of the telephone interview. Children completed self-report forms at home and returned completed packets to their classroom. Children were required to return both parental consent and child assent along with their completed packets to be included in the sample. Packets were collected from the classroom two weeks following the distribution date.

A total of 661 packets were sent home and 74 returned, for a response rate of approximately 11.2%. Children recruited through flyers (n=6) were screened briefly and packets delivered to their home and picked up by researchers. Telephone interviews took place several days to one month following the time of measure completion, based on dates selected by participants and availability during selected times. Interviews lasted approximately 15 minutes. All participating children were entered into a drawing for 1 of 4 $25 gift cards to Borders bookstore for their participation.

Participants

Participants were 80 children between the ages of 8 and 12 years. Seventy-one percent of the sample was female (n = 57). The average age was 9.6 years (SD = 1.10). More than half of the children were 9 or 10 years old (8-year-olds n=12, 9-year-olds n=21, 10-year-olds n=22, 11-year-olds n=12, and 12-year-olds n=3, and 10 children did not indicate age). Ethnic composition of the sample was primarily European American (74%), 6% Hispanic/Latino, 3% Asian, 4% Other, and 1% African American, and 12% declined to answer.

A total of 80 participants returned completed self-report measures. Twenty-four participants had missing interview data due to missing contact information (n=8) or were

unavailable when contact attempts were made (n=16). For those who were not available

at initial contact, several phone calls were made at various times of day over a three week

period. After leaving three voice messages, no further attempts were made to contact

children.

Measures

Please see Appendix A for copies of all measures.

Children's Opinions of Everyday Life Events (COELE; Suarez & Bell-Dolan,

2001). The COELE is an interview developed to measure children's interpretations of

ambiguous situations. Six ambiguous and six threatening vignettes are described, based

on previous work identifying areas of concern for children. Following the vignettes,

children are first asked what they think happened in each situation and responses are

coded as threat (1) or non-threat (0). Children then use a 5-point Likert type scale (1 = not

at all, 5 = extremely) to rate how worried, sad, and angry they would feel if this happened

to them, how threatening they find the situation, and how likely they think it is to occur.

The measure yields total scores for spontaneous threat interpretation, worry, sadness, and

anger ratings, threat rating, and likelihood rating. Test-retest reliability estimates for the

measure range from .52 (threat ratings for the ambiguous situations) to .77 (for the

likelihood ratings), and internal consistency scores range for .80 to .86. In the current

study, children were administered the COELE over the telephone in a session lasting

approximately 15 minutes. In order to reduce administration time, three ambiguous and

three threatening vignettes were chosen (each reflecting a family, social, and school

theme) and children did not rate anger. Children's spontaneous threat ratings for both

ambiguous and threatening vignettes were calculated separately and summed for a total

threat interpretation score. The six interpretations were coded by a second rater, a doctoral student in clinical psychology, for half of the participants. Inter-rater agreement was very good, kappa=.86.

Penn State Worry Questionnaire-Child Version (PSWQ-C; Chorpita et al., 1997). The PSWQ-C is a 14 item measure designed to assess worry in children ages 6 to 18 years. Children rate each item on a scale from 0 (never true) to 3 (always true), with higher scores indicating greater worry severity. Exploratory factor analysis revealed a one-factor solution for the measure. The measure has adequate psychometric properties, including good internal consistency, discriminant validity, and convergent validity with the worry/oversensitivity scale of the Revised Children's Manifest Anxiety Scale (Chorpita et al., 1997). The measure also showed test-retest reliability of .92 (Chorpita et al., 1997).

Revised Child's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978). The RCMAS is a 37 item self report measure designed to measure several components of anxiety in children and adolescents. Items are readable at a third grade level and the measure has been shown to be reliable and valid for children in grades 1 to 12. Children indicate a yes/no response to each item. The RCMAS has three factors, including physiological anxiety, worry/oversensitivity, and social concerns. For this study only worry/oversensitivity scores were used in order to provide an additional measure of worry. Reliability and validity estimates have been shown to be good to excellent (Gerard & Reynolds, 2004) and internal consistency is good (Reynolds & Paget, 1983).For this study, raw subscale scores were converted to age adjusted T-scores, based on published norms (Reynolds & Paget, 1983).

The Metacognitions Questionnaire for Children (MCQ; Bacow et al., 2009).

The MCQ is a 24 item self-report questionnaire for children ages 7 to 17 years, adapted

from the Metacognitions Questionnaire for Adolescents (Cartwright-Hatton, Mather,

Illingworth, Harrington, & Wells, 2004). The measure is comprised of four factors,

including positive metaworry, negative metaworry,

superstition/punishment/responsibility beliefs, and cognitive monitoring. Children

indicate their agreement to the items using a 4-point scale (1 = do not agree, 2 = agree

slightly, 3 = agree moderately, 4 = agree very much). The MCQ-C has a Flesch-Kincaid

reading grade level of 2.0, indicating that the measure is appropriate for children reading

at a second grade level. Initial evaluations indicate good internal consistency (alpha = .87

for nonclinical and alpha = .89 for clinical samples), concurrent validity with measures of

worry (subscales range from r = .21 to .48), and criterion validity, with the clinical

sample scoring significantly higher than the nonclinical sample (Bacow et al., 2009).

Intolerance of Uncertainty Scale for Children (IUSC; Comer, Roy, Furr,

Gotimer, Beidas, Dugas, & Kendall, 2009). The IUSC is a 27 item self-report measure

for children 7 to 17 years of age. The child measure is based on the Intolerance of

Uncertainty Scale for adults (Buhr & Dugas, 2002; Freeston et al., 1994) and assesses

children's tendency toward negative reactions to uncertain situations and events. Children

are asked to indicate their agreement with the items using a 5-point scale (1 = not at all, 3

= somewhat, and 5 = very much). A preliminary study suggests that the measure has

strong psychometric properties, including internal consistency (alpha = .92) and

convergent validity (correlations with anxiety and worry, r = .71 and r = .75,

respectively).

Social Problem Solving Inventory-Revised-Child Adaptation (SPSI;D'Zurilla & Nezu, 1990). The SPSI-R is a 52 item self report measure assessing approaches to solving problems in adults. The measure consists of five factors, including positive problem orientation, negative problem orientation, rational problem solving, impulsivity/carelessness style, and avoidance style. Currently, no measures of problem orientation are available for use with children. For the current study, the Negative Orientation (10 items) subscale was adapted for children ages 7 to 12 years. Items were reworded to be appropriate at a third grade reading level (as measured by the Flesch-Kincaid reading level), while maintaining meaning. Preliminary item changes were reviewed and modified with three doctoral students in clinical psychology and the lab director of the Healthy Parents-Healthy Kids Research lab.

Cognitive Development. Three variables were used to estimate cognitive development. Child age was used as the primary measure, along with two cognitive abilities hypothesized to relate specifically with the ability to worry, including awareness of thoughts and the ability to generate multiple possible outcomes.

Child age. Child age has frequently been used by other researchers to study cognitive development in relation to the ability to understand or perform certain tasks (Flavell, Green, & Flavell, 1993; 1995; 1998; 2000; 2004). Child age has also been used to examine trends in worry content and prevalence (Muris, Merckelbach, Gadet, & Moulaert, 2000; Vasey, Crnic, & Carter, 1994).

Awareness of thoughts. The ability to recognize internal streams of thought is inherent in the current definition of worry, and therefore it is expected to have some relation with worry. Indeed, Bacow et al. (2009) showed that cognitive monitoring

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increased with child age, suggesting that this is a cognitive ability that increases with age. For this study, awareness of internal thoughts was assessed using the cognitive monitoring subscale of the MCQC.

Interpretation total. Vasey (1993) suggests that children's ability to generate and reason about possible outcomes may influence their ability to worry. To measure this ability, an additional question was asked following the COELE interview, modified from the catastrophizing interview used previously with children by Vaesy et al. (1994). In Vasey et al.'s approach, children were presented with vignettes of worried children and asked to elaborate on the worries by responding to prompts of "Why would that bother him/her?" or "Why would that be bad?" Because catastrophizing interviews in the first person have been associated with considerable anxiety in adults (Vasey & Borkovec, 1992), the approach was modified to reduce the possibility that children would experience distress during the telephone interview. In this study, children were again read the first vignette from the COELE and instructed to generate as many possible explanations for the situation as they could. Children were prompted with "Try to think of another explanation" until they could no longer generate any additional responses. This generated two measures, including a total interpretations variable consisting of the sum of all responses, and a threat total consisting of the sum of the threatening responses only.

RESULTS

Preliminary Examination of Measures

The final sample included 56 children with complete data. An additional 14 children had self-report data but no interview data (n=70), and an additional 10 participants had self-report data but did not provide demographic or contact information for the interview (n=80). To increase power, efforts were made to include as much data as possible for each analysis.

Of the 80 completed self-report packets, there were 28 missing items (of a total of 80 participants x 98 items per packet = 7840 items), or less than 1% of the total items. No participant had more than one missing data point. Missing items were replaced with the series mean.

Descriptive statistics. Each measure will be briefly discussed in terms of published norms. Means and standard deviations are presented in Table 1.

Table 1.
Descriptive Statistics of Study Variables.

Worry Measures	Sample Mean	Clinical	Nonclinical
PSWQ-C (shortened)	13.54 (6.59)	.	7.1 (5.8)
PSWQ-C (standard)	19.55 (7.63)	23.84 (9.3)	11.79 (5.9)
Worry/Oversensitivity T*	56.90 (4.73)	54.9 (1.9)	.
Worry/Oversensitivity Raw	5.98(3.05)	.	4.04 (2.84)
Cognitive Measures			
IUSC-C	66.49 (20.69)	64.97 (21.7)	52.81 (18.)
Problem-Negative	16.91 (1.21)	.	.
MCQ-Positive	8.83 (3.07)	8.91 (3.96)	10.15 (2.91)
MCQ-Negative	13.63 (4.64)	13.55 (4.27)	12.50 (4.11)
Cognitive Development			
MCQ-CSC	14.99 (4.48)	14.53 (4.32)	16.45 (4.02)
All Possible Interpretations^	5.44 (4.12)	.	.

Note. Worry/oversensitivity n=70; ^All Possible Interpretations n=56; . data not available

Overall, the sample reported higher than expected levels of worry, intolerance of

uncertainty, and metacognition. The average adjusted Penn State Worry Questionnaire-

Child score for this sample was much higher than that of another community sample

(Muris et al., 2001), and falls in the 86th percentile based on community norms (Muris et

al., 2001). Standard Penn State Worry Questionnaire-Child scores were also elevated

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compared to previous published norms for community samples (Comer et al., 2009). Scores on the worry/oversensitivity subscale also suggest that the sample is highly worried. The average T score for the current sample was comparable to that of a sample of children with anxiety disorders (Mattison, Bagnato, & Brubaker, 1988). Further, 41% of the sample scored above 60, a cut score considered "pathological" and used to discriminate clinical from nonclinical children (Mattison, Bagnato, & Brubaker, 1988).

The sample also strongly endorsed intolerance of uncertainty and metacognitive variables. This group reported higher than expected levels of intolerance of uncertainty compared to a community sample mean reported in the IUSC validation study and was again closer to that of a sample of children with anxiety disorders than those from a community sample (Comer et al., 2009). Scores on measures of beliefs about worry were also high, and compared to the means reported in the MCQ-C validation study, the current sample scores more closely resembles scores from children with anxiety disorders than those from a community sample (Bacow et al., 2009).

Preliminary psychometrics of the negative problem orientation scale of the Social Problem Solving Inventory-Child adapted measure were examined by assessing internal consistency and convergent validity. Chronbach's coefficient alpha of .86 suggested adequate internal consistency and item-total correlations, using Pearson product-moment correlation, ranged from .27 to .82. Only one item failed to correlate at an acceptable level (Item 22, "When I can't fix a problem on my first try, I get sad and give up" $r = .27$, $p = .02$, based on criteria used by Chorpita et al., 1997 for adapting the Penn State Worry Questionnaire for children), but the correlation was significant so the item was included. These statistics were also examined for younger (8-9) and older (10-12) children

separately. Results mirrored those when groups were combined. The measure showed

adequate internal consistency for both groups, with alpha = .77 for younger children and

alpha = .90 for older children. Item 1 failed to correlate significantly with the total score

for the younger group, but all other items correlated significantly, ranging from .49 to

.74. In the older group Item 22 failed to correlate significantly with the total score.

Correlations for other items ranged from .60 to .89. The measure appeared to have strong

convergent validity, as evidenced by expected associations with other related variables.

Negative problem orientation correlated positively with the Penn State Worry

Questionnaire-Child, $r = .52$, $p<.001$, worry/oversensitivity, $r = .54$, $p<.001$, and

intolerance of uncertainty, $r = .76$, $p<.001$.

Preliminary psychometrics of the shortened COELE were also examined. Means,

standard deviations, and alphas are presented in Table 2. Spontaneous threat

interpretation scores were calculated for the ambiguous and threatening situations

separately by summing responses across each of the three stories (totals ranged from 0 to

3). Mean worry, sad, threat, and likelihood ratings were also calculated by averaging

across the three stories of each type. Total possible interpretation score is also presented.

Generally, internal consistency measures failed to meet acceptable standards (> .70,

Nunnally, 1978). When scores were collapsed across threat and ambiguous scenarios,

internal consistency improved somewhat, so that threat rating achieved an acceptable

level. Threat interpretation and worry rating still failed to meet standards of acceptability.

Due to these problems, worry and threat interpretation total score were not used in any

subsequent analyses. In place of threat interpretation total, average threat rating across

ambiguous and threat scenarios was used as a measure of threat interpretation for future

analyses. Validity was assessed by examining correlations with worry measures. See

Table 3. Threat interpretation did not correlate with either measure of worry, contrary to

results from Saurez and Bell-Dolan (2001). Worry, threat, and likelihood ratings

correlated positively with both measures of worry.

Table 2.

Descriptive Statistics for COELE Variables.

	Total Sample	Females n = 43	Males n = 13	
	Mean (SD)	Mean (SD)	Mean (SD)	Alphas
Threat Interpretation				.49
Ambiguous Scenario	1.64 (.97)	1.72 (.88)	1.38 (.77)	.32
Threat Scenario	2.75 (.51)	2.72 (.55)	2.85 (.38)	.21
Average Threat Rating				.75
Ambiguous Scenario	2.90 (.76)	2.96 (.79)	2.72 (.80)	.44
Threat Scenario	3.07 (.92)	3.08 (.88)	3.03 (1.06)	.72
Average Worry Rating				.69
Ambiguous Scenario	3.17 (.76)	3.18 (.79)	3.12 (.70)	.46
Threat Scenario	3.42 (.78)	3.46 (.76)	3.31 (.88)	.62
Average Likelihood Rating				.70
Ambiguous Scenario	2.41 (.70)	2.43 (.76)	2.33 (.49)	.36
Threat Scenario	2.29 (.80)	2.34 (.82)	2.13 (.73)	.62
All Possible Interpretations	5.44 (4.12)	6.00 (4.52)	3.62 (1.19)	

Table 3.

Correlations between COELE Variables and Worry Scores.

	PSWQ-C	Worry/oversensitivity
Threat Interpretation	.01	.05
Avg Threat Rating	.41**	.35**
Avg Worry Rating	.39**	.53**
Avg Likelihood Rating	.30*	.47**
All Possible Interpretations	-.11	-.12

*$p<.05$, **$p<.01$

Examination of Model Assumptions

Normality of the variables was assessed by a visual inspection of a histogram as well as examination of skewness and kurtosis z scores, where scores greater than 2.58 are significant at the $p <.01$ level, the suggested cut point for small samples sizes (Field, 2005). Positive beliefs about worry showed significant positive skew based on the histogram, and z score values for positive beliefs about worry and all possible interpretations indicated significant skewness and/or kurtosis, so log transformations were conducted. These transformations improved the distribution of both variables to roughly normal. Transformed variables were used in future analyses.

Sample Characteristics

Because not all children had complete data sets, differences between the three groups (complete, missing interviews, and missing interviews and demographics) were examined. ANOVAs for Penn State Worry Questionnaire-Child and worry/oversensitivity scores were nonsignificant, suggesting that data are missing at

random and that failure to complete the interview or provide demographic data was not related to worry severity.

Demographic and study variables were also examined across recruitment site to examine possible sampling differences (schools and flyer). There was a significant difference in child age, $F(4, 65) = 3.27, p = .02$, partial $\eta^2 = .17$, power = .81, and Levene's test was significant, $F(4, 65) = 2.79, p = .03$, so Dunnett's T3 was used for pairwise comparisons. Pairwise comparisons showed that children from one of the Catholic schools ($M = 9.13, SD = .64$) were significantly younger than children recruited with flyers ($M = 10.63, SD = 1.30$), $p = .02$. Groups did not differ on Penn State Worry Questionnaire-Child scores, but there was a difference on worry/oversensitivity scores, $F(4, 75) = 5.34, p = .001$, partial $\eta^2 = .22$, observed power = .96. Children recruited by flyer ($M = 3.62, SD = 3.20$) were significantly less worried than children from the public school ($M = 7.35, SD = 2.85$), $p = .02$, and one of the local Catholic schools ($M = 7.06, SD = 2.62$). Groups did not differ on any of the other cognitive variables. To control for sampling differences, recruitment site was used as a covariate in all future analyses.

Hypothesis Testing

Hypothesis One: Correlations between variables.

A. Cognitive development will correlate positively with cognitive variables and with worry. Partial correlations, controlling for recruitment site, were examined. Correlations are presented in Table 4. Before examining associations between cognitive development and the other variables, it should be noted that cognitive development measures were not correlated with one another. Child age did not correlate significantly with cognitive monitoring or all possible interpretations. All possible interpretations also

failed to correlate with cognitive monitoring. Because the all possible interpretations variable did not appear to be an indicator of cognitive development and was not associated with worry, it was not included in any future analyses.

Table 4.

Partial Correlations Between Study Variables, Controlling for Recruitment Site.

	PSWQC	W/O	IUSC	NP	PB	NB	Thrt Rtg	Age	Monitor	All Int
PSWQC	.									
n										
W/O	.59**	.								
n	70									
IUSC	.51**	.59**	.							
n	80	70								
NP	.53**	.49**	.75**	.						
n	80	70	80							
PB	.14	.03	.32**	.29**	.					
n	80	70	80	80						
NB	.53**	.47**	.65**	.60**	.12	.				
n	80	70	80	80	80					
Thrt Rtg	.24	.25	.29*	.39**	.15	.38**	.			
n	56	56	56	56	56	56				
Age	-.25*	-.17	.05	-.18	.05	-.06	-.11	.		
n	70	70	70	70	70	70	56			
Monitor	.39**	.30*	.51**	.43**	.15	.55**	.40**	-.17	.	
n	80	70	80	80	80	80	56	70		
All Int	-.04	-.12	.14	.05	.10	.14	.09	-.02	.15	.
n	56	56	56	56	56	56	56	56	56	

Note. W/O = worry/oversensitivity subscale, NP = negative problem orientation, PB = positive beliefs about worry, NB = negative beliefs about worry, Thrt Int = threat interpretation, All Int = all possible interpretations

*p<.05, **p<.01

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The hypothesis that cognitive development measures would correlate positively with cognitive variables was partially supported. Cognitive monitoring showed the strongest relations, correlating positively with intolerance of uncertainty, negative problem orientation, and negative beliefs about worry, and threat rating but not with positive beliefs. Surprisingly, child age did not correlate with any cognitive variables. The hypothesis that cognitive development measures would correlate positively with measures of worry was only partially supported. Child age correlated negatively with Penn State Worry Questionnaire-Child scores but did not correlate with worry/oversensitivity scores, while cognitive monitoring correlated positively with both measures of worry.

B. Cognitive variables will correlate positively with measures of worry. The hypothesis that cognitive variables would correlate with worry was largely supported. Intolerance of uncertainty, negative problem orientation, and negative beliefs about worry correlated positively with both worry measures, while positive beliefs about worry and threat rating did not. Because these two variables do not appear related to worry in children, threat rating and positive beliefs were excluded from future analyses.

Hypothesis Two: Cognitive development will predict scores on measures of negative beliefs about worry, intolerance of uncertainty and negative problem orientation.

Three regression equations, one for each of the cognitive variables, were used to test this hypothesis. Because child age and all interpretations failed to correlate with cognitive variables, only cognitive monitoring was used as a measure of cognitive development. Recruitment site was entered in Block 1, and cognitive monitoring in Block

2. Models 1 and 2 for intolerance of uncertainty were significant, $F(1, 78) = 9.85$, $p<.002$, and $F(2, 77) = 19.74$, $p<.001$, respectively. Model 2 explained a total of 33% of the variance in intolerance of uncertainty. The models for negative problem orientation were also significant, $F(1, 78) = 6.67$, $p = .01$, and $F(2, 77) = 12.91$, $p<.001$, respectively, and explained 23% of the variance in negative problem orientation. In the prediction of negative beliefs about worry, Model 1 failed to reach significance, $F(1, 78) = 3.96$, $p = .05$, and Model 2 was significant, $F(2, 77) = 19.79$, $p < .001$, explaining 32% of the variance in negative beliefs. Additional results are presented in Table 5. In summary, monitoring predicted intolerance of uncertainty, negative problem orientation, and negative beliefs about worry and explained a significant portion of the variance in each of the three variables.

Table 5.

Regressions Predicting IU, Negative Problem Orientation, and Negative Beliefs from Cognitive Monitoring.

	Dependent Variable		
	IU	Neg Prob.	Negative Beliefs
	t	t	t
Block 1			
site	-3.14**	-2.58*	-1.99*
Block 2			
site	-2.76**	-2.15*	-1.42
monitoring	5.14**	4.21**	5.83**

Note. *$p<.05$; **$p<.001$

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Model assumptions were examined to determine the extent to which the models might generalize to other samples. Linearity was assessed by examining scatter plots, which indicated a roughly linear relationship between variables. Homescedasticity of each variable was evaluated by examining the distribution of residuals. Multivariate outliers were screened for by examining standardized residuals and influential cases scanned for by using DFit, Cook's distance values, and Mahalanobis distances (where large values are a concern). Standardized residuals for each of the three models were normally distributed. Multicollinearity of each model was evaluated by examining the variance inflation factor (VIF) (values > than 10 are problematic) and tolerance (values <.1 are problematic). All VIFS and tolerance values were within acceptable limits.

Hypothesis Three: Intolerance of uncertainty, negative problem orientation, and negative beliefs about worry will predict child worry and cognitive development will moderate the relation, such that advanced development is associated with stronger predictive power of the cognitive variables.

Two sets of regressions were conducted to test this hypothesis, the first set using child age as a moderator and the second with cognitive monitoring as a moderator. Although child age failed to show a direct association with worry, it could be that the relations between cognitive variables and worry are influenced by child age. To reduce the number of overall tests and associated error, regression models were run for Penn State Worry Questionnaire-Child scores only. Independent variables were centered before calculating the interaction term in order to reduce multicollinearity.

For the first set of regressions, recruitment site was entered into Block 1, the cognitive variable, child age, and the interaction in Block 2. Models are presented in

Table 6. Block 1 and 2 of each model was significant, and the cognitive variable in each

equation was significant. Child age was significant only in predicting intolerance of

uncertainty. No interaction terms were significant.

Table 6.

Cognitive Variables, Cognitive Development, and the Interactions in the Prediction of

PSWQ-C Scores.

Intolerance of Uncertainty

Child Age	t	F	ΔR Sq.	Cognitive Monitoring	t	F	ΔR Sq.
Block 1		8.87**	.12**	**Block 1**		6.91*	.08*
Site	-2.97**			Site	-2.63*		
Block 2		8.85**	.24**	**Block 2**		9.91**	.26**
Site	-1.04			Site	-.93		
Age	-2.18*			Monitor	1.51		
IU	4.15**			IU	3.74**		
Age* IU	.24			Monitor*IU	-.85		

Negative Problem Orientation (NP)

Child Age	t	F	ΔR Sq.	Cognitive Monitoring	t	F	ΔR Sq.
Block 1		8.87**	.12**	**Block 1**		6.91*	.08*
Site	-2.98**			Site	-2.63*		
Block 2		9.41**	.25**	**Block 2**		11.09**	.29**
Site	-1.45			Site	-1.24		
Age	-1.35			Monitor	1.77		
NP	4.35**			NP	4.09**		
Age* NP	.95			Monitor*NP	-.37		

Negative Beliefs(NB)

Child Age	t	F	ΔR Sq.		Cognitive Monitoring	t	F	ΔR Sq.
Block 1		8.87**	.12**		**Block 1**		6.91*	.08*
Site	-2.98**				Site	-2.63*		
Block 2		9.83**	.26**		**Block 2**		10.24**	.27**
Site	-1.41				Site	-1.64		
Age	-1.94				Monitor	1.19		
NB	4.22**				NB	3.88**		
Age* NB	1.30				Monitor*NB	-.18		

Note. For child age models, df = (1, 68) for Block 1; df = (4, 65) for Block 2
For cognitive monitoring models df = (1, 78) for Block 1; df = (4, 75) for Block 2
*$p<.05$**$p<.01$

For the second set of regressions, cognitive monitoring was used as the measure of cognitive development. In Block 1 recruitment site was entered, followed by the cognitive variable, cognitive monitoring, and the interaction in Block 2. Results were similar to analyses using child age and are presented in Table 8. Again, the cognitive variable in each equation was significant, but no interaction terms were significant. Cognitive monitoring was not a significant predictor in any equation.

Finally, an overall model was constructed to examine the relative predictive power of each of the three cognitive variables. Again, recruitment site was entered in Block 1 and all three cognitive variables in Block 2. Blocks 1 and 2 of the model were significant, $F(1, 78) = 6.91, p = .01$ and $F(4, 75) = 12.08, p<.001$, respectively. The R

Square change value was significant, $p<.001$, and Model 2 explained 38% of the variance in Penn State Worry Questionnaire-Child scores. Of the individual predictors, negative beliefs about worry emerged as significant, $t = 2.39, p = .02$, and there was a trend toward significance for negative problem orientation, $t = 1.91, p = .06$. IU was nonsignificant, $t = .73, p = .47$. In summary, the three cognitive variables significantly predicted worry but child age and cognitive monitoring did not moderate the association. Negative beliefs about worry appeared to have the strongest association with worry when the effects of negative problem orientation and intolerance of uncertainty were also accounted for.

After each model, model assumptions were examined. Linearity and homescedasticity were assessed by examining scatter plots of standardized residuals against standardized predicted values. Inspection of the graphs revealed no violations of the assumptions. Multivariate outliers were screened for by examining standardized residuals and influential cases scanned for by using DFit, Cook's distance values, and Mahalanobis distances (where large values are a concern). Standardized residuals for each of the three models were normally distributed and multicollinearity did not appear to be problematic, as all VIFs and tolerance values were within acceptable limits.

Hypothesis Four: Female children will report higher scores than male children on measures of intolerance of uncertainty, negative problem orientation, negative beliefs about worry, and worry.

A series of t-tests was used to compare male and female children on the four cognitive variables and the two measures of worry. Because sample sizes are unequal, the pooled-variance estimate t-test was used. This test takes the different sample sizes into

account by weighting the sample variances according to the sample size (Field, 2005).

The pooled variance was estimated using the following equation:

$$s_p^2 = (n_1-1)\, s_1^2 + (n_2-1)\, s_2^2 \,/\, n_1 + n_2 - 2$$

The pooled variance estimate is then replaced in the standard t statistic calculation, where

Δ is the hypothesized difference between the two means, in this case 0:

$$t = \frac{\bar{x}_1 - \bar{x}_2 - \Delta}{\sqrt{s_p^2\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$$

To ensure equality of variances, Levene's test was conducted for each t-test and all were

nonsignificant. Means, standard deviations, and t statistics are presented in Table 7.

Results indicated that female children reported significantly higher levels of negative

problem orientation and negative beliefs about worry compared to male children.

Table 7.

Pooled Variance t-test Results for Sex Differences on Cognitive Variables.

	Males M (SD)	Females M(SD)	t	p
PSWQ-C	12.14 (7.87)	14.11 (5.98)	-1.21	ns
Worry/oversensitivity	5.00 (2.88)	6.37 (3.05)	-1.37	ns
IUSC	63.23 (18.66)	67.81 (21.47)	-.41	ns
NPO	13.89 (10.44)	17.49 (8.40)	-8.29	*p*<.01
Positive Beliefs	8.44 (2.83)	8.99 (3.17)	-.15	ns
Negative Beliefs	12.17 (4.52)	14.22 (4.61)	-3.17	*p*<.01

Note. $df = 68$, $t > 1.99$ when $p = .05$

Hypothesis Five. The cognitive variables of negative beliefs about worry, intolerance of uncertainty, and negative problem orientation will predict group membership of high and low worriers.

First, children were divided into high and low worry groups based on worry/oversensitivity scores. This type of methodology has been used previously in other studies to identify highly anxious children (Beidel & Turner, 1988; Mattison et al., 1988; Saurez & Bell-Dolan, 2001) and a cut score of T > 60 has been shown to discriminate clinical from nonclinical children (Mattison, Bagnato, & Brubaker, 1988). Using this cut score, 43 children were classified as low worriers and 27 as high worriers. A binary logistic regression was conducted with worry group as the dependent variable, recruitment site entered into Block 1 and negative problem orientation, intolerance of uncertainty, and negative beliefs entered into Block 2. Model 1 and Model 2 were significant, X^2(df = 4) = 15.85, p = .003 and X^2(df=(7) = 45.67, $p<.001$, indicating that both models resulted in a significant improvement in model prediction compared to the initial model containing only the constant (predicting that all children are low worriers). The Chi Square for Block 2 was significant, X^2 (df=3) = 29.83, $p<.001$, indicating that the addition of the cognitive variables resulted in significant improvement over Block 1. Overall, Model 2 accurately classified 87% of the children as high or low worriers, compared to 71% in Model 1. Of the predictors in the model, the Wald statistics were significant for recruitment site, Wald statistic = 5.47, p = .02, and intolerance of uncertainty, Wald statistic = 4.86, p = .03., exp b = 1.07. The odds that a child is in the high worry group increase by 1.07 for every 1 unit increase in intolerance of uncertainty.

Exploratory analyses.

The current sample, although drawn from the community, included a greater than expected proportion of highly worried children. Several studies have shown that associations between variables differ based on the nature of the sample (community versus clinical). Because a significant portion of the children in this study scored above a clinical cut score (T>60 on the worry/oversensitivity scale), it could be that combining these two groups (clinical worriers and average worriers) "washed out" significant effects. To further examine this hypothesis, several analyses were conducted.

One of the most surprising results of the study was the lack of association between child age and cognitive monitoring, given Bacow et al.'s (2009) finding that monitoring increased with age in their clinically anxious sample of children. With nonclinical adolescents, however, Cartwright-Hatton et al. (2004) found no relation between monitoring and age. Thus, it was hypothesized that these relations might be impacted by worry level. Partial correlations between age and monitoring were then calculated for high and low worry groups separately. Results showed significant but inverse correlations depending on worry group. For low worriers, cognitive monitoring decreased with child age ($r = -.59$, $p<.001$, n = 31), while for high worriers monitoring increased with age ($r = .50$, $p = .02$, n = 19). This relation is depicted graphically in Figure 3. It may be then, that cognitive monitoring is not a measure of cognitive development, but is better conceptualized as a cognitive variable more similar to intolerance of uncertainty, negative problem orientation, or negative beliefs about worry.

Figure 3. Relationship between child age and cognitive monitoring by worry group. High and low worry groups defined with a cut score of T> 60 on the worry/oversensitivity scale
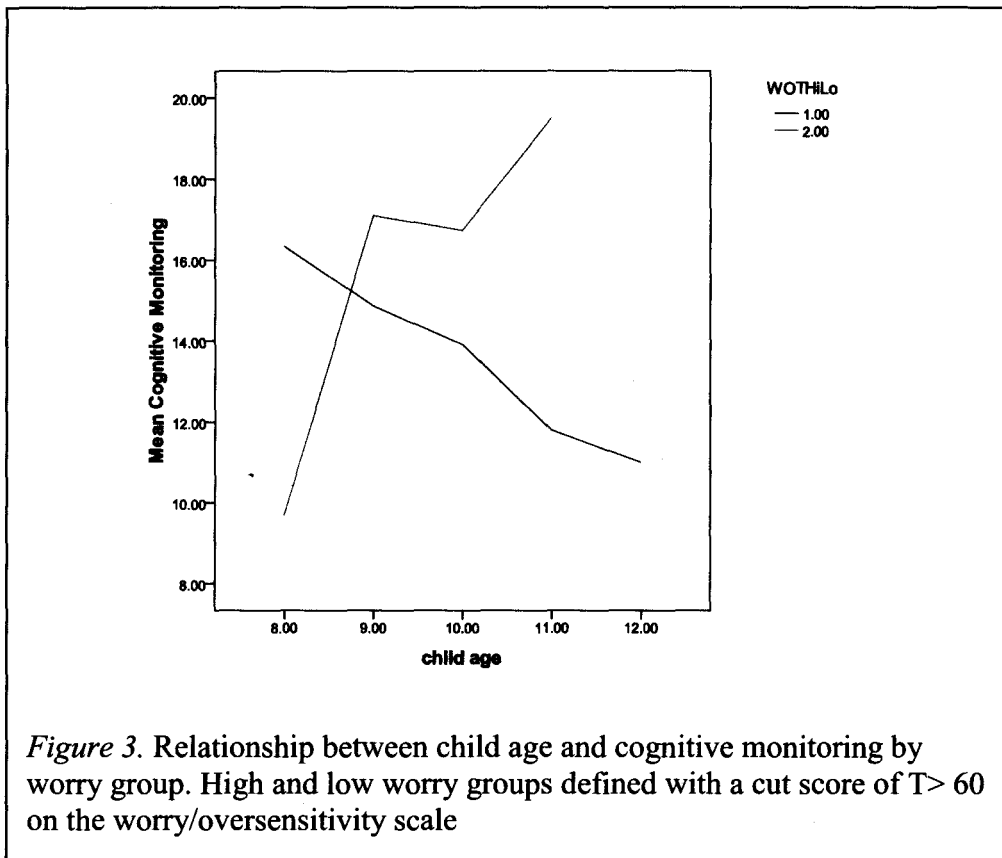
Based on these results, it was hypothesized that worry group would moderate the relation between child age and the other cognitive variables. Hypothesis two was therefore re-tested. Recruitment site, child age, worry group, and the interaction were entered into each equation. Regressions were conducted with recruitment site, age, worry group, and the age x group interaction as independent variables and intolerance of uncertainty, negative problem orientation, and negative beliefs as the dependent variables. Results are presented in Table 8. For significant interactions, slope values were calculated for each group and graphed. See Figures 4, 5, and 6 for graphs of interactions. The model for intolerance of uncertainty was significant, $F (4, 65) = 13.54, p < .001$, but no individual predictors were significant. The models for negative problem orientation,

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$F(4, 65) = 8.41, p<.0001$, and negative beliefs, $F(4, 65) = 8.09, p < .001$, were significant. The interaction terms in both models were also significant. To further understand the correlations between child age and cognitive monitoring and the effect of worry group, a model was also constructed for cognitive monitoring. This model was also significant, $(4, 65) = 6.08, p < .001$.

Table 8.

Regression Equations Predicting Cognitive Variables from Worry Group and Child Age.

	Interaction R^2	t	Worry Group Low b	Worry Group High b
IU	.02		.36	6.19
Site		-1.69		
Age		-.98		
Worry group		-.75		
Age*Worry group		1.34		
Negative Problem	.05*		-2.19*	2.38
Site		-.96		
Age		-2.58*		
Worry group		-1.82		
Age*Worry group		2.23*		
Negative Beliefs	.06*		-.67	1.95*
Site		-1.05		
Age		-2.41*		
Worry group		-2.03*		
Age*Worry group		2.45*		
Monitoring	.14**		-1.33**	2.21*
Site		-.98		
Age		-3.83**		
Worry group		-3.36**		
Age*Worry group		3.56**		

Note. *p<.05; =**p<.01

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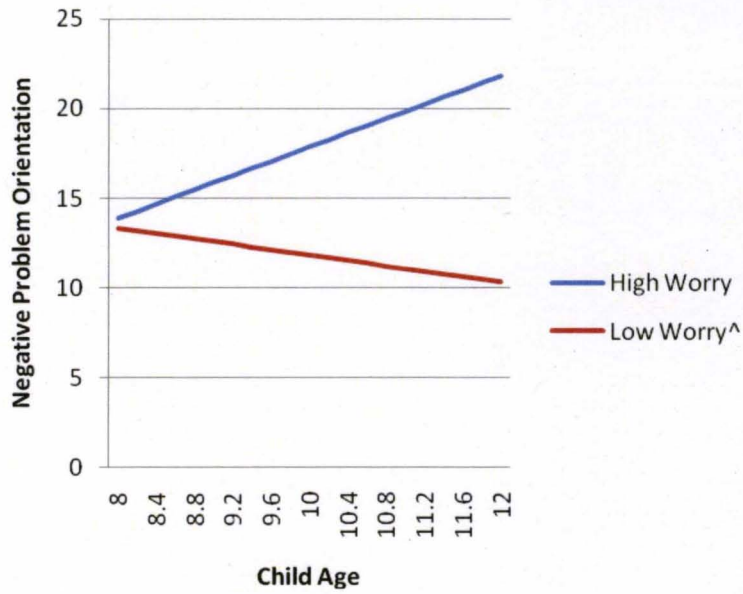
Figure 4. The effect of worry group and age on negative problem orientation. High and low worry groups defined by a cut score of T>60 on the worry/oversensitivity scale. ^ indicates significant slope value
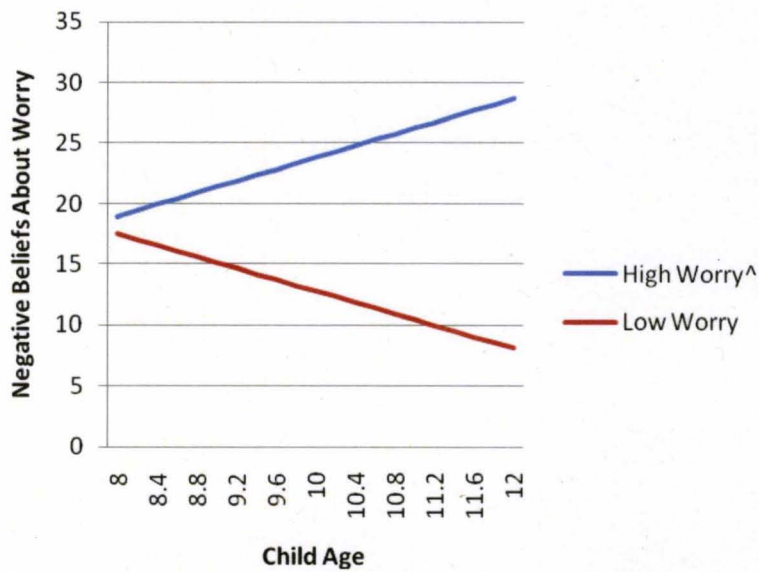
Figure 5. The effect of worry group and age on negative beliefs about worry. High and low worry groups defined by a cut score of T>60 on the worry/oversensitivity scale. ^ indicates significant slope value

Figure 6. The effect of worry group and age on cognitive monitoring. High and low worry groups defined by a cut score of T>60 on the worry/oversensitivity scale. ^ indicates significant slope value
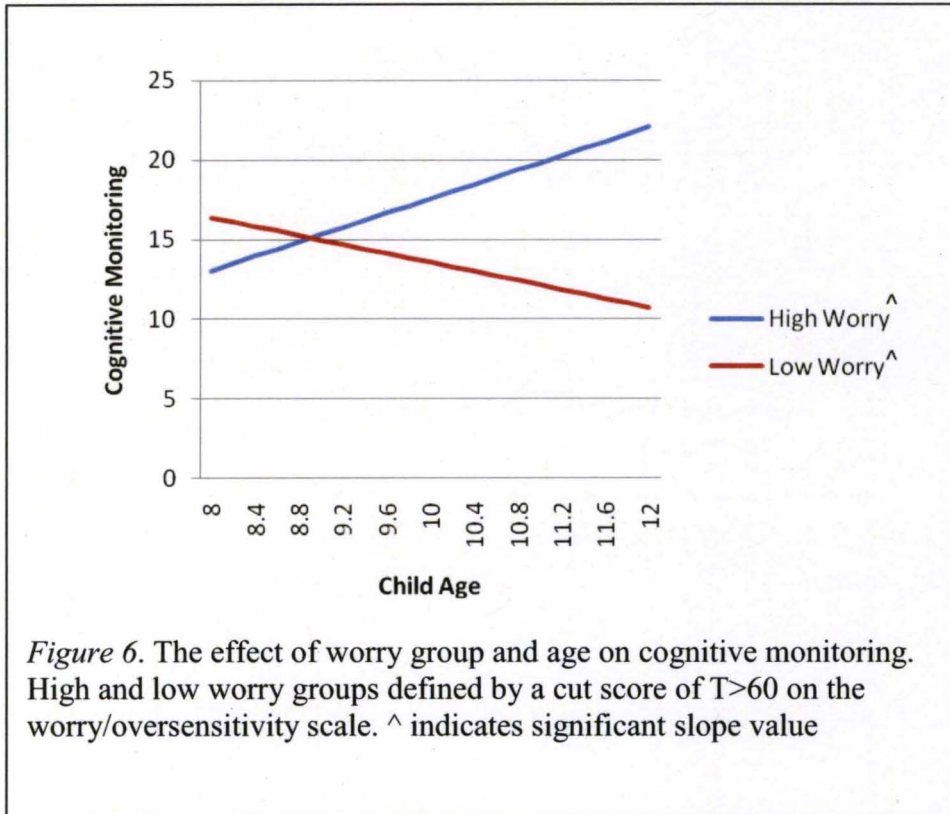
Because worry group moderated the relation between child age and the cognitive variables and, in turn, cognitive variables were hypothesized to predict worry, it seemed reasonable to next examine if the predictive power of the cognitive variables was also affected by worry group. That is, are the associations between the cognitive variables and worry also moderated by worry group? Three regression equations were conducted to predict Penn State Worry Questionnaire-Child scores, with recruitment site, the cognitive variable, worry group, and the interaction. Results presented in Table 9. The overall models for all three cognitive variables were significant, but an examination of individual predictors showed that negative beliefs and negative problem orientation significantly

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predicted worry, while intolerance of uncertainty did not. No interaction terms were significant.

Table 9.

Predicting PSWQ-C Scores from Cognitive Variables and Worry Group.

Cognitive Variable	t	Interaction R^2	F	Worry Group Low b	High b
IU		.02	8.59**	.13*	.02
Site	-1.36				
IU	1.91				
Group	1.82				
Group*IU	-1.28				
Negative Problem		.01	10.94**	.36**	.15
Site	-1.30				
NP	2.29*				
Group	2.19*				
Group*NP	-1.26				
Negative Beliefs		.01	10.10**	.64**	.30
Site	-1.25				
NB	1.99^				
Group	1.77				
Group*NB	-1.04				

Note. df = 4, 65 for overall models; *p<.05; **p<.01; ^=.05

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DISCUSSION

The current study examined worry and related cognition in a community sample of school aged children. First, preliminary analyses were conducted to investigate the validity of several measures, including a shortened version of the COELE, a measure of negative problem orientation adapted for children, and a measure of children's ability to generate multiple possible outcomes to a neutral scenario. Next, several paths from a larger conceptual model proposed to explain cognitive processes related to worry in children were tested. Hypotheses related to the power of threat interpretation, intolerance of uncertainty, negative problem orientation, and negative beliefs about worry to predict worry in children were tested. It was also hypothesized that cognitive development would moderate the association between the cognitive variables and worry, such that increasing development would be associated with stronger predictive power of the cognitive variables. Hypothesized sex differences in cognitive variables and worry were also examined. Finally, the utility of the cognitive variables in discriminating high from low worry groups was examined.

Preliminary analyses.

The shortened version of the COELE did not relate to other measures as expected and its psychometric properties were generally weak. Surprisingly, threat interpretation and threat ratings were not associated with worry. This was unexpected given the large

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body of work linking worry and threat interpretation using other measures of threat interpretation (Bögels, Snieder, & Kindt, 2003; Taghavi, Moradi, Neshat-Doost, Yule, & Dalgleish, 2000). Results from this study also failed to replicate those of Saurez and Bell-Dolan (2001), who using the original COELE, showed that worry correlated positively with interpretations of ambiguous stories, threat and worry ratings for both stories, and likelihood ratings. Although the COELE reportedly has strong psychometric properties, the original validation study is the only known study to date to use the measure. It may be that relations in the initial examination are specific to that sample and do not generalize well to other groups. It could also be that the adaptation of the interview from 12 to 6 stories used in this study affected the measure's validity. A basic analysis of the measure psychometrics indicated low internal consistency of the scales and several scales failed to correlate with worry measures, suggesting that validity may have been affected. The telephone administration of the interview may have also influenced responses and measure psychometrics. Children may have been distracted during the interview, which would have interfered with their attention, processing of the information, and verbal responses.

The measure of negative problem orientation adapted for children from the Social Problem Solving Inventory showed promising psychometric properties. Although a full examination of the measure's psychometrics is beyond the scope of the present study, preliminary estimates of internal consistency were adequate and the measure correlated with other variables as expected. Future studies aimed more specifically at examining the psychometrics of the measure would be beneficial. Specifically, work including sample

sizes adequate for a factor analysis and an examination of test-retest reliability would provide additional support for use of the adapted SPSI with children.

Initial examination of the measure of children's ability to generate multiple possible outcomes for a neutral scenario showed no association with other measures of cognitive development, including both child age and cognitive monitoring. This suggests that the measure is not an adequate marker of cognitive development for this age range. It may be that these skills emerge earlier in life and are fully developed by age 8 years. If this is the case, from age 8 years on the ability to consider multiple possible future outcomes is relatively stable across development. It has been hypothesized that children's ability to generate multiple possible negative events is associated with the ability to catastrophize, or elaborate on threat (Ellis & Hudson, 2010; Vasey, 1993), and that this ability increases with development and is related to worry. Future work should determine if this ability is related to cognitive development in younger children.

Hypothesis Testing.

First, the association between the three cognitive development measures was examined. Generally, the measures were not correlated. Cognitive monitoring and child age also failed to correlate with one another. This was somewhat surprising given that others have found a positive association between the two variables (Bacow et al., 2009). This finding is explained, however, by post-hoc exploratory analyses revealing that worry group influenced directionality of the correlations, washing out the results when groups were combined. When high and low worry groups were examined separately, age was associated with increases in cognitive monitoring in the high worry group but decreases in the low worry group. It seems then, that for typical or low worry children, attention to

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thoughts decreases over time while it increases over time for worried children. Worried children may be hypervigilant to their thoughts, scanning for potential danger both internally and externally, and this increases over time. In contrast, typical children are less likely to be excessively attentive to internal stimuli and engage in less monitoring over time. It may be that cognitive monitoring serves as a maintaining factor in the worry process. In the future it will be important to determine the directionality of the relations, specifically if vigilance precedes worry or is a consequence of it, which cannot be determined from the current study.

The hypothesis that the three cognitive development measures would correlate positively with worry-related cognition was only partially supported and varied by measure. Cognitive monitoring showed positive correlations with intolerance of uncertainty, negative beliefs about worry, negative problem orientation, and both measures of worry. Age failed to correlate with any of the worry related cognitive e variables and correlated negatively with worry when measured with the Penn State Worry Questionnaire-Child. It was somewhat surprising that child age correlated negatively with worry, given previous work suggesting increases or no difference with age (Chorpita et al., 1997; Muris et al., 2001). The all possible interpretations variable did not correlate with any of the worry related cognitive variables or with either measure of worry. The failure of the all possible interpretations measure to correlate with either measure of worry has important implications for our understanding of worry in children. This result suggests that children's ability to generate multiple possible explanations, whether negative or neutral, for an ambiguous event is not related to worry in children. This runs counter to the current definition of worry, which describes worry as a stream or chain of

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internal content depicting multiple threatening scenarios. This result also fails to support the hypothesis that the ability to generate possible outcomes increases with child age and allows a child to worry in a generalized way (Ellis & Hudson, 2010; Vasey, 1993). For school age children imagining one possible threatening outcome may be sufficient to worry, raising the possibility that children are not worrying in the way that adults worry. It could be that children's worry involves greater focus on one particular threat rather than the chain of multiple negative outcomes that characterizes adult worry. Future work designed to test this hypothesis and to better understand the nature of children's worry would be beneficial.

There was also a significant interaction between cognitive development, as measured by child age, and worry group in the prediction of intolerance of uncertainty, negative problem orientation, and negative beliefs about worry. Exploratory analyses showed that worry group moderated the relation between child age and two cognitive variables, with decreases in negative problem orientation with age for the low worry group and increases in negative beliefs about worry with age for the high worry group. Comer et al. (2009) found a similar pattern for intolerance of uncertainty in their sample of children, such that intolerance of uncertainty decreased with child age in a community sample but not a sample of children with anxiety disorders. The authors suggest that typical development is marked by an increased ability to tolerate uncertainty, a skill that fails to develop in children with clinical levels of anxiety (Comer, 2009). Similarly, learning adaptive ways of viewing problems and worry itself might also mark typical development. Results from this study indicate, however, that highly worried children experience an increase in negative problem orientation with child age and fail to

experience the decrease in negative beliefs about worry seen in children with lower levels of worry.

Because directionality of the associations cannot be determined based on the study's design, there are two ways of interpreting these findings. First, it could be that worry interferes with the typical trajectory of worry related cognition that most children experience over time. For typical children, worry is likely infrequent, relatively short lived, and not particularly upsetting. Over time, as children experience worry as transient and nonthreatening, beliefs about uncertainty, problems, and worry itself become more balanced and adaptive. Children who experience excessive worry, however, may be more likely to find worry distressing because it is frequent, interferes with their lives, and is accompanied by physical symptoms. The experience of such worry might in turn interfere with children's development of rational appraisals of worry (e.g., worry is unwanted, dangerous, and unpleasant) and situations that might trigger a worry response, such as facing a problem or ambiguity.

An alternative explanation for the findings is that the directionality is reversed, so that deviations from the typical trajectory of worry related cognition increases the likelihood of worry. In particular, lacking confidence in problem solving skills might contribute to feelings of incompetence, increasing the likelihood of engaging in worry rather than proactive coping in the face of uncertainty or a problem. It could also be that parents play a role in facilitating the development of these cognitions in their children. Given the familial nature of anxiety, it is likely that anxious children have anxious parents. Anxious parents might embody these negative thinking styles and be unable to

model more adaptive ways of viewing uncertainty, problems, and the experience of worry itself for their children.

The hypothesis that cognitive variables would be associated with worry was largely supported. Intolerance of uncertainty, negative beliefs about worry, and negative problem orientation correlated positively with worry, while positive beliefs did not. These results were consistent with other work which has shown positive associations between intolerance of uncertainty and worry (Comer et al., 2009), and negative beliefs and worry (Bacow et al., 2009) in children. This is the first known study to examine problem orientation and worry in children, but based on work with adults and adolescents, the positive relation between the two was as expected (Laugesen, Dugas, & Bukowski, 2003; Robichaud & Dugas, 2005). Positive beliefs, however, were not correlated with worry in this sample, in line with previous results in a sample of both clinical and non-clinical children (Bacow et al., 2009) and adolescents (Cartwright-Hatton et al., 2004). However, the current findings contradict other work with adults (Davey, Tallis, & Capuzzo, 1996) and findings from Laugesen, Dugas, and Bukowski (2003), who showed that positive beliefs about worry explained substantial variance in worry scores in a community sample of adolescents. This suggests that worry's association with positive beliefs may not emerge until later in life and are not relevant for young children. Future work should examine positive beliefs as a maintaining factor in chronic worry.

As expected, intolerance of uncertainty, negative problem orientation, and negative beliefs about worry significantly predicted Penn State Worry Questionnaire-Child scores. Of the three predictors, negative beliefs about worry emerged as the

strongest. Cognitive development did not moderate the predictive power of the cognitive variables, indicating that the variables are significantly related to worry regardless of developmental level (as measured by child age and cognitive monitoring). This suggests that children as young as age eight years old experience intolerance of uncertainty, negative problem orientation, and negative beliefs about worry, and that these thoughts predict worry in much the same way they do in adults. Contrary to hypotheses, advanced development is not associated with higher scores on measures of the cognitive variables, and worry's relation with intolerance of uncertainty, negative beliefs about worry, and negative problem orientation did not differ statistically across development. Further, exploratory analyses showed that the predictive power of the cognitive variables held constant across worry group. It seems then, that the set of cognitive variables are related to worry in the same way, across worry level and cognitive development.

This finding has important implications for treatment and prevention of worry in children. Because many of the same cognitive processes associated with worry in adults appear to be at work in worried children, adapting adult treatment protocols to developmentally appropriate levels may be effective intervention tools. For example, metacognitive therapy, focused on modifying negative beliefs about worry, has recently been shown to be effective in samples of adults with anxiety disorders (Wells & King, 2006).The finding that similar processes are involved in high and low worry groups also suggests that programs designed to prevent the development of excessive worry may also be advantageous. Intolerance of uncertainty, negative problem orientation, and negative beliefs are associated with worry, even at normal levels, and so would be accessible for all children. Learning skills to modify these beliefs and tolerate uncertainty may help

children cope with worry and prevent at risk children from developing clinical problems in the future. Future work is needed with clinically anxious children, however, and studies should examine if associations between these variables are also similar across clinically anxious and nonanxious children.

Exploratory analyses revealed a complex relation between cognitive monitoring, worry, and cognitive variables. Results from previous studies examining the relation between cognitive monitoring and worry severity have shown that nonclinical children reported higher levels of monitoring compared to clinical children (Bacow et al., 2009), a finding that has been documented with adolescents as well (Cartwright-Hatton, 2004). Exploratory analyses accounting for the effects of both clinical severity and child age hinted at developmental trends in cognitive monitoring that were impacted by worry severity. In the low worry group, the tendency to monitor thoughts decreases with child age, a pattern also seen with intolerance of uncertainty (although not significant statistically), negative problem orientation, and negative beliefs about worry. It seems logical that the ability to recognize thoughts would follow a similar pattern to the other cognitive variables, as awareness of thoughts would necessarily precede evaluations (including intolerance of uncertainty, negative problem orientation, and negative beliefs about worry) of them. Typical development may include an ability to disengage from thoughts, a skill that is underdeveloped or interfered with by severe worry. Bacow et al (2009) suggests that increased awareness of thoughts may not be sufficient to lead to anxiety problems. However, it may be a necessary prerequisite for the set of negative cognitions that explain significant variance in worry in children.

Results for the effect of sex on worry and worry related cognition were mixed. The current study found no differences between male and female children on Penn State Worry Questionnaire-Child or worry/oversensitivity scores. Previous work has not shown any difference consistently, with some studies reporting higher worry in females while others report no difference (Chorpita et al., 1997; Muris et al., 2001; Reynolds & Richmod, 1978).

Male and female children differed significantly on two cognitive variables, with female children reporting higher levels of negative beliefs about worry and negative problem orientation. Previous work with children showed no sex differences in positive beliefs, negative beliefs, or cognitive monitoring in children (Bacow et al., 2009) or adolescents (Cartwright-Hatton, 2004), although work with community samples of adults has shown higher levels of negative problem orientation in women (D'Zurilla, Maydeu-Olivares, & Kant, 1998; Robichaud, Dugas, & Conway, 2003).

Several explanations for sex effects have been proposed. Robichaud et al. (2003) hypothesized that women's negative problem orientation could be related to their increased feelings of powerlessness, perceived inability to control problems, and lack of confidence in their coping abilities. Similarly, Stavosky and Borkovec (1987) suggest that women (and girls) may adopt worry as a problem solving skill, as it reflects a more traditional feminine role. That is, worry is a less instrumental and assertive way to solve a problem, a style stereotypically associated with femininity. The authors also suggest that women might be encouraged to adopt these strategies for coping with problems, rather than a more aggressive or confrontational approach, and receive reinforcement for using them. Further, women might not be exposed to alternative problem solving strategies.

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Stavosky and Borkovec (1987) strongly advocate for the idea that the effects of biological sex and gender role identification be separated. For example, Green (1980, as cited in Stavosky & Borkovec, 1987) found differences in adolescent depression based on gender role identification but not sex. Specifically, feminine or undifferentiated gender role identification was associated with depression. Future work might consider social and environmental factors that contribute to children's perceptions that problems and uncertainty are threatening, overwhelming, and intolerable and that worry is an internal experience to be fearful of.

Results from this study supported the final hypothesis, indicating that the cognitive variables distinguished between high and low worriers. Intolerance of uncertainty, negative beliefs about worry, and negative problem orientation successfully predicted whether children fell above or below the clinical cut score on the worry/oversensitivity scale, and the model overall accurately classified 87% of children. Of the cognitive variables, only intolerance of uncertainty made a significant contribution to the prediction. This result is similar to that of Laugesen et al. (2003) who showed that intolerance of uncertainty and negative problem orientation, but not positive beliefs or cognitive avoidance, accurately discriminated moderate from high worriers in a community sample of adolescents. Similarly, Cartwright-Hatton et al. (2004) showed that adolescents with emotional disorders endorsed more negative beliefs about worry compared to nonclinical adolescents, but not more positive beliefs or cognitive monitoring. Of note, however, Bacow et al. (2009) failed to find differences between children with anxiety disorders and groups on negative beliefs about worry. More work is needed in establishing consistent relations between these variables.

Implications for a conceptual model.

Results from this study have important implications for the conceptual model proposed earlier. Support for the paths between worry and intolerance of uncertainty, negative beliefs about worry, and negative problem orientation was found in children as young as age eight years. Although support for threat interpretation was not found in this study, caution should be used when interpreting these results. A large body of literature has supported the association between information processing and worry in children and it seems most likely that the lack of significant results in this study are unique to the sample or to the methodology used (namely shortening the COELE interview used by Saurez & Bell-Dolan, 2001). This study also suggests that positive beliefs about worry are not particularly relevant to worry in children between the ages of 8 and 12 years old. The influence of cognitive development on worry related variables appears to differ as a function of worry severity, suggesting that it will be important to account for the influence of worry severity in future models of worry in children.

Limitations of the current study.

Although this study has a number of strengths, it is also bound by some limitations. First, the nature of the sample undoubtedly affected the results of this study. The sample was not drawn at random, and although a community sample, the group was biased toward high levels of worry, as evidenced by the average Penn State Worry Child Questionnaire-Child and worry/oversensitivity scores. Children who experience higher levels of worry (or their parents, or both) may have been more likely to participate in the study because it was personally relevant to them. Results may be better understood as coming from two distinct populations including a highly worried group and a more

typical group, rather than from the same population. Exploratory analyses including worry group as moderator support this idea. However, there are also implications for splitting the sample into two smaller groups. First, differences may exist that the current analyses were not able to detect due to limited sample size and resulting power. Second, results may be specific to this sample and may not generalize to other groups. Future work should further test these associations to cross-validate findings from this study.

A second limitation related to power is the relatively small number of male children, which may have restricted the ability to find differences based on child sex. Prevalence differences between males and females in worry and GAD may in fact have contributed to potential sampling bias, as worried children are more likely to be female. A larger sample size with equal numbers of male and female children could have better answered questions about sex differences in worry and related cognitive variables.

Third, the unequal distribution across the age range, especially at the low and high ends, limited power in analyses dealing with child age. Although equal numbers of children from all ages were invited to participate, no seven-year-old children returned completed packets. Most likely the amount of material was overwhelming for children at that reading level, although all measures but one (the SPSI-Child Adaptation) have been validated for children of that age. Because most children were aged 9 and 10 years, there may not have been sufficient variability to detect differences related to cognitive development.

Finally, the cross-sectional design of the study prevents any directional or causal conclusions. Associations between cognitive development, the cognitive variables, and worry are complex and appear to change as s function of worry severity. In particular, the

finding that child age is associated with increases in intolerance of uncertainty, negative beliefs about worry, and negative problem orientation in the high worry group should be examined longitudinally.

Summary and future directions.

In summary, it appears that a cognitive model of worry can be applied to children as young as eight years old. Intolerance of uncertainty, negative beliefs about worry and negative problem orientation appear to be closely associated with worry in this sample, while positive beliefs about worry are not. Specifically, negative beliefs about worry demonstrated the strongest association with continuous worry measures while intolerance of uncertainty was the strongest predictor of high and low worry group. The role of information processing is less clear based on this study, and further work is needed in this area. Cognitive development appears to influence worry related cognition as a function of worry severity, where typical development is marked by a decrease in intolerance of uncertainty, negative problem orientation, and negative beliefs about worry. Overall, results from this study suggest that intolerance of uncertainty, negative problem orientation, and negative beliefs about worry significantly predict worry in children, regardless of child age or worry level, and negative problem orientation and intolerance of uncertainty have especially strong associations with worry.

This study makes an important contribution to a complex and, at times, contradictory literature. Future work could disentangle the complicated relations between cognitive development, worry, and cognitive variables in several ways. Understanding worry in children must account for a number of variables that could alter or moderate relations between variables, including but not limited to child sex, age, and worry

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severity. Emerging evidence suggests that each of these variables influences the directionality and/or strength of association between worry and related variables, and drawing conclusions at this time is difficult due to what appears to be inconsistent findings across studies. Future work should account for potential moderators in order to contribute to the literature in a way that allows for comparisons across studies. What appear to be contradictory findings might be due to the use of samples of different ages or worry severity level. Other conflicting findings might be explained by the study design and more specifically which cognitive variables are included in the analyses. To date, studies of worry in children have examined a single cognitive variable and its association with worry. Including more than one cognitive variable in the study design helps to distinguish which variables are most important relative to the other variables. Future work designed to account for relations between these variables and their association with worry will be important in clearly identifying the most relevant cognitive variables.

In addition, cognitive models should be tested in children younger than age eight years. To date no studies have examined a comprehensive model in children aged seven years or younger. Measures of intolerance of uncertainty and metacognition have been validated for use with children seven years old; however no known studies have examined the kind of comprehensive cognitive model tested here. In addition, developing other valid assessment measures of children's worry related cognition, beyond child self-report, would allow for the investigation of these constructs in eve younger children. Understanding the lower limit for the applicability of these models has important implications for treatment. If, as has been demonstrated in this study and others, cognitive

variables are strongly associated with worry in children, targeted interventions aimed at altering these thoughts could be beneficial in treatment.

Relatedly, longitudinal studies would clarify issues related to the temporal relations between cognitive variables, worry, and cognitive development. Studies designed to understand issues of timing, such as when these cognitions develop, how they become problematic, and their sequential relation with worry will be especially important in the creation of prevention and treatment programs in youth.

Additional work is also needed to test the applicability of this model to clinical samples of children. Although the current sample had a substantial proportion of clinically worried children, the model should be tested with children recruited from an anxiety clinic and in those diagnosed with GAD. Such a model could then be used to devise GAD and worry specific interventions for use in treating children.

Finally, the influence of parenting on the relevant cognitive variables should also be examined in the future. Cognitive variables have demonstrated a predictive relation to worry in children ages 8 to 12 years. Understanding how such beliefs about worry, uncertainty, and problems develop in children could inform prevention and intervention efforts. One likely source of influence is parents and family environment factors. Examining parental beliefs and specific parenting behaviors could help us to understand how children develop negative thinking styles and ultimately guide prevention and treatment efforts.

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APPENDIX A

Children's Opinions of Everyday Life Events
Interview

Story #1--Your mother usually gets home from work around 5:30 PM. One afternoon while you are watching TV, the phone rings at 6:30 PM and you realize your mom is not home yet. What do you think has happened?

_____

_____

_____

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

Story #2--One of your close friends tells you that another one of your friends is having a birthday party next Saturday. Your friend received a special invitation in the mail and you have not received one. What do you think has happened?

_____

_____

_____

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

Story #3--One day before starting the lesson, your teacher asks you to stay after class. What do you think has happened?

_____

_____

_____

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

Story #4-- While you are trying to go to sleep, you hear loud voices in your parents' bedroom. Your dad is yelling at your mom and she screams back at him. What do you think has happened?

_____

_____

_____

---

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

Story #5—On the first day of summer camp, some kids are talking and when you approach them you overhear them saying mean things about you. What do you think has happened?

_____

_____

_____

---

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

	1	2	3	4	5
	not at all	a little	somewhat	very much	extremely

Story #6—Your English teacher asks you to read a paragraph in front of the class. In the middle of your reading, the teacher tells you "Sit down, that's wrong" and asks someone else to continue reading. What do you think has happened?

_____

_____

_____

1. How would you feel if this happened to you?

	not at all	a little	somewhat	very much	extremely
Worried	1	2	3	4	5
Sad	1	2	3	4	5

2. How scary is this situation for you?

1	2	3	4	5
not at all	a little	somewhat	very much	extremely

3. How likely do you think this is to happen to you?

1	2	3	4	5
not at all	a little	somewhat	very much	extremely

PSWQ-C

Directions. This form is about worrying. Worrying happens when you are scared about something and you think about it a lot. People sometimes worry about school, their family, their health, things coming up in the future, or other kids of things. For each sentence that you read, circle the answer that best tells how true that sentence is about you.

1. My worries really bother me.	never true	sometimes true	most times true	always true
2. I don't really worry about things.	never true	sometimes true	most times true	always true
3. Many things make me worry.	never true	sometimes true	most times true	always true
4. I know I shouldn't worry about things, but just can't help it.	never true	sometimes true	most times true	always I true
5. When I am under pressure, I worry a lot.	never true	sometimes true	most times true	always true
6. I am always worrying about something.	never true	sometimes true	most times true	always true
7. I find it easy to stop worrying when I want.	never true	sometimes true	most times true	always true
8. When I finish one thing, I start to worry about everything else.	never true	sometimes true	most times true	always true
9. I never worry about anything.	never true	sometimes true	most times true	always true
10. I've been a worrier all my life.	never true	sometimes true	most times true	always true
11. I notice that II have been worrying about things.	never true	sometimes true	most times true	always true
12. Once I start worrying, I can't stop.	never true	sometimes true	most times true	always true
13. I worry all the time.	never true	sometimes true	most times true	always true
14. I worry about things until they are done.	never true	sometimes true	most times true	always true

RCMAS

Read each question carefully. Put a circle around the word YES if you think it is true about you. Put a circle around the word NO if you think it is not true about you.

1. I have trouble making up my mind.	YES	NO
2. I get nervous when things do not go the right way for me.	YES	NO
3. Others seem to do things easier than I can.	YES	NO
4. I like everyone I know.	YES	NO
5. Often I have trouble getting my breath.	YES	NO
6. I worry a lot of the time.	YES	NO
7. I am afraid of a lot of things.	YES	NO
8. I am always kind.	YES	NO
9. I get mad easily.	YES	NO
10. I worry about what my parents will say to me.	YES	NO
11. I feel that others do not like the way I do things.	YES	NO
12. I always have good manners.	YES	NO
13. It is hard for me to get to sleep at night.	YES	NO
14. I worry about what other people think about me.	YES	NO
15. I feel alone even when there are people with me.	YES	NO
16. I am always good.	YES	NO
17. Often I feel sick in my stomach.	YES	NO
18. My feelings get hurt easily.	YES	NO
19. My hands feel sweaty.	YES	NO
20. I am always nice to everyone.	YES	NO
21. I am tired a lot.	YES	NO
22. I worry about what is going to happen.	YES	NO
23. Other children are happier than I.	YES	NO
24. I tell the truth every single time.	YES	NO
25. I have bad dreams.	YES	NO
26. My feelings get hurt easily when I am fussed at.	YES	NO
27. I feel someone will tell me I do things the wrong way.	YES	NO
28. I never get angry.	YES	NO
29. I wake up scared some of the time.	YES	NO
30. I worry when I go to bed at night.	YES	NO
31. It is hard for me to keep my mind on my schoolwork.	YES	NO
32. I never say things I shouldn't.	YES	NO
33. I wiggle in my seat a lot.	YES	NO
34. I am nervous.	YES	NO
35. A lot of people are against me.	YES	NO
36. I never lie.	YES	NO
37. I often worry about something bad happening to me.	YES	NO

SPSI-R (Child Adaptation)

You are going to read some sentences about how people might think, feel, and act when they have important problems in their life. I'm not talking about everyday problems. The kinds of problems I am talking about are important in your life that bother you, but you don't know right away how to change it or how to make it stop bothering you. You know you have a problem when you feel puzzled, stumped, uncertain, or confused about something. You will read each statement and decide which number tells how true the statement is about you. Then circle the number. Remember not to skip any!

How true is the statement about you?

0 - not at all true

1- a little true

2 –medium amount true

3- very much true

4 – extremely true

1. I worry too much about things instead of trying to fix them.

     0   1   2   3   4

2. I feel afraid when I have a big problem to solve.

     0   1   2   3   4

3. When I have a big choice to make I feel scared and not sure that I can do it.

     0   1   2   3   4

4. Sometimes I can't solve a problem at first. Then I think that if I try hard and don't give up I will solve the problem later.

     0   1   2   3   4

5. When I have a problem, most of the time I think there is a way to fix it.

     0   1   2   3   4

6. I wait for problems to go away before I try to fix them.

     0   1   2   3   4

7. If I can't solve a problem right away, I get angry and feel stuck.

     0   1   2   3   4

8. When I have a big problem to solve, I feel like I can't fix it no matter how hard I try.

     0   1   2   3   4

9. When I have a problem, I put off trying to solve it for as long as I can.

     0   1   2   3   4

10. I try hard not to deal with problems in my life.

     0   1   2   3   4

11. Hard problems in my life make me very upset.

     0   1   2   3   4 .

12. When I have a problem in my life I try to solve it head on.

    0   1   2   3   4

13. I try not to think about problems instead of trying to fix them.

    0   1   2   3   4

14. I believe that I can fix a problem with no help if I keep trying hard.

    0   1   2   3   4

15. I put off problems until it is too late.

    0   1   2   3   4

16. I spend more time trying to stay away from my problems than trying to fix them.

    0   1   2   3   4

17. When I try to fix a problem I get so upset that it's hard to think.

    0   1   2   3   4

18. I hate solving problems in my life.

    0   1   2   3   4

19. I try to see problems as a way to learn something new.

    0   1   2   3   4

20. I feel sad and stuck when I have a big problem to solve.

    0   1   2   3   4

21. When I have a big problem, I ask someone to help me solve it.

    0   1   2   3   4

22. When I can't fix a problem on my first try, I get sad and give up.

    0   1   2   3   4

IUSC

How well do these statements describe you? Please answer questions #1 through #27 with this scale.

1	2	3	4	5
Not at all		Somewhat		Very much

1. Doubts stop me from having strong opinions.
       1   2   3   4   5

2. Being unsure means that a person is mixed-up.
       1   2   3   4   5

3. Not knowing what will happen in the future makes life hard.
       1   2   3   4   5

4. It's not fair that we can't predict the future.
       1   2   3   4   5

5. I can't relax if I don't know what will happen tomorrow.
       1   2   3   4   5

6. Not knowing what will happen in the future makes me uneasy, anxious or stressed.
       1   2   3   4   5

7. Surprise events upset me greatly.
       1   2   3   4   5

8. It frustrates me to not have all of the information I need.
       1   2   3   4   5

9. Not knowing what could happen keeps me from enjoying life.
       1   2   3   4   5

10. One should always think ahead to avoid surprises.
        1   2   3   4   5

11. Plans can be ruined by things you didn't think would happen.
        1   2   3   4   5

12. When it is time to do things, not knowing what could happen keeps me from acting.
        1   2   3   4   5

13. Being unsure of things means that I am not great.
        1   2   3   4   5

How well do these statements describe you?

1	2	3	4	5
Not at all		Somewhat		Very much

14. When I am not sure of something I can't go forward.
    1   2   3   4   5

15. When I am not sure of something I can't work very well.
    1   2   3   4   5

16. Other kids have less doubts than I do.
    1   2   3   4   5

17. Not knowing what will happen makes me unhappy or sad.
    1   2   3   4   5

18. I always want to know what will happen to me in the future.
    1   2   3   4   5

19. I don't like being taken by surprise.
    1   2   3   4   5

20. The smallest doubt can keep me from doing things.
    1   2   3   4   5

21. I should be able to prepare for everything in advance.
    1   2   3   4   5

22. Being unclear about things means that I am not confident.
    1   2   3   4   5

23. It's not fair that other kids are more sure of things.
    1   2   3   4   5

24. Not knowing what can happen keeps me from sleeping well.
    1   2   3   4   5

25. I must get away from all situations where I don't know what will happen.
    1   2   3   4   5

26. Things that are unclear stress me.
    1   2   3   4   5

27. I don't like being undecided about the future.
    1   2   3   4   5

MCQC

We are interested in how young people think. Listed below are a number of beliefs that people have. Please read each item and say how much you generally agree with by circling a number. Please respond to all the items. There are no right or wrong answers.

Do not agree	Agree slightly	Agree	Agree very moderately	much
1	**2**	**3**	**4**	

1. If I worry about things now, I will have fewer problems in the future.
    1   2   3   4

2. It is not a good idea to worry because worrying is bad for me.
    1   2   3   4

3. I often notice the thoughts I have in my head.
    1   2   3   4

4. If I worry a lot, I could make myself sick.
    1   2   3   4

5. When I am thinking about a problem in my head, I take note of how my mind works.
    1   2   3   4

6. If I did not get a worry thought out of my head and then something bad happened, it would be my fault.
    1   2   3   4

7. Worrying about things helps me to be organized and keep my stuff in order.
    1   .   2   3   4

8. My worrying thoughts keep going, no matter how hard I try to put them out of my head.
    1   2   3   4

9. When I am confused, worrying helps me sort things out.
    1   2   3   4

10. I can't stop thinking of the things that I worry about.
    1   2   3   4

11. I try hard to keep track of the thoughts that I have in my head.
    1   2   3   4

12. I should be able to tell myself to stop and start thinking about things whenever I want to.
    1   2   3   4

Do not	**Agree**	**Agree**	**Agree**	**very**
agree	**slightly**		**moderately**	**much**
1	**2**	**3**	**4**	

13. Worrying might make me go crazy.
    1   2   3   4

14. I am always thinking about the thoughts in my head.
    1   2   3   4

15. I pay a lot of attention to the way I think.
    1   2   3   4

16. Worrying helps me feel better.
    1   2   3   4

17. If I can't stop my thoughts, I am no good.
    1   2   3   4

18. Once I start worrying about something, I cannot stop.
    1   2   3   4

19. If I can't stop my thoughts, bad things will happen.
    1   2   3   4

20. Worrying helps me solve problems.
    1   2   3   4

21. It is bad to think about certain things.
    1   2   3   4

22. If I couldn't be in control of what I think, I would fall apart.
    1   2   3   4

23. I need to worry in order to get my work done.
    1   2   3   4

24. I think about my thoughts over and over.
    1   2   3   4

CURRICULUM VITAE

Sarah J. Kertz
59 Chestnut St., #6
Waltham, MA 02453
skertz@harvard.mclean.edu
573.576.8627

Academic History

7/2010-present	**McLean Hospital/Harvard Medical School,** Belmont, MA Predoctoral Psychology Internship
8/2006-present 12/2008	**University of Louisville**, Louisville, KY Master of Arts, Psychology Expected Degree: Ph.D., Clinical Psychology Mentor: Janet Woodruff-Borden, Ph.D. Dissertation Title: Childhood Worry: Proposal and Test of a Cognitive Model Current GPA: 3.95
8/2002-5/2006 5/2006	**Truman State University**, Kirksville, MO Degree: Bachelor of Arts Major: Psychology Minors: Statistical Methods; English GPA: 3.92

Honors and Awards

2010	Stanley A. Murrell Scientist-Practitioner Award
2009	Distinguished Pass on Preliminary Exam
2006	Graduated Summa Cum Laude
2006	Phi Beta Kappa
2006	Nominated for Outstanding Student in Psychology Award, Truman State
2006	President's Certificate Recognition - Outstanding Academic Achievement
2002-2006	Truman State University Leadership Scholarship- Tuition, Room & Board
2002-2006	President's List for 4.0 GPA
2002-2006	State of Missouri Bright Flight Scholarship
2003-2006	Phi Sigma Pi Coed National Honor Fraternity

Published Manuscripts

Kertz, S. J., Smith, C., Chapman, L. K., & Woodruff-Borden, J. (2008). Maternal sensitivity and anxiety: Impacts on child outcome. *Child and Family Behavior Therapy*, 30(2), 153-171.

Chapman, L. K., **Kertz, S. J.**, Zurlage, M., & Woodruff-Borden, J. (2008). A confirmatory factor analysis of specific phobia domains in African American and Caucasian young adults. *Journal of Anxiety Disorders* 22, 763-771.

Chapman, L. K., **Kertz, S. J.**, & Woodruff-Borden, J. (2009). Structural equation model analysis of perceived control and psychological distress on worry among African American and Caucasian American young adults. *Journal of Anxiety Disorders,* 23(1), 69-76.

Manuscripts Under Revision
Kertz, S. J. & Woodruff-Borden, J. Human and economic burden of GAD, subthreshold GAD, and worry in a primary care sample.

Kertz, S. J. & Woodruff-Borden, J. The developmental psychopathology of worry.

Manuscripts in Preparation
Brown, D. D., **Kertz, S. J.**, Woodruff-Borden, J., & Burns, B. M. Maternal elaborative style, maternal sensitivity, and the early understanding of causal connections during mother-child interactions.

Williams, S., **Kertz, S.J.**, Schrock, M., & Woodruff-Borden, J. A sequential analysis of parent-child interactions in anxious and nonanxious dyads.

Research Experience
08/2007-06/2010	**Lab Coordinator, Healthy Parents-Healthy Kids Research Lab**
University of Louisville	Supervisor: Janet Woodruff-Borden, Ph.D.

Responsibilities included coordinating activities of research team, creating and maintaining databases, writing study protocols, maintaining IRB approval, and supervising undergraduate students.

08/2006-06/2010	**Healthy Parents-Healthy Kids Research Lab**
University of Louisville	Supervisor: Janet Woodruff-Borden, Ph.D.

Primary responsibilities included project design, administration of diagnostic interviews and self-report measures, behavioral interaction coding, data entry and analysis, attending weekly lab meetings, and manuscript preparation.

08/2005-05/2006   **Research Practicum**
Truman State University   Supervisor: Jeffrey Vittengl, Ph.D.

Assisted in research on educational behaviors and attitudes, specifically in data collection, data coding, entry, analysis, and interpretation.

08/20005-12/2006   **Senior Capstone Project**
Truman State University   Supervisor: Sherri Palmer, Ph.D.

Investigated the relationship between mood and decision making. Responsibilities included review of the literature, development of a questionnaire, project design, data collection, data analysis, and manuscript preparation.

Poster Presentations

Kertz, S.J., Hosey, R., Schrock, M., Williams, S., & Woodruff-Borden, J. (2010). *Child coping style moderates the relation between trait anxiety and anxiety symptoms.* Poster to be presented at the Association of Behavior and Cognitive Therapies Convention, Navember 18-21, San Francisco, CA.

Schrock, M., **Kertz, S.J.**, Williams, S., Hosey, R., & Woodruff-Borden, J. (2010). *The impact of stressful life events on anxious and non-anxious parents' conditional responses to child behavior.* Poster to be presented at the Association of Behavior and Cognitive Therapies Convention, Navember 18-21, San Francisco, CA.

Williams, S., **Kertz, S.J.**, Hosey, R., Schrock, M., & Woodruff-Borden, J. (2010). *The role of anxiety on parent coaching and dismissing behaviors and thier relationship to child anxiety.* Poster to be presented at the Association of Behavior and Cognitive Therapies Convention, Navember 18-21, San Francisco, CA.

Kertz, S.J., & Woodruff-Borden, J. (2009). *The influence of maternal perceptions and anxiety on sensitivity.* Poster presented at the Association of Behavior and Cognitive Therapies Convention, November 19-22, New York, NY.

Kertz, S.J., Schrock, M., Williams, S., & Woodruff-Borden, J. (2009). *A sequential analysis of the influences of parental and child anxiety on child responses to parental aversiveness.* Poster presented at the Association of Behavior and Cognitive Therapies Convention, November 19-22, New York, NY.

Briggs, N., **Kertz, S.J.**, Maynor, A., & Woodruff-Borden, J. (2009). *Demographic correlates and impact of excessive worry in a primary care sample.* Poster presented at the Association of Behavior and Cognitive Therapies Convention, November 19-22, New York, NY.

Schrock, M., Williams, S., **Kertz, S.J.**, & Woodruff-Borden, J. (2009). *Anxious and non-anxious children's response to parental aversiveness: A sequential analysis.*

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Poster presented at the Association of Behavior and Cognitive Therapies Convention, November 19-22, New York, NY.

Williams, S., **Kertz, S.J.**, Schrock, M., & Woodruff-Borden, J. (2009). *Parental behaviors following child negativity in anxious and nonanxious parents: A sequential analysis.* Poster presented at the Association of Behavior and Cognitive Therapies Convention, November 19-22, New York, NY.

Brown, D., **Kertz, S. J.**, & Woodruff-Borden, J. (2008). *Maternal Sensitivity and Young Children's Use of Causal Connections during Storytelling.* Poster presented at the Biennial Society for Research in Child Development Convention, April 2-4, Denver, CO.

Kertz, S. J., Hosey, R., Schrock, M, Williams, S. R., Woodruff-Borden, J. (2008*). A path analysis of parent and child behaviors: Differences in children with GAD and other anxiety disorders.* Poster presented at the Annual Behavior and Cognitive Therapies Convention, November 13-16, Orlando, FL.

Schrock, M, **Kertz, S. J.**, Hosey, R., Williams, S., & Woodruff-Borden, J. (2008*). Impact of parental anxiety on parent's perceptions of child behavior.* Poster presented at the Annual Behavior and Cognitive Therapies Convention, November 13-16, Orlando, FL.

Hosey, R., Schrock, M., **Kertz, S. J.**, Williams, S., Chapman, L. K., & Woodruff-Borden, J. (2008). *Anxiety as a function of crime risk in a primary care sample.* Poster presented at the Annual Behavior and Cognitive Therapies Convention, November 13-16, Orlando, FL.

Kertz, S. J., & Woodruff-Borden, J. (2008). *Observations of Parent-Child Dyads: Differences Across Childhood Generalized Anxiety Disorder, Other Anxiety Disorders, and Normal Controls .* Poster at the Annual Association of Psychological Science Convention, May 22-25, Chicago, IL.

Chapman, L.K., **Kertz, S. J.**, & Woodruff-Borden, J. (2007). *A structural equation model analysis of perceived control and negative affect on worry among African American and Caucasian young adults.* Poster at the Annual Behavior and Cognitive Therapies Convention, November 15-18, Philadelphia, PA.

Kertz, S. J., Zurlage, M., Chapman, L. K., Woodruff-Borden, J. (2007). *Retrospectiv Reports of Family Functioning and Current Social Anxiety in a College Sample.* Poster at the Annual Behavior and Cognitive Therapies Convention, November 15-18, Philadelphia, PA.

Kertz, S. J., Zurlage, M., Chapman, L.K., Woodruff-Borden, J. (2007). *Anxiety and Ethnicity: An Analysis of Maternal Behaviors in African American and Caucasian*

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Families with Preschool Age Children. Poster at the Annual Behavior and
Cognitive Therapies Convention, November 15-18, Philadelphia, PA.

Zurlage, M., **Kertz, S. J,**, Smith, C., Chapman, L.K., Woodruff-Borden. (2007).
MaternalSensitivity and Anxiety as Predictors of Child Behavioral Outcomes.
Poster at the Annual   Behavior and Cognitive Therapies Convention, November
15-18, Philadelphia, PA.

Zurlage, M., **Kertz, S. J**, Chapman, L.K., Woodruff-Borden. (2007). *Fathers'*
Psychological Control and Acceptance as a Mediator and Moderator of Anxiety .
Poster at the Annual Behavior and Cognitive Therapies Convention, November
15-18, Philadelphia, PA.

Ballash, N., **Kertz, S. J.**, Zurlage, M., Chapman, L. K., Woodruff-Borden, J. (2007). *A*
Developmental Analysis of Maternal Control in the Etiology of Anxiety. Poster at
the Annual American Psychological Association Convention, August 17-20, San
Francisco, CA.

Zurlage, M., **Kertz, S.J**, Chapman, L.K., Woodruff-Borden. (2007). *Explanatory Models*
of Anxiety in Primary Care. Poster at the Annual American Psychological
Association Convention, August 17-20, San Francisco, CA.

Kniffley, S., **Kertz, S. J.**, Chapman, L. K., Woodruff-Borden, J. (2007). *An Analysis of*
Parental Behaviors and Anxiety in Black and White Young Adults. Poster at the
University of Louisville Summer Research Opportunity Program, August 1st,
Louisville, KY.

Meltzer, M., Agwu, C., Greenberg, B., **Kertz, S.**, Skelton, A., Vittengl, J.Wessel, A.,
Wooldridge, C. (2006). *The Correlation Between Student Embracement of*
the Liberal Arts and Expected Annual Income. Poster at the Midwestern
Psychological Association, May, Chicago IL.

Skelton, A., Agwu, C., Greenberg, B., **Kertz, S.**, Meltzer, M., Vittengl, J., Wessel, A.,
Wooldridge, C. (2006). *Exploring the Structure of Liberal Arts*
Acculturation and its Prediction of College Students' Well-being. Poster at the
Midwestern Psychological Association, May, Chicago, IL.

Clinical Experience

07/2010-present   **Behavioral Health Partial Program**
McLean Hospital   Supervisor: Thröstur Bjorgvinsson, PhD

Worked in a CBT and DBT oriented skills based partial hospital program for individuals
with Axis I and Axis II personality disorders. Conducted six groups per week and met
with patients for individual skills coaching. Approximately five hours of supervision
were provided weekly.

| 08/2009-05/2010 | **Psychological Services Center, Mindfulness and Acceptance Based Behavior Therapy Treatment Team** |
| University of Louisville | Supervisor: Paul Salmon, Ph.D. |

Several hours per week spent providing mindfulness and acceptance based treatments to individuals with anxiety and depressive symptoms. Weekly group and individual supervision meetings and mindfulness practice were also included.

| 08/2006-07/2009 | **Psychological Services Center, Cognitive-Behavioral Therapy for Anxiety Disorders Team** |
| University of Louisville | Supervisor: Janet Woodruff-Borden, Ph. D. |

Several hours per week focused on providing cognitive-behavioral treatment to individuals with anxiety disorders and depression. Other responsibilities included assessment, client reports, observing clients, and attending weekly supervision meetings.

| 05/2007-05/2010 | **Psychological Services Center, Assessment Practicum** |
| University of Louisville | Supervisors: Bernadette Walter, Ph.D. & David Winsch, PhD. |

Conducted advanced placement, Attention Deficit-Hyperactivity Disorder, and full diagnostic assessments of children and adults. Activities included test administration, scoring, interpretation, and the preparation of integrated reports. Results were also presented to the client in a verbal feedback session.

| 04/08-05/08 | **Girls Intervention Group – Wilkerson Elementary School** |
| University of Louisville | Supervisor: Janet Woodruff-Borden, Ph.D. |

Conducted 8 week intervention group designed to help at-risk girls ages 11 and 12 prepare for transition from elementary to middle school. Group met once per week for two hours and focused on issues such as self-image, assertiveness, peer relationships, and stress management.

| 06/2005-08/2005 | **Childcare Practicum** |
| Edgewood Children's Center | Supervisor: Anne Marie Potchen, M.S.W. |

Worked with children suffering from emotional and behavior disorders, developed and evaluated behavior modification plans, monitored behavioral and psychological status, intervened in crisis situations, including the use of physical restraint, taught behavioral, social and life skills.

Teaching Experience

08/2006-04/2007   **Teaching Assistant: Introductory Psychology**
University of Louisville   Supervisor: Edna Ross, Ph.D.

Taught six recitation sections over two semesters. Responsibilities included material preparation, delivering lectures, grading assignments, assisting students, proctoring exams, and recording and calculating grades.

Editorial Activities

Ad hoc reviewer, *Journal of Anxiety Disorders*

Professional Talks

"Helping Your Child Cope with Stress and Worry." Presented at the Family Scholar House, February 25th, 2010.

"Cognitive Behavioral Treatment of Comorbid OCD and OCPD." Case Conference Presentation, University of Louisville, March 25th, 2009.

"Stress and Anxiety." Guest lecture at Jefferson Community College on the nature and treatment of stress and anxiety disorders. April 24th, 2008.

"Student Involvement in Faculty Research: Making the Most out of Research Lab/Team Experiences." Panel Discussion at the Kentucky Psychological Association Convention, November 9th, 2007.

"Helping your child succeed in school." Workshop presented for parents at Semple Elementary School, September 28th, 2007.

Group Membership

2007-2010	Association for Behavior and Cognitive Behavior Therapies
2008	Association for Psychological Science
2007	American Psychological Association
2004-2006	Psi Chi National Psychology Honor Society

Professional Development

2007	University of Louisville Depression Center Conference
2006	Volunteer at Kentucky Psychological Association Convention
2006	Volunteer at Celebrating Women Conference

References

Dr. Paul Salmon
Associate Professor
Department of Psychological and Brain Sciences
University of Louisville
Louisville, Kentucky, 40292
(502) 852-8268
e-mail: p0salm01@louisville.edu

Dr. Bernadette Walter
Associate Professor
Director
Noble H. Kelley Psychological Services Center
University of Louisville
Louisville, KY 40292
(502) 852-8270
e-mail:brwalter@louisville.edu

Dr. Janet Woodruff-Borden
Professor
Director of Clinical Training
Department of Psychological and Brain Sciences
University of Louisville
Louisville, Kentucky 40292
(502)852-6070
e-mail: j.woodruff-borden@louisville.edu