Clin Child Fam Psychol Rev (2011) 14:174–197
DOI 10.1007/s10567-011-0086-3

The Developmental Psychopathology of Worry

Sarah J. Kertz · Janet Woodruff-Borden

Published online: 27 February 2011
© Springer Science+Business Media, LLC 2011

Abstract Although childhood generalized anxiety disorder is generally understudied, worry, the cardinal feature of GAD, appears to be relatively common in youth. Despite its prevalence, there are few conceptual models of the development of clinical worry in children. The current review provides a framework for integrating the developmental psychopathology perspective, models of worry in adults, and data available on worry in children. General risk factors for the development of worry are considered, as well as potential pathways including genetics, temperament, cognitive, emotional and parenting influences, as well as the influence of cognitive development. Based on this review, it appears unlikely that main effects models will be able to explain the development of GAD or clinical worry in children and that a broad, complex model incorporating a number of factors and their interactions will best describe etiological and maintaining factors. With this perspective in mind, a number of suggestions for future work are offered.

Keywords Developmental psychopathology · Worry · Generalized anxiety disorder

Worry is common in children. Studies have shown that as many as 70% of children from a community sample report worry about a number of things (Orton 1982) and 30% report subclinical levels of worry (Bell-Dolan et al. 1990). Worry itself in children is not unusual; however, 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 0.16 to 8.8% of community samples (Cartwright-Hatton et al. 2006). GAD has a chronic course, and many adults report that their worries began in childhood (American Psychiatric Association 2000). The prevalence, 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 content of child worry and patterns of associated symptoms described in DSM-IV (e.g., Hale et al. 2008; Muris et al. 2002a; Silverman et al. 1995; Tracey et al. 1997; Vasey et al. 1994; Weems et al. 2000). Recent work has begun to examine the role of cognitive factors in adolescents (Gosselin et al. 2007; Laugesen et al. 2003) and has demonstrated that many elements of adult cognitive models are applicable to younger populations. Work with children is still relatively uncommon, however, and the impact of cognitive development on models of worry has yet to be fully explored (one notable exception is Ellis and Hudson 2010). Incorporating a developmental psychopathology perspective may provide a useful framework for understanding the development and maintenance of worry in children.

Developmental psychopathology models emphasize several key points (Cicchetti and Cohen 1995). First is the principle of multifinality, which states that factors may not function similarly across children or contexts, and thus may

S. J. Kertz (✉)
McLean Hospital/Harvard Medical School, 115 Mill Street, Belmont, MA 02478, USA
e-mail: skertz@mclean.harvard.edu

J. Woodruff-Borden
Psychological and Brain Sciences, University of Louisville, Louisville, KY 40292, USA

not lead to similar outcomes. Rather, variables likely interact in dynamic and complex ways and their influence changes as a function of other key variables in the system. It may be for this reason that main effects models have been unable to explain the bulk of the variance in child anxiety. The second tenet of the developmental psychology model is that of equifinality, or the idea that there are numerous pathways to the development of psychopathology. It seems most likely that a number of factors, spanning a range of domains, interact in complex ways with the child to result in the development of anxiety. It follows, then, that a group of anxious children may have travelled very different paths to arrive at the same destination. The perspective also emphasizes the importance of understanding typical child development patterns. This allows for the identification of points where children deviate from an expected trajectory, which may in turn predict later anxiety. Finally, the developmental psychopathology perspective highlights the importance of understanding that the child is growing, changing, and evolving over time. The set of skills and abilities of the child at any given time likely alters the influence of other variables.

Several models of the developmental psychopathology of anxiety generally have been proposed (Vasey and Dadds 2001), and Rapee (2001) has proposed a model specific to GAD. Vasey and Dadds (2001) propose a model including a number of factors that may predispose to or protect against anxiety disorders. Included are factors such as genetic and neurobiological factors, temperament, emotion regulation, cognitive biases and distortions, early control experiences, parental responses, and experience with and exposure to phobic stimuli. Rapee discusses a model more specific to GAD, but noted that research in the area was "in its infancy" (p. 481), and that many of the factors and pathways he discussed may be associated with all the anxiety disorders and not specific to the development of GAD. Like Vasey and Dadds (2001), Rapee discusses the role of temperament and genetic factors, but also reviews support for the importance of environmental factors, the transmission of parental anxiety and parent reactions, peer relationships, and stressors. These models have been, and continue to be, tremendously informative; over the last 10 years, however, significant advances have been made in our understanding of worry and GAD (see Behar et al. 2009, for a review of empirically supported models in adults), allowing us to build upon and refine earlier models.

This review is organized in several parts. First, we will review the literature on factors that may be involved in the development of clinical worry and GAD in children, including genetic, temperament, cognitive, emotion regulation, and parenting factors. A conceptual model incorporating these factors with hypothesized pathways is then proposed, and a number of suggestions for future work are made.

Risk Factors and Vulnerability Processes

Several factors have been linked with GAD and worry in children, adolescents, and adults. It is likely that these factors interact with each other in complex ways over time and are affected by levels of demographic variables and biological, environmental, cognitive, and affective processes. These interactions and bidirectional relationships result in numerous pathways leading to the development of worry and GAD. The factors discussed here vary in the extent to which they have been studied in relation to children and worry. Some have shown strong relations with worry or GAD in adults but remain understudied in youth, while others have been studied in the context of child anxiety generally but not worry specifically. In instances where data are not available for children, the adult literature will be reviewed with a consideration of how such factors might apply to children. Of note, adult models have been largely cognitive, and this review reflects the state of the literature in this regard. Finally, most factors have been examined in terms of main effect models, and so the literature reviewed here is limited in this way. The factors with the most empirical support are reviewed here. General risk factors of age and sex will be reviewed first, followed by vulnerability processes.

Age

Generally, the prevalence of GAD and worry changes as a function of child age, and older children endorse more symptoms than younger children. For example, one study examined symptom patterns in a sample of children with overanxious disorder (OAD), the previous diagnostic category for worried children (Strauss et al. 1988). Results showed that clinically referred adolescents (12–19 years) were more likely than younger children (5–11 years) to present with six or more symptoms (66% compared to 35%), and more older children met all seven OAD diagnostic criteria compared to younger children (28 and 4%, respectively) (Strauss et al. 1988). A longitudinal study of community adolescents from early to middle adolescence showed that the number of GAD symptoms increased for girls but decreased for boys (Hale et al. 2008). The prevalence of worry itself also increases with child age. Older children (ages 12–18 years) score higher than younger children (ages 6–11 years) on the Penn State Worry Questionnaire for Children (PSWQ-C), and an examination of the factors structure of the measure showed that older group had higher factor loadings compared to the younger group (Chorpita et al. 1997). Developmental changes in fears and worry in normal school children have also been found (Muris et al. 2000b). Fears were common in the youngest children ages 4–6 years, most common for

children ages 7–9 years, and least common in children ages 10–12 years. Worry, however, was more common in the two older groups (78 and 76%) compared to the youngest group (47%).

Age differences in worry content have also been documented. One study found that the most frequent worry of children ages 3–6 years involved fear of imaginary creatures, a very uncommon concern in older children ages 7–14 years (Muris et al. 2002b). Older children worried more about school performance, a concern that increased steadily with child age. Other studies have found similar developmental patterns, with younger children reporting more concern over threats to physical safety, which declines with age, while older children report worries about behavioral competence, interpersonal/social issues, and psychological well-being, which generally increases with age (Muris et al. 2002b; Vasey et al. 1994). However, results have not been entirely consistent. For example, Vasey et al. (1994) found that 8- and 9-year-old children and 11–12-year-old children did not differ in their worry about behavioral competence. In another study of a community sample of children, Silverman et al. (1995) found only that younger children experienced more intense worry about disasters compared to older children.

Sex

Sex differences in childhood worry mirror those found in adults. Female children tend to report higher levels of worry compared to male children (Chorpita et al. 1997; Muris et al. 2001), and this pattern has been documented in children as young as 7 years (Silverman et al. 1995). Parent report corroborates children's self-report findings, indicating that mothers believe their daughters worry more than their sons (Gottlieb and Bronstein 1996). Another study found that girls reported more specific worries than boys and also endorsed more physical symptoms than boys (Muris et al. 1998).

Prevalence of OAD and GAD in males and females also differs. Several studies have found that the disorder is more common in females, especially as children grow older. A community-based study including children ages 8, 12, and 17 found that 12.4% of the sample met criteria for OAD, and more girls than boys were affected (15.2 and 9.5%, respectively) (Kashani and Orvaschel 1990). A sex difference was also found in a primary care sample of children ranging in age from 7 to 11 years, with girls again more commonly diagnosed than boys (6.4 and 2.6%, respectively) (Costello 1989). A non-clinical sample of children showed that significantly more girls than boys met criteria for OAD (Muris et al. 1998). Interestingly, other studies have found that prevalence estimates of OAD are approximately equal in younger children but that the disorder tends to decline in males as children approach adolescence (Strauss et al. 1988; Velez et al. 1989).

Genetics

Genetics undoubtedly play a role in the development of generalized anxiety and worry. Family, twin, and genetic studies of adults, children, and adolescents all provide support for genetic contributions to the development of GAD. For example, Newman and Bland (2006) found mild to moderate familial aggregation of GAD, with odds ratios ranging from 1.4 to 1.8 in first degree relatives of those with GAD and 2.1–2.8 in children of those with GAD. Others have found moderate support for genetics in the development of GAD in a study of female twins, but no evidence for the contribution of family environment (Kendler et al. 1992). Combining results from three twin studies, one group found that approximately 32% of the variance in GAD was explained by genetics (Hettema et al. 2001). This effect was consistent across sex, suggesting that the same genes are at work in both men and women. Interestingly, this study also found a small effect for familial environment, but only for women, and the bulk of the variance was explained by non-shared environmental factors. Consistent with these findings, a later meta-analysis of twin studies estimated the heritability of GAD at 0.32, with the bulk of the variance explained by non-shared environmental influences (Hettema et al. 2004). There was again a small effect for shared environment, but only for girls.

Twin studies of children and adolescents show results similar to those of adults, with mild to moderate heritability of GAD. In an examination of adolescent twins and their siblings (12–19 years), evidence was found for moderate genetic and non-shared influences for GAD, as well as a range of other disorders. Shared environment influences were also found for past year and lifetime MDD, and for lifetime but not past year GAD (Ehringer et al. 2006). Another twin study of children and adolescents aged 8–17 years examined genetic and environmental effects for GAD using scores on the Screen for Child Anxiety-Related Disorders Questionnaire (Ogliari et al. 2006). They found a significant genetic and child age interaction, with heritability estimates of 0.60 for children ages 8–11 years and 0.53 for children and adolescents 12–17 years.

Candidate gene studies have also shed light on the biological contributions to generalized anxiety. As reviewed by Gregory et al. (2008), several studies have found associations between GAD and both serotonin genes and monoamine oxidase A (MAO-A). Ohara and colleagues found that compared to controls, individuals with GAD had higher frequency of an allele containing 12 copies of the variable number tandem repeat in the second intron of the serotonin

transporter gene (Ohara et al. 1999). Another group found relations between the short allele of the promoter region of the serotonin transporter and GAD in a sample of Chinese patients (You et al. 2005). A study of MAO-A found that the instance of more than 3 repeat alleles of the MAO-A gene polymorphism was greater in women with GAD compared to controls (Samochowiec et al. 2004). Others found a unique link between the MAO-A G941T polymorphism and GAD but not panic disorder or major depression (Tadic et al. 2003), which is especially informative given the common comorbidity of GAD and MDD.

Genetic studies of anxiety have also examined children and adolescents. Olsson et al. (2007) examined the contributions of a composite genetic factor of catechol-O-methyltransferase (COMT) ($Val^{158}Met$) and serotonin transporter (5HTTLPR) (long–short) functional loci to the persistence of anxiety in adolescence, based on evidence that these genes play a role in mood and behavior through their regulation of serotonin, dopamine, and norepinephrine. Anxiety was measured using a composite of worry scales assessed at eight time points beginning in high school and ending at age 24. Results found dose–response reductions in the persistence of anxiety for the COMT Met 158 and 5HTTLPR short alleles. Interestingly, odds of reporting persistent anxiety were reduced more than twice in individuals homozygous for both alleles. Other genetic work with children ages 6–16 has examined the dopamine transporter gene DAT1 (Rowe et al. 1998). Results showed that the DAT1 10 repeat allele is associated with GAD, MDD, panic, separation distress, social phobia, specific phobia, obsessive compulsive disorder (OCD) and Tourette's syndrome. Strongest relations were found for GAD, social anxiety, OCD and Tourette's, and children with 10 repeat alleles, compared to those with 9, also had more symptoms of the four disorders (Rowe et al. 1998).

A small number of studies have also examined the influence of gene by environment interactions in childhood GAD. One study found that the short 5-HTT allele interacted with low social support to predict BI, a temperamental factor associated with anxiety, and shyness in children (Fox et al. 2005). Another study found that genes interacted with adverse life events to explain GAD in a sample of adolescent girls, such that genes explained only 19% of the variance in GAD for girls who had not experienced an adverse event, while genetics explained 44% of the variance for girls who had two such events (Silberg et al. 2001).

Overall, most studies show moderate genetic effects for GAD. Fewer studies found small effects for shared environment, but only for females. Support for the specificity of the heritability of GAD, rather than a general risk for anxiety or depressive disorders, is still mixed. Several studies found common underlying genetic factors for several anxiety disorders or for GAD and MDD. For example, one study found the genetics underlying GAD and MDD were completely shared and that non-shared environmental risk factors accounted for whether women developed MDD or GAD (Kendler et al. 1992). Similarly, Eley and Stevenson (2000) found that approximately half of their proband twin pairs were not concordant on anxiety diagnoses and half of these were monozygotic twins. It may be then that a more general risk for anxiety and/or depression is conferred by genetic factors, and expression of a particular disorder is dependent upon environmental factors. Methodological issues such as high rates of comorbidity within the anxiety disorders and with depressive disorders also complicate the issue. It is not always clear if individuals considered "probands" are diagnosed with only GAD, or if the GAD is comorbid with other anxiety or depressive disorders. Rapee (2001) has also pointed out that inconsistent definition of GAD (e.g., 1 month symptom duration compared to 6 months) across studies limits our ability to generalize findings.

Temperament

The development of clinical worry or GAD may have some basis in stable, trait-like temperamental characteristics. Temperament has been defined as behavioral inhibition, harm avoidance, negative affect, and reactivity and self-regulation. A complete review and discussion of the various models of temperament and their conceptual and methodological issues are beyond the scope of this paper, and so the current discussion will focus on those temperamental dimensions most strongly linked with anxiety.

Behavioral inhibition (BI), defined as a state of distress, reactivity, and uncertainty in response to unfamiliar objects or people, or stressful situations (Kagan 1994, 1997), is commonly studied in relation to anxiety. BI may be characterized by child proximity to caregivers, long latency to speech or approach, reduced verbalizations, and apparent distress (Kagan et al. 1994). Over time, BI may be expressed as irritability in infants, as fearful and clingy behavior in toddlers, and as hesitancy, reticence, and constriction with unfamiliar adults in preschool and young school age children (Pollock et al. 1995). Some research suggests that BI is a relatively stable trait for children classified as behaviorally inhibited (highest 10–15% of the sample) across 4 measurements from ages 4 to 13 years (Kagan 1989, 1994; Kagan et al. 1988; Kagan and Snidman 1999; Schwartz et al. 1999). BI did not show similar stability for children who fell in the middle of the distribution of BI.

Evidence for the association between BI and anxiety symptoms and disorders comes from longitudinal data and from family studies (see Degnan et al. 2010, for a review).

For example, Caspi et al. (1995) found that at ages 3–5 years boys who showed low levels of approach behavior and girls who showed withdrawal from novelty were more likely to be anxious in later childhood. Other work indicates that children identified as behaviorally inhibited at 21 months are more likely to develop an anxiety disorder 5–10 years later (Biderman et al. 1993; Hirshfeld et al. 1992). In a study specific to GAD, Rettew et al. (2006) found that the temperamental trait of harm avoidance was strongly associated with a GAD diagnosis in children and adults. In families, behaviorally inhibited children are more likely to have a parent with an anxiety disorder (Rosenbaum et al. 1992), and children of parents with panic disorder or depression have been shown to display higher levels of BI compared to children of non-anxious parents (Rosenbaum et al. 2000). Another study found that inhibited children of parents with panic disorder and/or major depression had higher rates of avoidant disorder or social anxiety disorder compared to non-inhibited children (Biederman et al. 2001).

Rothbart and colleagues have defined temperament as constitutionally based differences in reactivity and self-regulation across emotionality, motor activity, and attention (Derryberry and Rothbart 1997). Such individual differences are hypothesized to be influenced by genetic, developmental, and environmental factors. Reactivity refers to an individual's responses to changes in stimulation as well as factors related to latency, rise time, peak intensity, and recovery time. Self-regulation relates to processes that modulate the response. Factor analytic studies support a three factor model of temperament, including surgency, negative affectivity, and effortful control (Gartstein and Rothbart 2003). The ways in which temperamental characteristics might be implicated in the development of psychopathology have been discussed elsewhere (Rothbart 2004; Rothbart et al. 1995), including direct, indirect, and moderation effects.

Compared to work linking BI and anxiety, far fewer studies have investigated the association between Rothbart's model of temperament and anxiety. Tincas et al. (2006) reviewed the work but overall found mixed results. While one study (Rydell et al. 2003) found that lower-order emotional traits distinguished between internalizing and externalizing disorders, other available work was less conclusive. The authors suggest that the process oriented conceptualization of Rothbart's model of temperament makes predictions more difficult and requires more elaborate study methodologies (longitudinal data collection and the inclusion of possible moderators, for example).

Along these same lines, some researchers have started to examine interactions between temperament and other factors in the development of anxiety in children, an important step in advancing our understanding of developmental psychopathology models of anxiety. For example, a recent review examined interactions between BI and three environmental factors, including parenting, non-parental childcare, and peer relationships, on the development of anxiety in children (Degnan et al. 2010). They found that several parenting related factors, including maternal behavior, personality, parenting style, psychopathology, and attachment, moderate the association between BI and anxiety. Mixed results were found for the effects of non-parental childcare on the association between BI and anxiety, while experiences with peers was shown to moderate the trajectory of children with high levels of BI. Degnan and Fox (2007) reviewed literature suggesting that sensitive parents who encourage their behaviorally inhibited children act autonomously and to engage socially may prevent the development of more severe inhibition, while introverted parents who display overprotection may increase children's fearfulness. They also found that children's motivational bias to approach or withdraw (electroencephalogram asymmetry) cardiac measures and executive functioning may play a role in the continuity or discontinuity of BI over time.

Other work has examined interactions between temperament and attention biases and their associations with anxiety. For example, Lonigan and Vasey (2009) examined interactions between elements of temperament (effortful control) and attentional bias toward threat as potential mechanisms liking anxiety and negative affect. Results showed that effortful control moderated the association between negative affect and attentional bias, such that low levels of effortful control and high levels of negative affect resulted in bias toward threat. Other work has also shown that cognitive factors (attentional bias toward threat and neural response to novelty) moderate the association between early BI and later anxiety (Perez-Edgar et al. 2010; Reeb-Sutherland et al. 2009).

Overall, the relation between temperamental factors and anxiety appears to be specific to children with extreme levels of BI and are influenced by a number of related factors, including parental and contextual factors and information processing patterns. It is important to point out that extreme temperamental characteristics are neither necessary nor sufficient to determine an anxiety diagnosis. For example, Rettew and colleagues (Rettew et al. 2006) noted a significant number of individuals with high levels of harm avoidance did not meet criteria for GAD, and other work has shown that one-half to two-thirds of inhibited children do not develop clinically significant anxiety (Biederman et al. 1990; Prior et al. 2000; Schwartz et al. 1999). Taken together, it appears that temperament likely interacts with other important factors in complex ways to influence the development of anxiety.

Cognition

Worry in adults has received increasing attention over the last 15 years. Worry has been conceptualized as a largely cognitive process and the state of the literature reflects this view. As such, most research 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). The child literature lags well behind the adult literature in this area, and researchers are just now 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. Further, very few have examined the role of potential moderators or considered bidirectional or transactional processes, resulting in a literature that rests mostly on "direct effect" models. Despite these limitations, this literature provides valuable information in updating our models of GAD and worry and allows for the generation of hypotheses related to more complex developmental psychopathology models. The next section reviews the empirically supported adult models of GAD and worry, with findings relevant to adolescents or children included when available. Literature on cognitive development and implications for models of worry are then reviewed.

Avoidance Model

Borkovec (1994) 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 to occur or preventing such events entirely (Borkovec 1994). These beliefs about worry are negatively reinforced because the likelihood of most feared events is relatively small to begin with. Individuals with GAD also report that they use worry as a method of distraction and for avoiding deeper, more 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 and Hu 1990; Lyonfields et al. 1995; Thayer et al. 1996). Borkovec et al. (1998) suggest that it is the predominantly verbal nature of worry that results in reduced vagal activity, as verbal thoughts elicit less cardiovascular activity than images of the same content. The suppression of autonomic responses has important implications for the maintenance of worry. If worrying prevents physiological response, habituation to feared stimuli cannot be achieved (Borkovec and Lyonfields 1993). Worry works in much the same way as other avoidance strategies, preventing exposure and perpetuating anxious meanings and worry (Borkovec 1994).

Beliefs About Worry, Metaworry, and Metacognition

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 the content of worry, suggesting that metaworry, or worry about worry, is rare in normal worriers. He suggests that worry only becomes problematic when individuals develop metaworry, which leads to perseveration and attempts to control the 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. 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 and Carter 1999).

Other researchers have focused on positive and negative beliefs about worry. Freeston et al. (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 et al. 1996b) 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 also 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 in adults (Freeston et al. 1994).

Work examining metacognition in children is just beginning to emerge. Two studies have validated measures of metacognition in younger samples. One study found support for a five factor model of metacognition in a community sample of adolescents ages 13–17 years, 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) The five factors correlated positively with anxiety, although no worry measure was included. Bacow et al. (2009) adapted a similar questionnaire for use with children ages 7–17 years. Results supported the hypothesized four factor structure including positive meta-worry, negative meta-worry, 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 non-clinical children (with non-clinical children reporting higher levels of cognitive awareness).

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 between 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.

Related to Wells' model, two studies have examined children's attempts to control their worry, which may provide some insight into how worry is maintained (Muris et al. 1998; Szabó and Lovibond 2004). Results showed that children (ages 8–13 years) frequently resisted their worries and most frequently used distraction strategies and seeking social support in their attempts to control their worry (Muris et al. 1998). Clinical and non-clinical samples also differed, with GAD/OAD children attempting to distract themselves from their worries less frequently than normal children. Children also use distraction most frequently to end their worry, followed by decision making (decided how to cope with stressor), and seeking social support (Szabó and Lovibond 2004). This study failed to find differences between anxious and non-anxious groups in worry control strategies.

Intolerance of Uncertainty

Other cognitive variables have also been linked with worry in adults, and intolerance of uncertainty (IU) in particular has received growing attention. Intolerance of uncertainty is defined as a negative response, including emotional, cognitive, and behavioral reactions, to situations or events interpreted as ambiguous (Buhr and Dugas 2006). More specifically, IU reflects a set of beliefs about uncertainty, including that uncertainty is stressful, upsetting, interferes with functioning and that being uncertain about the future is unfair (Buhr and Dugas 2002). IU 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 and Dugas 2002). IU also appears to have a unique relationship with worry. In a study with undergraduate students, Buhr and Dugas (2006) found that IU remained positively correlated with worry even after controlling for intolerance of ambiguity, perfectionism, and perceived control. This study also showed that IU explained additional variance in worry scores above and beyond demographics and other study variables. Other work has shown that manipulations of IU influence worry, suggesting a causal relation between the two variables (Rosen and Knäuper 2009).

Work on IU has just recently begun with children and adolescents (see Laugesen et al. 2003 discussed later), likely due to the fact that reliable and valid measures were not available. To address this issue, Comer et al. (2009) modified a measure of IU for use with children ages 7–17 years. Their results found support for the measure and its relation with worry, indicating that IU 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 IU decreased with child age in the community group. One study used a Dutch translation of the IUS-12 with a community sample of adolescents ages 14–18 years (Boelen et al. 2010) and found that worry and social anxiety, but not depression, significantly predicted IU. This study also found that IU mediated the relation of negative affect and worry. These preliminary findings suggest that IU is also relevant to worry in adolescence and childhood, although much work is needed in this area.

Problem Solving and Problem Orientation

Relations between problem solving and worry in adults have been highlighted by other researchers, although no known work has examined similar associations in children. 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 et al. 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 receiving poor feedback about problem-solving solutions (regardless of true performance) was associated with lower problem-solving confidence, which in turn was associated with more catastrophizing steps during a worry interview (Davey et al. 1996a). The relationship between worry and problem solving seems to have less to do with actual skill sets 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. Ladouceur et al. (1998) define problem orientation as an individual's set of potential responses when confronted with a problem and metacognitive activity that characterizes an individual's approach to dealing with problems. One study found that non-clinical moderate worriers, non-clinical 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) investigated the relation of worry and depression 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 et al. 1997).

Information Processing

Models of worry in adults have emphasized the importance of information processing, which may serve as a causal and/or maintaining factor in GAD. Overall, work suggests 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 non-anxious controls, as indicated by faster reaction times to dots presented after threatening compared to non-threatening material (MacLeod et al. 1986; Mathews 1990; Mathews and 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 and Mathews 1991; Mogg et al. 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 non-anxious controls to name threat words (Mathews and MacLeod 1985;(Mogg et al. 1989). Attentional interference is thought to occur due to word content, resulting in errors and longer response times. This work is not unequivocal, however, as at least one study failed to find differences in attentional bias associated with GAD (Dibartolo et al. 1997). Individuals with GAD are also more likely than non-anxious 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 non-anxious individuals (Butler and Mathews 1983). A later study found similar results using homophones, with GAD participants reporting more threatening meanings (e.g., die rather than dye) than non-anxious participants (Mathews et al. 1989).

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 diagnosed with OAD, depression, and normal controls found that anxious participants reported that both future social and physical threat were more likely to occur (Dalgleish et al. 1997). Another study found that worried children provided higher threat ratings for both threatening and ambiguous vignettes and rated future negative events as more likely than non-worriers (Suarez and Bell-Dolan 2001). Higher threat interpretation in anxious children was also supported using a homograph task (Taghavi et al. 2000).

Attentional biases in childhood GAD have also been documented. When GAD, mixed anxious-depressed, and normal children viewed threat and depression-related stimuli, the GAD group showed bias toward threat-related, but not depression-related material (Taghavi et al. 1999). The mixed anxiety-depression group failed to show bias toward either material type. Using a modified Stroop task, Taghavi et al. (2003) found that children with GAD showed significant interference for negative (threat and

depression related) but not neutral words, an effect not found for non-anxious children. A similar pattern of attentional bias was found when emotional faces were used as probes. Children with severe GAD (as measured by clinician severity ratings) displayed a bias toward both angry and happy faces, whereas non-anxious children showed no bias (Waters et al. 2008). Low severity children did not differ statistically from the control group. 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. A particular informative study designed to identify relations between specific forms of pathology and information processing patterns compared children with major depressive disorder, GAD, and post-traumatic stress disorder on multiple information processing variables, including memory, attention, and prospective cognition (Dalgleish et al. 2003). 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 from each other in their estimation of likelihood of threatening events, either for self or others. Anxious and depressed groups did not differ on the memory task.

Children with GAD also show higher threat interpretations of ambiguous situations. An initial sample of children was administered measures of GAD, separation anxiety, and social anxiety symptoms (Bögels et al. 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.

Integrated Models

The importance of avoidance, IU, beliefs about worry, and information processing in the process of worry in adults has been established. However, most studies have focused on only one of these variables and its relation with worry. While this is important in advancing our understanding of worry, it seems possible that the collection of cognitive variables associated with worry is also related to one another. For example, if uncertainty is both distressing and interpreted as threatening, it seems likely that problem orientation and information processing factors are also affected by such a reaction. Alternatively, a negative problem orientation could lead to difficulty defining problems, resulting in higher levels of IU.

Dugas and colleagues have tested a number of models examining unique contributions of cognitive variables to worry. One study found that both IU and negative problem orientation made unique and shared contributions to the prediction of worry in a sample of GAD patients (Dugas et al. 1997). A later study by Dugas et al. (2005) found that IU differentially influenced information processing, such that those high in IU recalled more words associated with uncertainty compared to neutral words. A second study by Dugas et al. (2005) found that those high in IU were more likely to interpret ambiguous information as threatening, and IU predicted threat interpretation above and beyond age, gender, anxiety, depression, and worry. Another study found that IU, beliefs about worry, problem orientation, and cognitive avoidance discriminated GAD from non-anxious participants and that IU in particular played the strongest role in the classification (Dugas et al. 1998). The study's second discriminant analysis approach compared the utility of the above cognitive variables to GAD associated symptoms in classifying GAD and non-anxious participants. Results showed that the cognitive variables correctly classified nearly as many participants as the symptom measures.

Studies have also shown that cognitive variables are related to clinical severity of GAD. For example, one study showed that both non-clinical subjects meeting GAD symptom criteria by questionnaire and GAD patients reported higher IU and more dysfunctional beliefs about the usefulness of worry compared to moderate worriers (Ladouceur et al. 1998). Ruscio and Borkovec (2004) found that high worriers with and without GAD demonstrated 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. IU, negative problem orientation, cognitive avoidance, and positive beliefs have also been shown to correlate with at least one measure of GAD severity in a clinical sample (Dugas et al. 2007).

Two studies have tested the relevance of integrated conceptual adult models to adolescent samples. One group tested associations between worry and IU, 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 IU 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 IU and problem orientation contributed to the classification, while beliefs about worry and thought

suppression did not. A later study by Gosselin et al. (2007) examined relationships between beliefs about worry, cognitive avoidance, and worry in a sample of high school students. Participants were divided into high (>80th percentile) and moderate (40–60th 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.

Cognitive Development

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 worry prevalence and content. Such an understanding could also inform intervention strategies, ensuring that cognitive techniques designed to alleviate worry are applicable given a 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 will be explored. First, the question of how child development influences the expression and experience of worry (as it is currently defined) will be addressed, and second, the implications of cognitive development for adult models of worry and GAD will be discussed.

Borkovec (1994) has defined worry as an uncontrollable, future oriented, primarily verbal, stream of negatively valenced and threatening thoughts. Based on this definition, several skills and abilities are required to engage in such a process. Vasey (1993) has pointed out that 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 perception that such thought is uncontrollable.

Borkovec's (1994) definition implies that worry requires a fairly advanced conceptualization of the future. Vasey (1993) has suggested that very young children's restricted ability to think about the future limits their ability to worry in a generalized way. For example, Povinelli et al. (1996) concluded that children younger than age 4 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 et al. 1971), may be sufficient for worry. However, the increase in ability to understand the future seen in children around age 8 (Wallace and 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, as it is currently defined, also requires the production of a chain of negative thoughts depicting various threatening outcomes. Vasey (1993) and Ellis and Hudson 2010 have summarized work indicating that children's abilities to generate and reason about possible outcomes also increases with child age. The cognitive literature also suggests that young children's basic abilities to reason about causal events and consider alternative outcomes increases with age. For example, Flavell et al. (2004) reviewed work indicating that children as young as age 3 can infer causal relationships in complicated conditions. Counterfactual reasoning, which involves making predictions about what could have happened but did not, has also been documented in children as young as 3 years (Harris et al. 1996). German (1999) 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 et al. 2000). Other work (Lagattuta 2007) also 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 assume an awareness of internal verbal thoughts, and subsequent assessments of cognition. Studies suggest that children's awareness of their internal stream of consciousness and that of others varies as a function of cognitive development. Ellis and Hudson 2010 have reviewed literature examining the development of metacognition, specifically children's awareness of the content and controllability of their thoughts. They suggest that children as young as age 3 years have an awareness of possessing information, a skill related to the development of theory of mind, and that the ability to report on one's own thoughts, although present at age 5 years, is more advanced at age 8 years. One study showed that 4- and 5-year-old children are significantly worse than adults at detecting inner speech (Flavell et al. 1997), and 5-year-olds are unable to report spontaneous ideation when instructed to have "no thoughts" (Flavell et al. 2000). Most young children, ages 3 and 4 years, are also unaware that people may have thoughts when not engaged in tasks (e.g., sitting in a chair and waiting), although most 6-year-olds acknowledge that such a person has thoughts (Flavell et al. 1993). Flavell et al. (1997) have suggested 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 control may still be emerging in early childhood (See Ellis and Hudson 2010, for a discussion). Overall, results suggest that most development in understanding that thoughts are uncontrollable 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 age nine 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 be appropriate.

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 et al. (1994) examined relations between cognitive development, self-concept complexity, and worry in a community sample of children ages 5–12 years. In response to a series of vignettes depicting worried children, older children (8–12 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 reported worries and were able to elaborate on them, although not to the extent of the older children. Results also showed correlations between self-concept complexity and proportion of physical threat and social evaluation/psychological worries. Muris et al. (2002b) found similar results in their study of a community sample of children ages 3–14 years. Personal and vignette worry elaboration scores correlated positively with both child age and cognitive development (measured by Piagetian conservation tasks). Interestingly, even the youngest group of children (ages 3–6 years) reported a significant amount of worry. Worry elaboration also mediated the relationships 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 et al. 2002a). For average children, passing the conservation task was associated with an increased likelihood of worry, but no such relationship was found for the children with below average intelligence.

The stage of a child's cognitive development has implications for the applicability of the adult models described earlier, including but not limited to how children conceptualize information, the extent to which worry serves as avoidance, and their ability to engage in metacognition. Children's use of mental representation of information may affect the expression or experience of worry, as Borkovec's definition of worry describes worry as primarily verbal stream of negative thoughts (1994). Children's cognitive and language development may also 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.

Cognitive development should also inform models including metacognition. Several models rest on an individual's ability from relatively complex thoughts and judgments about both internal and external stimuli. Flavell et al. (1993, 1995, 2000) suggests 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.

There is still much to learn about the role of cognitive development in worry in children. The direct effects of cognitive development are generally understudied, and the influence of cognitive development on associations between other related variables (e.g., temperament) and worry remains unknown. Further, a child's stage of cognitive development likely influences and is influenced by the cognitive factors discussed here, so that bidirectional effects are also likely to be at work. Future work should examine these associations longitudinally to understand not only how cognitive development is related to worry in children, but also how cognitive development interacts with other related variables to influence their association with worry over time.

Emotion Regulation

Although most models of GAD have focused on cognitive and metacognitive factors, other work has examined worry and emotion regulation. Emotion regulation refers to the attempts and strategies individuals use to modify when, how, and which emotions are experienced and expressed (Gross 1998). Adult literature in this area is more developed than the child literature, and several models of relations between emotion regulation deficits and GAD specifically have been proposed and tested (Mennin et al. 2005; Mennin et al. 2007; Salters-Pedneault et al. 2006; Turk et al. 2005).

Mennin et al. (2005) have proposed an emotion dysregulation model of GAD in adults that incorporates four related emotional factors. They suggest that a tendency toward heightened emotional intensity paired with both poor emotional understanding and negative reactivity to emotions leads to maladaptive emotional management, such as worry. Results from their study of undergraduate and clinical samples showed that those in the GAD groups had higher levels of emotional intensity, difficulty identifying and describing emotions, negative beliefs about activated emotions, and difficulty returning to baseline after negative emotional arousal. An emotion dysregulation composite score also predicted GAD group membership in the undergraduate sample, even after controlling for worry, trait anxiety, and depression. When these hypotheses were tested in a second undergraduate study using a mood induction paradigm, results showed that after anxious and sad mood inductions, those in the GAD group reported greater physiological arousal and less acceptance of and influence over their mood compared to the control group.

Work by others has also supported the associations between worry or GAD and emotion regulation. One study found specific emotion regulation deficits that appeared unique to GAD. The authors found that an analog GAD group described stronger emotional impulses and fear of depression compared to an analog social anxiety group, while those with social anxiety reported less expression of positive emotions, difficulty describing emotions, and being less attentive of emotions compared to the GAD group (Turk et al. 2005). Another study found relations between emotion regulation and worry. Specifically, difficulty in accepting emotions, difficulty engaging in goal directed behavior when distressed, impulse control difficulties, decreased clarity of emotional experience, and limited access to emotion regulation strategies correlated positively with worry scores and differed significantly between GAD analog and normal groups, even after controlling for negative affect (Salters-Pedneault et al. 2006).

Despite exciting advances in our understanding of worry and emotion regulation in adults, the development of emotion regulation in children and how it relates to anxiety and worry is still in the early stages. Available data are encouraging, however, and several studies have linked deficits in emotion regulation with childhood anxiety disorders broadly and, in a few studies, worry specifically.

Developmental trends in emotion regulation strategies suggest that as children grow older they move from externally oriented behavioral strategies to more internal, cognitive ones (Saarni 1999). A study of emotion regulation strategies and their relation to depression across the lifespan (ranging from early adolescents to older adults) found that older adults endorsed the highest levels of acceptance, positive refocusing and putting into perspective strategies, while non-clinical adults reported the most planning, and positive reappraisal (Garnefski and Kraaij 2006). Early adolescents used fewer of all types of strategies compared to late adolescents.

Anxiety in children is related to both emotion regulation deficits and perceived competence in emotion management. A community study found relations between anxiety symptoms and low emotional awareness (Suveg et al. 2008), while another showed that children with an anxiety disorder had less developed understanding of hiding emotions and changing emotions compared to non-anxious children (Southam-Gerow and Kendall 2000). Other work indicated that children with an anxiety disorder had more dysregulated worry, sadness, and anger, as well as less adaptive coping compared to non-anxious children (Suveg and Zeman 2004). Further, results from this study showed that all children had more difficulty coping with worry than with sadness. Mothers of anxious children in the study rated their children lower on appropriate emotion expression and self-awareness than mothers of non-anxious children. Children diagnosed with GAD, social anxiety, or separation anxiety also have been shown to experience greater intensity and frequency of negative emotions, have difficulty reappraising negative emotions, and depend on strategies likely to increase impairment or negative emotions compared to non-anxious children (Carthy et al. 2010). Anxious children in this study also had lower perceptions of self-efficacy related to regulating emotions. A recent study of the effectiveness of CBT for anxious youth demonstrated that treatment resulted in improvements in anxiety, anxiety self-efficacy, emotion awareness, and worry regulation (Suveg et al. 2009), suggesting that such deficits may play a key causal or maintaining role in clinical worry.

Although most work in this area continues to examine mostly main effects models, a recent study has examined a meditational model incorporating several related factors. The proposed developmental emotion dysregulation model of anxiety posits that temperament and emotion parenting variables exert their influence on child anxiety via emotion dysregulation (Suveg et al. 2010). Results showed that the emotion dysregulation mediated the association between BI and anxiety and partially mediated the relation between family emotional environment and anxiety. Future work might continue this line of work by also examining these factors as potential moderators of the effects of emotion dysregulation and anxiety.

Parenting

The relationship between parenting factors and childhood anxiety has received significant attention in the literature over the last decade. The bulk of the literature has conceptualized this effect as originating from the parent, suggesting that certain parenting behaviors are predictive of child anxiety symptoms. However, this association is likely influenced by a number of other factors and is complexly related to child outcome. For example, child temperament has been associated with parenting behavior (Gauvain and Fagot 1995; Paulussen-Hoogeboom et al. 2007), and other work suggests that the influence of parenting on children varies as a function of child temperament (Hastings et al. 2005; Propper and Moore 2006; Russell et al. 2003; Wood et al. 2003). Further, associations between parent behaviors and child anxiety are likely transactional, with both parents and children mutually influencing each other over time. To date, most of the literature is cross-sectional, and our ability to draw conclusions about the directionality of the effects is limited. The following literature review should be considered with this issue in mind.

Parental Behaviors

Several narrative reviews and meta-analyses have consolidated results from a wide range of studies. Wood et al.'s (2003) comprehensive review included studies of parental control and acceptance (a dimension of warmth) and also examined the effect of different measurement methods. Overall, parental control showed the most consistent effects, while support was mixed for acceptance, with stronger relationships found in studies using an observational methodology compared to those using parent or child report of parenting. Another review of work published after Wood et al.'s review focused on parental control and negativity (Bögels and Brechman-Toussaint 2006). Four additional observational studies also supported the relations between parental control and child anxiety (Bögels and Brechman-Toussaint 2006). Three observational studies of parental warmth showed inconsistent results, with two studies finding the support for the hypothesized relationship and one failing to find such results. A later meta-analysis of 47 studies found a medium effect size for the relationship between parental control and childhood anxiety (McLeod et al. 2007). When the authors broke down the constructs of rejection and control to the subdimensions of warmth, withdrawal, aversiveness, overinvolvement, and autonomy-granting, results showed that autonomy-granting and overinvolvement explained the greatest proportion of variance in childhood 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 meta-analysis of 17 observational studies further examined the relationship between parenting constructs and child anxiety (van der Bruggen et al. 2008). They reported a medium to large effect size for the association between parental control and child anxiety and 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.

Although the work described previously is not associated with specific anxiety disorders, other studies have examined links between parenting and worry or GAD symptoms 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 found that self-report worry scores correlated with both maternal and paternal anxious rearing and rejection, and maternal rejection (Muris et al. 2000a). Another study using the same measure with an older sample of children found significant correlations between worry and anxious rearing and overprotection of both parents for girls, but only overprotection of both parents for boys (Muris 2002). Findings of these two studies were partially replicated with a clinic referred anxious sample (8 with a diagnosis of GAD), with significant correlations between parental rejection and worry, but not anxious rearing, overprotection, or warmth (Brown and Whiteside 2008). Analysis of relationships between parenting factors and worry for the GAD sample alone were not conducted.

Other work has linked parenting with measures of GAD symptoms in children. Results from a self-report study of primary school children showed that parental anxious rearing, mother's control, and father's emotional warmth each correlated with GAD symptoms (Muris and Merckelbach 1998). Interestingly, the same pattern of results was also found for separation anxiety symptoms but not for other anxiety disorders. Another study of non-anxious adolescents (Hale et al. 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.

As previously discussed, most work to date has examined the association of parenting and childhood anxiety. However, several studies have examined the effect from the opposite direction, examining the effect of child anxiety on parenting behaviors. Several studies have found that child anxiety significantly predicts maternal behavior during parent–child interactions (Moore et al. 2004; Whaley et al. 1999). Van der Bruggen et al. (2010) examined the contribution of both parent and child trait anxiety to displays of parental control. They found that high parental trait anxiety showed a curvilinear relation with control, such that high parent trait anxiety was associated with both high and low levels of control. Further, higher trait anxiety in boys, but not girls, and child withdrawal was associated with more parental control. In another study of the influence of both dyad members, Schrock and Woodruff-Borden (2010) examined the influence of parent and child anxiety on the behavior of both participants in interactions. They found a significant interaction between parent and child anxiety for negative parent behaviors and child productive and overcontrol behaviors.

Other work has adopted an approach more consistent with the developmental psychopathology perspective by examining the associations between temperament, parenting behaviors, and child anxiety disorder/internalizing symptoms, testing both mediation and moderation models. Several studies have found support for temperament by parenting interactions in the prediction of prosocial behavior (Hastings et al. 2005; Russell et al. 2003). Another group (Williams et al. 2009) examined interactions between temperament (at 14 and 24 months) and parenting in the prediction of later internalizing symptoms. They found that behaviorally inhibited children who also had permissive mothers showed the greatest level of internalizing symptoms at age 4 years. Another group found that although temperament and parenting (negative affect and encouraging independence) each made unique contributions to the classification of children as anxious or non-anxious, parenting behaviors did not moderate the association between temperament and child anxiety status (Lindhout et al. 2009). A longitudinal study examining the association between children's temperament (negative emotionality) at 3.5 years of age and anxiety symptoms 1 year later found that maternal rejection, but not paternal rejection, mediated the association between temperament emotionality and later anxiety (van der Bruggen et al. 2010).

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. It stands to reason that exposure to a parent's anxious behavior, both avoidant and catastrophizing, will influence children's interpretation of threat, cognition about new or threatening situations, and preferred coping strategies. Methods for studying parental

modeling have included behavioral tasks, naturalistic observation, and discussion-based tasks.

In a study of maternal modeling, one study showed that children ages 15–20 months showed greater avoidance a toy paired with a negative maternal reaction compared to a toy paired with a happy/encouraging maternal response (Gerull and Rapee 2002). Children continued to display the fear response 1 and 10 min after the initial modeling trial, suggesting that there is some lasting effect of exposure to parental behaviors and affect. Another experimental study compared children's responses to parental anxious and non-anxious behavior before a planned spelling test (Burstein and Ginsburg 2010). Results showed that when parents behaved in an anxious manner before the test, children reported more anxiety, more anxious cognition, and urges to avoid the test compared to instances when parents displayed non-anxious behavior. Interestingly, fathers had a stronger impact than mothers on children's cognition and anxiety.

Naturalistic observations of parent and child behaviors also support the modeling hypothesis. Mothers and their children ages 4–10 years were observed in the waiting room of a pediatric clinic and behaviors coded for maternal emotion, maternal problem focused behavior, and child distress (Greenbaum et al. 1988). A sequential analysis showed that in dyads with high trait anxious mothers, maternal agitation predicted child distress; alternatively, in low trait anxious mothers, child distress was more likely to be followed by maternal agitation. Discussion-based studies have tested hypotheses 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 non-anxious mothers (Whaley et al. 1999). Another study found that anxious mothers were more likely to catastrophize than non-anxious mothers, regardless of the anxiety status of their children (Moore et al. 2004). For non-anxious mothers, having an anxious child increased the likelihood of maternal catastrophizing. However, a second study failed to find differences between anxious and non-anxious groups in parent–child discussions of affect (Suveg et al. 2008).

Parent–Child Relationship Quality

Studies of the quality of parent–child relationships have also found associations with worry and GAD. Two studies have shown that insecurely attached children had higher levels of worry, although no differences were found between ambivalent and avoidant attachment styles (Brown and Whiteside 2008; Muris et al. 2000a). In a stepwise regression examining contributions of parenting and attachment status, only parental rejection and insecure attachment explained significant variance in worry scores (Brown and 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 non-anxious counterparts (Eng and Heimberg 2006). Cassidy and colleagues (2009) examined childhood attachment status and current representations of attachment in a sample of adults with severe GAD presenting for treatment. Results showed that those with GAD reported experiencing less maternal love in childhood, more maternal rejection and neglect, and more role reversal and enmeshment (defined as the need to protect and fear of losing a primary care giver) compared to non-anxious controls. Individuals with GAD also reported more current vulnerability in their relationship with their mother.

Parental Influence on Child Cognition

A number of theoretical models hypothesize that parental behavior promotes the development of dysfunctional cognitions in children, increasing their risk for anxiety disorders (Chorpita and Barlow 1998; Vasey and Dadds 2001). However, few empirical studies have examined these hypotheses and whether the link between parental factors and child worry might be mediated by child cognition, such as information processing, threat interpretation, and metacognition, remains understudied. The impact of parenting on children's worry related cognition has received very limited attention, although significant relations between parent and child information processing in children with anxiety disorders broadly have been found and will be reviewed here.

The hypothesis that parents influence children's threat interpretations has generally been supported. Mothers of anxious children report higher threat interpretation in response to ambiguous situations, and mother and child threat interpretation scores have shown significant positive correlations (Creswell et al. 2005). One study found that when presented with ambiguous homographs and homophones, anxious children made more threatening interpretations than non-clinical children but not externalizing children, and mothers of anxious children showed higher threat interpretation than other mothers (Gifford et al. 2008). Results also showed that contrary to Creswell et al.'s (2005) findings, mother and child's 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 relationship between mother and child threat interpretations, the correlation between maternal anxiety and child threat interpretation suggests an influence that warrants additional attention.

Family discussion tasks of ambiguous situations have been used to examine children's threat interpretation and

the influence of parents. Comparing mothers and children diagnosed with an anxiety disorder, oppositional defiant disorder, and a group of non-clinical control children, one group (Barrett et al. 1996) found that anxious and oppositional children were more likely to interpret ambiguous scenarios as threatening, and anxious children were more likely than both groups to choose avoidant coping plans. Parents of anxious children predicted that their children would make a higher number of threat interpretations and choose avoidant coping strategies. After a discussion with their parents, anxious children increased their avoidant responses, while non-clinical children decreased avoidance responses. The authors suggest that parents may reinforce threatening interpretations and model avoidant behavior by providing reassurance and sheltering their children from potentially anxiety provoking situations. Similar work by Chorpita et al. (1996) hypothesized that parental verbalization contributes to the development of threat interpretations in children and that parental discussion of threat or danger primes children for future threat interpretation. They found 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 ($n = 8$ non-clinical and $n = 4$ anxious) of the study and low power limits its generalizability; however, the preliminary results are compelling. These results have not been replicated consistently, however. Other studies have failed to demonstrate the effect (Logsdon-Conradsen 1998, as cited in Shortt et al. 2001). Results from one study suggest that the demands of the task, specifically whether or not the discussion would determine treatment eligibility for the child, influenced the FEAR effect (Shortt et al. 2001).

Other methods have also been used to examine how parental information affects children's threat interpretations. Morren et al. (2004) examined children's use of emotional reasoning (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 (forming judgments about a stimulus based on the perceived reactions of others) when interpreting ambiguous situations. Results showed that children's interpretations of danger relied on both objective information as well as anxiety-related signals from parents (leg trembling vs. smiling). Results showed that child anxiety alone did not predict interpretation; however, there was a significant anxiety by age interaction. In children with high anxiety, the parent-based reasoning effect decreased with age, while the effect increased with age in children with low anxiety. Although replication of the effect is needed, the methodology used in this study contributes to the growing body of literature explaining how parents influence their children's cognitive biases.

More traditional information processing paradigms have also shown relations between parents and their children's way of thinking. Moradi et al. (1999) may have found evidence for a cognitive vulnerability in children of non-symptomatic children of parents with post-traumatic stress disorder. Comparing performance of non-clinical children of parents with post-traumatic stress disorder and control parents on the Stroop color naming task, results showed a significant interaction of word type and group status. Children of parents with PTSD were slower to name threat-related words compared to neutral words, while children of normal controls were faster to name depression-related words compared to neutral words, despite similar levels of anxiety symptoms.

Very few studies have examined the influence of parenting on specific cognitive variables hypothesized to relate to anxiety. In a study of a community sample of adolescents, negative metacognition about worry correlated positively with over reactive parenting, defined as punitive, harsh, or inconsistent discipline (Gallagher and Cartwright-Hatton 2008). Over reactive parenting also predicted trait anxiety, and metacognition partially mediated the relationship. Finally, children of over reactive parents reported more dysfunctional positive and negative beliefs about worry. Another study of young adults (ages 18–23 years) found that perceived parental rejection and anxious rearing correlated positively with IU, and that IU mediated the relation between perceived anxious rearing behaviors and anxiety and worry (Zlomke and Young 2009).

Although not specific to clinical worry, a recent study of parents and children with obsessive compulsive disorder informs our understanding of children's metacognition and anxiety, particularly because cognitive models of OCD and GAD share similarities in that thoughts are monitored, evaluated, and managed with suppression or control attempts. This study examined parental influences on adolescent's metabeliefs (Jacobi et al. 2006). Small but significant positive correlations were found between parent and child report of 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 relationship. Such weak relationships could be the result of the use of a community sample. If neither parents nor children reported high levels of OCD symptoms, the amount of variability in the data may have obscured relationships that may exist.

Summary and Future Directions

Undoubtedly, numerous factors are involved in the development and maintenance of worry and GAD in children. These factors interact with one another and within the

context of the developing child over time, with no single factor either necessary or sufficient. Although the interaction of factors results in a complex web of pathways, an attempt to summarize the factors and hypothesize potential pathways is made here (see Fig. 1). The model does not specify any one particular path to the development of worry or GAD, and similar to hypothesized models of depression in children, direct and indirect paths are hypothesized, as well as moderation effects (Garber 2010). Exactly which factors interact, how they affect one another, and the ways their dose and timing influence the development of worry remain largely unknown, and so at this point in time the model is necessarily speculative. It is also important to keep in mind that these factors are continually interacting, changing over time, and are both affected by and affecting social, emotional, and cognitive development.

The model begins by hypothesizing that a child's temperament likely plays a large part in a predisposition toward anxiety, but there may also be additional genetic factors at work that are not well understood at this time. Specifically, how those genetic factors predispose children toward anxiety remains unclear. This biological vulnerability is likely influenced in part by parental anxiety, due to both genetic contributions and environmental factors. Biological vulnerability factors in turn influence parental factors, cognitive vulnerability factors, and responses to affect. The model also posits that the relationships between these variables (parental factors, cognitive vulnerability factors, and responses to affect) are bidirectional, each one interacting with the others in their association with worry. The quality of the parent–child relationship also plays an important role, directly or indirectly by moderating the effects of other factors.

Biological vulnerability factors likely exert some influence over parental anxiety, modeling of anxious behavior, and parenting behaviors, which also influence each other. Parents may be more likely to display certain parenting behaviors with children of certain temperaments and the effects of parenting behaviors may differentially influence children as a function of their temperaments. For example, a child with high levels of BI may elicit more controlling behaviors from the parent. The effect of such behavior on children is likely moderated by the child's temperament, so that a parent's controlling behavior may in turn foster children's overreliance on parents and hinder the development of autonomy. In a child with lower levels of BI, such parenting might provide structure or support needed to encourage autonomy.

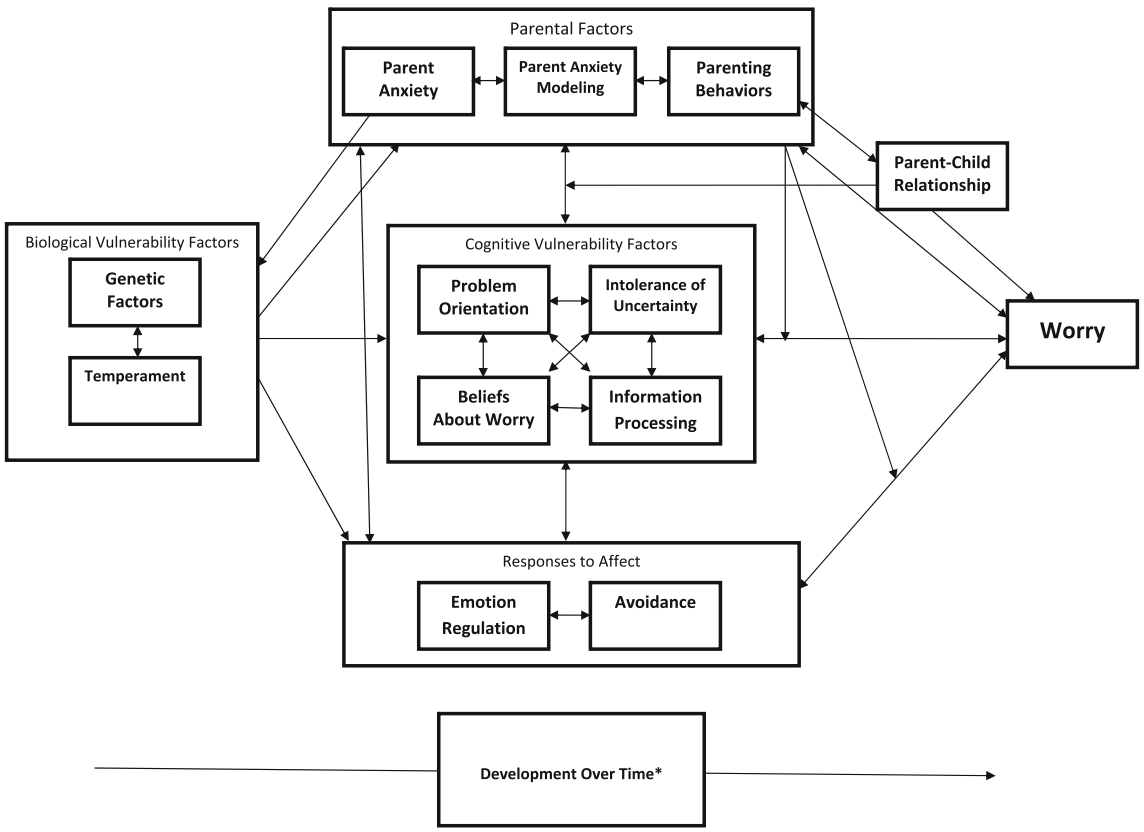

Fig. 1 Proposed model of the developmental psychopathology of worry

Biological vulnerability factors, parental factors, and responses to affect are also hypothesized to relate to cognitive vulnerability factors. Cognitive vulnerabilities have been linked directly with worry in adults, and preliminary work suggests that IU and metacognitive factors are also associated with anxiety in children. Parental factors, emotion regulation strategies, avoidance, and the parent–child relationship likely interact with one another to influence the development and maintenance of cognitive vulnerabilities directly. A child may develop ways of thinking and interacting with the world through interactions with their parents, by dealing with problems and ambiguity, and through experience with their own emotions. For example, a child with a behaviorally inhibited temperament might, thorough experience with an anxious parent, learn that ambiguity is threatening and something to be avoided. A parent who lacks warmth and displays high levels of control may also convey the message that the child is unable to cope effectively with problems or uncertainty independently. This may result in anxious affect or cognition when a child is confronted with an uncertain or ambiguous event, which the child might attempt to regulate with avoidance, a maladaptive emotion regulation strategy, or worry.

It is also likely that there is a biological bass to affect regulation, and such regulation is influenced by parental and cognitive vulnerability factors. Affective variables have been linked directly with worry in adults, and preliminary work suggests such models might also be applicable for children (Carthy et al. 2010; Suveg and Zeman 2004; Turk et al. 2005). Certain temperamental characteristics or other biological factors may be associated with high levels of emotional intensity or difficulty returning to baseline emotional arousal. In turn, high levels of emotional intensity may be related to poor emotional understanding, negative beliefs about emotions, and/or attempts to avoid or suppress emotional experience. These responses may be related directly to worry or moderated by parental factors. For example, a child with high levels of reactivity will likely have a predisposition toward experiencing intense anxiety and longer recovery time to return to emotional baseline. As a result, the child might develop negative beliefs about emotion (e.g., "Anxiety is dangerous" or "Feeling anxious means I'm out of control") and uncertainty, which might trigger anxiety. To cope with anxiety, such a child might turn to avoidance or suppression of anxiety, making worry a particularly appealing coping strategy.

Any of the variables described have the potential to work as protective factors at any point in the process outlined above, moderating the effect of other factors. A child with high levels of BI and maladaptive emotion regulation strategies might experience lower levels of anxiety or worry if protected by a positive parent–child relationship, compared to a child with a negative relationship. Similarly, a parent who models approach rather than avoidant behavior could protect or buffer a child's tendency toward emotional intensity or negative beliefs about emotional experience.

Finally, worry itself likely influences the cognitive vulnerability factors, responses to affect, and parental factors, and parent factors moderate such associations. Borkovec (1994) has suggested that positive beliefs about worry, such as thinking that worry prevents negative occurrences, may be reinforced by the event's non-occurrence. For example, a child who worries that his or her parent will be involved in a car accident may believe that worry facilitated his or her parent's safe arrival. Worry might also be reinforcing as an emotion regulation strategy. If worry works as a temporarily effective method for avoiding or dampening intense anxiety, it may increase the likelihood that it will be used again as a coping strategy in the future. This effect might be strengthened if the child is exposed to an anxious parent who is modeling or encouraging such a response, or lessened in families where parents encourage more proactive ways of coping.

The model presented here is complex, involving interactions between multiple factors, affected by issues of timing and levels of child cognitive and social development. Pathways involving biological and cognitive vulnerability factors, parental factors, responses to affect, and the parent–child relationship interact in complex ways to lead to the development of worry and GAD. It should be emphasized that these factors alone may not be necessary or sufficient for the development of clinical worry, and in some cases vulnerabilities may be shared between all the anxiety disorders or with depression. The interaction of these factors and at what point in development they occur may be what contributes to a more specific risk for GAD or worry.

Based on this developmental psychopathology perspective, several lines of future work would be beneficial. First, it will also be important to study very young children (younger than age 7) to investigate the experience of worry in this group, and to examine how worry develops over time. There is empirical evidence to suggest that children younger than 7 years of age can and do worry (Vasey et al. 1994). Our understanding of whether this worry meets the assumptions implied by our current definitions of worry is still limited. How the factors discussed here put children at risk for or protect against worry, and how these factors interact over time remains unknown but has important implications for prevention and treatment in children.

Relatedly, longitudinal work is needed to understand how cognitive and social development influence children's experience of worry, and conversely, how worry affects children's cognitive and social development. Currently, we

do not know whether the cognitive factors that have been so well supported in the adult literature are also important for children or at what developmental stage they begin to play a role. Issues related to the contribution of emotion regulation to worry in young children also remains understudied, as does the potential impact of cognitive development. It could be that affective models explain more variance in children in earlier stages of cognitive development, when language and cognitive skills are still developing, while cognitive variables take on more importance over time. At this time, we can only speculate as to the answers to these questions.

Future work would also benefit from broadening the scope of models to understand interactions with factors across multiple domains. As has been stated, the development of worry and GAD is likely complex, and models that fail to reflect this complexity can only make limited contributions to the literature. For instance, exciting work with genetics has found significant interaction effects with child age, sex, and environmental stressors (see Gregory et al. 2008). This work could be extended event further to examine relations with shared environmental factors, temperament, cognition, or emotion regulation.

Finally, future work should tease apart etiological and maintaining factors in childhood anxiety with longitudinal work. Such a design can shed light on causal and maintaining factors that cross-sectional studies, although informative, simply cannot. Studies of "at risk" children might be particularly useful here. Children might be considered at risk for a number of reasons, including genetic or temperamental predispositions, parental characteristics, presence of dysfunctional cognitions, or emotion regulation deficits. Understanding differences between vulnerable, disordered, and normal children, as well as the stability of vulnerability factors and shifts from one category to another, could inform prevention and treatment efforts.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: American Psychiatric Association.

Bacow, T. L., Pincus, D. B., Ehrenreich, J. T., & Brody, L. R. (2009). The metacognitions questionnaire for children: Development and validation in a clinical sample of children and adolescents with anxiety disorders. *Journal of Anxiety Disorders, 23*(6), 727–736.

Barrett, P. M., Rapee, R. M., Dadds, M. M., & Ryan, S. M. (1996). Family enhancement of cognitive style in anxious and aggressive children. *Journal of Abnormal Child Psychology, 24*(2), 187–203.

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011–1023.

Bell-Dolan, D. J., Last, C. G., & Strauss, C. C. (1990). Symptoms of anxiety disorders in normal children. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*(5), 759–765.

Biederman, J., Hirshfeld-Becker, D. R., Rosenbaum, J. F., Hérot, C., Friedman, D., Snidman, N., et al. (2001). Further evidence of association between behavioral inhibition and social anxiety in children. *The American Journal of Psychiatry, 158*(10), 1673–1679.

Biderman, J., Rosenbaum, J. F., Bolduc-Murphy, E. A., Faraone, S. V., Chaloff, J., Hirshfeld, D. R., et al. (1993). A 3-year follow-up of children with and without behavioral inhibition. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 918–924.

Biederman, J., Rosenbaum, J. E., Hirshfeld, D. R., Faraone, S. V., Bolduc, E. A., Gersten, M., et al. (1990). Psychiatric correlates of behavioral inhibition in young children of parents with and without psychiatric disorders. *Archives of General Psychiatry, 47*, 21–26.

Boelen, P., Vrinssen, I., & van Tulder, F. (2010). Intolerance of uncertainty in adolescents: Correlations with worry, social anxiety, and depression. *Journal of Nervous and Mental Disease, 198*(3), 194–200.

Bögels, S. M., & Brechman-Toussaint, M. L. (2006). Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review, 26*(7), 834–856.

Bögels, S. M., Snieder, N., & Kindt, M. (2003). Specificity of dysfunctional thinking in children with symptoms of social anxiety, separation anxiety and generalised anxiety. *Behaviour Change, 20*(3), 160–169.

Borkovec, T. D. (1994). The nature, functions, and origins of worry. In G. C. L. Davey & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (pp. 5–33). Oxford, England: Wiley.

Borkovec, T. D., & Hu, S. (1990). The effect of worry on cardiovascular response to phobic imagery. *Behaviour Research and Therapy, 28*(1), 69–73.

Borkovec, T. D., & Lyonfields, J. D. (1993). Worry: Thought suppression of emotional processing. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 101–118). Ashland: Hogrefe and Huber Publishers.

Borkovec, T. D., Ray, W. J., & Stober, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research, 22*(6), 561–576.

Brown, A. M., & Whiteside, S. P. (2008). Relations among perceived parental rearing behaviors, attachment style, and worry in anxious children. *Journal of Anxiety Disorders, 22*(2), 263–272.

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*(8), 931–946.

Buhr, K., & Dugas, M. J. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222–236.

Burstein, M., & Ginsburg, G. S. (2010). The effect of parental modeling of anxious behaviors and cognitions in school-aged children: An experimental pilot study. *Behaviour Research and Therapy, 48*(6), 506–515.

Butler, G., & Mathews, A. (1983). Cognitive processes in anxiety. *Advances in Behaviour Research and Therapy, 5*(1), 51–62.

Carthy, T., Horesh, N., Apter, A., & Gross, J. J. (2010). Patterns of emotional reactivity and regulation in children with anxiety disorders. *Journal of Psychopathology and Behavioral Assessment, 32*(1), 23–36.

Cartwright-Hatton, S., Mather, A., Illingworth, V., Brock, J., Harrington, R., & Wells, A. (2004). Development and preliminary validation of the meta-cognitions questionnaire—adolescent version. *Journal of Anxiety Disorders, 18*(3), 411–422.

Cartwright-Hatton, S., NcNicol, K., & Doubleday, E. (2006). Anxiety in a neglected population: Prevalence of anxiety disorders in pre-adolescent children. *Clinical Psychology Review, 26*, 817–833.

Caspi, A., Henry, B., McGee, R. O., & Moffitt, T. E. (1995). Temperamental origins of child and adolescent behavior problems: From age three to fifteen. *Child Development, 66*(1), 55–68.

Cassidy, J., Lichtenstein-Phelps, J., Sibrava, N. J., Thomas, C. L., & Borkovec, T. (2009). Generalized anxiety disorder: Connections with self-reported attachment. *Behavior Therapy, 40*(1), 23–38.

Chorpita, B. F., Albano, A. M., & Barlow, D. H. (1996). Cognitive processing in children: Relation to anxiety and family influences. *Journal of Clinical Child Psychology, 25*(2), 170–176.

Chorpita, B. F., & Barlow, D. H. (1998). The development of anxiety: The role of control in the early environment. *Psychological Bulletin, 124*(1), 3–21.

Chorpita, B. F., Tracey, S. A., Brown, T. A., Collica, T. J., & Barlow, D. H. (1997). Assessment of worry in children and adolescents: An adaptation of the Penn state worry questionnaire. *Behaviour Research and Therapy, 35*(6), 569–581.

Cicchetti, D., & Cohen, D. J. (1995). *Developmental psychopathology, Vol. 1: Theory and methods*. Oxford, England: Wiley.

Comer, J. S., Roy, A. K., Furr, J. M., Gotimer, K., Beidas, R. S., Dugas, M. J., et al. (2009). The intolerance of uncertainty scale for children: A psychometric evaluation. *Psychological Assessment, 21*(3), 402–411.

Costello, E. J. (1989). Child psychiatric disorders and their correlates: A primary care pediatric sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*(6), 851–855.

Creswell, C., Schniering, C. A., & Rapee, R. M. (2005). Threat interpretation in anxious children and their mothers: Comparison with nonclinical children and the effects of treatment. *Behaviour Research and Therapy, 43*(10), 1375–1381.

Dalgleish, T., Taghavi, R., Neshat-Doost, H., Moradi, A., Canterbury, R., & Yule, W. (2003). Patterns of processing bias for emotional information across clinical disorders: A comparison of attention, memory, and prospective cognition in children and adolescents with depression, generalized anxiety, and posttraumatic stress disorder. *Journal of Clinical Child and Adolescent Psychology, 32*(1), 10–21.

Dalgleish, T., Taghavi, R., Neshat-Doost, H., Moradi, A., Yule, W., & Canterbury, R. (1997). Information processing in clinically depressed and anxious children and adolescents. *Journal of Child Psychology and Psychiatry, 38*(5), 535–541.

Davey, G. C. L. (1994). Worrying, social problem-solving abilities, and social problem-solving confidence. *Behaviour Research and Therapy, 32*(3), 327–330.

Davey, G. C., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of worrying: Evidence for worrying and anxiety as separate constructs. *Personality and Individual Differences, 13*(2), 133–147.

Davey, G. C. L., Jubb, M., & Cameron, C. (1996a). Catastrophic worrying as a function of changes in problem-solving confidence. *Cognitive Therapy and Research, 20*(4), 333–344.

Davey, G. C. L., Tallis, F., & Capuzzo, N. (1996b). Beliefs about the consequences of worrying. *Cognitive Therapy and Research, 20*(5), 499–520.

Degnan, K. A., Almas, A. N., & Fox, N. A. (2010). Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology and Psychiatry, 51*(4), 497–517.

Degnan, K. A., & Fox, N. A. (2007). Behavioral inhibition and anxiety disorders: Multiple levels of a resilience process. *Development and Psychopathology, 19*, 729–746.

Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology, 9*(4), 633–652.

Dibartolo, P. M., Brown, T. A., & Barlow, D. H. (1997). Effects of anxiety on attentional allocation and task performance: An information processing analysis. *Behaviour Research and Therapy, 35*(12), 1101–1111.

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*(6), 593–606.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215–226.

Dugas, M. J., Hedayati, M., Karavidas, A., Buhr, K., Francis, K., & Phillips, N. A. (2005). Intolerance of uncertainty and information processing: Evidence of biased recall and interpretations. *Cognitive Therapy and Research, 29*(1), 57–70.

Dugas, M. J., Savard, P., Gaudet, A., Turcotte, J., Laugesen, N., Robichaud, M., et al. (2007). Can the components of a cognitive model predict the severity of generalized anxiety disorder? *Behavior Therapy, 38*(2), 169–178.

Ehringer, M. A., Rhee, S. H., Young, S., Corley, R., & Hewitt, J. K. (2006). Genetic and environmental contributions to common psychopathologies of childhood and adolescence: A study of twins and their siblings. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology, 34*(1), 1–17.

Eley, T. C., & Stevenson, J. (2000). Specific life events and chronic experiences differentially association with depression and anxiety in young twins. *Journal of Abnormal Child Psychology, 28*, 383–394.

Ellis, D. M., & Hudson, J. M. (2010). The metacognitive model of generalized anxiety disorder in children and adolescents. *Clinical Child and Family Psychology Review, 13*(2), 151–163.

Eng, W., & Heimberg, R. G. (2006). Interpersonal correlates of generalized anxiety disorder: Self versus other perception. *Journal of Anxiety Disorders, 20*(3), 380–387.

Flavell, J. H., Green, F. L., & Flavell, E. R. (1993). Children's understanding of the stream of consciousness. *Child Development, 64*(2), 387–398.

Flavell, J. H., Green, F. L., & Flavell, E. R. (1995). Young children's knowledge about thinking. *Monographs of the Society for Research in Child Development, 60*(1), v-96.

Flavell, J. H., Green, F. L., & Flavell, E. R. (2000). Development of children's awareness of their own thoughts. *Journal of Cognition and Development, 1*(1), 97–112.

Flavell, J. H., Green, F. L., & Flavell, E. R. (2004). Recent progress in cognitive developmental research: Implications for clinical practice. In H. Steiner (Ed.), *Handbook of mental health interventions in children and adolescents: An integrated developmental approach* (pp. 73–97). San Francisco: Jossey Bass.

Flavell, J. H., Green, F. L., Flavell, E. R., & Grossman, J. B. (1997). The development of children's knowledge about inner speech. *Child Development, 68*(1), 39–47.

Fox, N. A., Nichols, K. E., Henderson, H. A., Rubin, K., Schmidt, L., Hamer, D., et al. (2005). Evidence for a gene-environment interaction in predicting behavioral inhibition in middle childhood. *Psychological Science, 16*(12), 921–926.

Freeston, M. H., Rhéaume, J., Letarte, H., & Dugas, M. J. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791–802.

Gallagher, B., & Cartwright-Hatton, S. (2008). The relationship between parenting factors and trait anxiety: Mediating role of cognitive errors and metacognition. *Journal of Anxiety Disorders, 22*(4), 722–733.

Garber, J. (2010). Vulnerability to depression in childhood and adolescence. In R. E. Ingram & J. M. Price (Eds.), *Vulnerability to psychopathology: Risk across the lifespan* (pp. 189–247). New York: The Guilford Press.

Garnefski, N., & Kraaij, V. (2006). Relationships between cognitive emotion regulation strategies and depressive symptoms: A comparative study of five specific samples. *Personality and Individual Differences, 40*(8), 1659–1669.

Gartstein, M. A., & Rothbart, M. K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant Behavior and Development, 26*(1), 64–86.

Gauvain, M., & Fagot, B. (1995). Child temperament as a mediator of mother-toddler problem solving. *Social Development, 4*(3), 257–276.

German, T. P. (1999). Children's causal reasoning: Counterfactual thinking occurs for 'negative' outcomes only. *Developmental Science, 2*(4), 442–447.

Gerull, F. C., & Rapee, R. M. (2002). Mother knows best: The effects of maternal modelling on the acquisition of fear and avoidance behaviour in toddlers. *Behaviour Research and Therapy, 40*(3), 279–287.

Gifford, S., Reynolds, S., Bell, S., & Wilson, C. (2008). Threat interpretation bias in anxious children and their mothers. *Cognition and Emotion, 22*(3), 497–508.

Gosselin, P., Langlois, F., Freeston, M. H., Ladouceur, R., Laberge, M., & Lemay, D. (2007). Cognitive variables related to worry among adolescents: Avoidance strategies and faulty beliefs about worry. *Behaviour Research and Therapy, 45*(2), 225–233.

Gottlieb, D., & Bronstein, P. (1996). Parents' perceptions of children's worries in a changing world. *Journal of Genetic Psychology, 157*(1), 104–118.

Greenbaum, P. E., Cook, E. W., Melamed, B. G., & Abeles, L. A. (1988). Sequential patterns of medical stress: Maternal agitation and child distress. *Child and Family Behavior Therapy, 10*(1), 9–18.

Gregory, A. M., Lau, J. Y. A., & Eley, T. C. (2008). Finding gene-environment interactions for generalised anxiety disorder. *European Archives of Psychiatry and Clinical Neuroscience, 258*(2), 69–75.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*(3), 271–299.

Hale, W. W., III, Engels, R., & Meeus, W. (2006). Adolescent's perceptions of parenting behaviours and its relationship to adolescent generalized anxiety disorder symptoms. *Journal of Adolescence, 29*(3), 407–417.

Hale, W. W., III, Raaijmakers, Q., Muris, P., van Hoof, A., & Meeus, W. (2008). Developmental trajectories of adolescent anxiety disorder symptoms: A 5-year prospective community study. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(5), 556–564.

Harris, P. L., German, T., & Mills, P. (1996). Children's use of counterfactual thinking in causal reasoning. *Cognition, 61*(3), 233–259.

Hastings, P. D., Rubin, K. H., & De Rose, L. (2005). Links among gender, inhibition, and parental socialization in the development of prosocial behavior. *Merrill-Palmer, Quarterly, 51*, 467–493.

Hettema, J. M., Neale, M. C., & Kendler, K. S. (2001). A review and meta-analysis of the genetic epidemiology of anxiety disorders. *The American Journal of Psychiatry, 158*(10), 1568–1578.

Hettema, J. M., Prescott, C. A., & Kendler, K. S. (2004). Genetic and environmental sources of covariation between generalized anxiety disorder and neuroticism. *The American Journal of Psychiatry, 161*(9), 1581–1587.

Hirshfeld, D. R., Rosenbaum, J. F., Biederman, J., Bolduc, E. A., Faravone, S. V., Snidman, N., et al. (1992). Stable behavioral inhibition and its association with anxiety disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 31*, 103–111.

Jacobi, D. M., Calamari, J. E., & Woodard, J. L. (2006). Obsessive-compulsive disorder beliefs, metacognitive beliefs and obsessional symptoms: Relations between parent beliefs and child symptoms. *Clinical Psychology and Psychotherapy, 13*(3), 153–162.

Kagan, J. (1989). Temperamental contributions to social behavior. *American Psychologist, 44*, 668–674.

Kagan, J. (1994). *Galen's prophecy*. New York: Basic Books.

Kagan, J. (1997). Temperament and the reactions to unfamiliarity. *Child Development, 68*(1), 139–143.

Kagan, J., Reznick, J. S., Snidman, N., & Gibbons, J. (1988). Childhood derivatives of inhibition and lack of inhibition to the unfamiliar. *Child Development, 59*(6), 1580–1589.

Kagan, J., & Snidman, N. (1999). Early childhood predictors of adult anxiety disorders. *Biological Psychiatry, 46*, 1536–1541.

Kagan, J., Snidman, N., Arcus, D., & Reznick, J. S. (1994). *Galen's Prophecy*. New York: Basic Books.

Kashani, J. H., & Orvaschel, H. (1990). A community study of anxiety in children and adolescents. *The American Journal of Psychiatry, 147*(3), 313–318.

Kendler, K. S., Neale, M. C., Kessler, R. C., & Heath, A. C. (1992). Major depression and generalized anxiety disorder: Same genes, (partly) different environments? *Archives of General Psychiatry, 49*(9), 716–722.

Ladouceur, R., Blais, F., Freeston, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*(2), 139–152.

Lagattuta, K. H. (2007). Thinking about the future because of the past: Young children's knowledge about the causes of worry and preventative decisions. *Child Development, 78*(5), 1492–1509.

Laugesen, N., Dugas, M. J., & Bukowski, W. M. (2003). Understanding adolescent worry: The application of a cognitive model. *Journal of Abnormal Child Psychology, 31*(1), 55–64.

Lindhout, I. E., Markus, M. T., Hoogendijk, T. H. G., & Boer, F. (2009). Temperament and parental child-rearing style: unique contributions to clinical anxiety disorders in childhood. *European Child and Adolescent Psychiatry, 18*(7), 439–446.

Littenberg, R., Tulkin, S. R., & Kagan, J. (1971). Cognitive components of separation anxiety. *Developmental Psychology, 4*(3), 387–388.

Lonigan, C. J., & Vasey, M. W. (2009). Negative affectivity, effortful control, and attention to threat-relevant stimuli. *Journal of Abnormal Child Psychology, 37*, 387–399.

Lyonfields, J. D., Borkovec, T. D., & Thayer, J. F. (1995). Vagal tone in generalized anxiety disorder and the effects of aversive imagery and worrisome thinking. *Behavior Therapy, 26*(3), 457–466.

MacLeod, C., & Mathews, A. (1991). Biased cognitive operations in anxiety: Accessibility of information or assignment of processing priorities. *Behaviour Research and Therapy, 29*(6), 599–610.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology, 95*(1), 15–20.

Mathews, A. (1990). Why worry? The cognitive function of anxiety. *Behaviour Research and Therapy, 28*(6), 455–468.

Mathews, A., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy, 23*(5), 563–569.

Mathews, A., Richards, A., & Eysenck, M. (1989). Interpretation of homophones related to threat in anxiety states. *Journal of Abnormal Psychology, 98*(1), 31–34.

McLeod, B. D., Weisz, J. R., & Wood, J. J. (2007). Examining the association between parenting and childhood depression: A meta-analysis. *Clinical Psychology Review, 27*(8), 986–1003.

Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion dysregulation model of

generalized anxiety disorder. *Behaviour Research and Therapy, 43*(10), 1281–1310.

Mennin, D. S., Holaway, R. M., Fresco, D. M., Moore, M. T., & Heimberg, R. G. (2007). Delineating components of emotion and its dysregulation in anxiety and mood psychopathology. *Behavior Therapy, 38*, 284–302.

Mogg, K., Mathews, A., Eysenck, M., & May, J. (1991). Biased cognitive operations in anxiety: Artefact, processing priorities or attentional search? *Behaviour Research and Therapy, 29*(5), 459–467.

Mogg, K., Mathews, A., & Weinman, J. (1989). Selective processing of threat cues in anxiety states: A replication. *Behaviour Research and Therapy, 27*(4), 317–323.

Moore, P. S., Whaley, S. E., & Sigman, M. (2004). Interactions between mothers and children: Impacts of maternal and child anxiety. *Journal of Abnormal Psychology, 113*(3), 471–476.

Moradi, A. R., Neshat-Doost, H. T., Taghavi, R., Yule, W., & Dalgleish, T. (1999). Performance of children of adults with PTSD on the Stroop color-naming task: A preliminary study. *Journal of Traumatic Stress, 12*(4), 663–671.

Morren, M., Muris, P., & Kindt, M. (2004). Emotional reasoning and parent-based reasoning in normal children. *Child Psychiatry and Human Development, 35*(1), 3–20.

Muris, P. (2002). Parental rearing behaviors and worry of normal adolescents. *Psychological Reports, 91*(2), 428–430.

Muris, P., Meesters, C., & Gobel, M. (2001). Reliability, validity, and normative data of the Penn state worry questionnaire in 8–12-year-old children. *Journal of Behavior Therapy and Experimental Psychiatry, 32*(2), 63–72.

Muris, P., Meesters, C., Merckelbach, H., & Hülsenbeck, P. (2000a). Worry in children is related to perceived parental rearing and attachment. *Behaviour Research and Therapy, 38*(5), 487–497.

Muris, P., Meesters, C., Merckelbach, H., Sermon, A., & Zwakhalen, S. (1998). Worry in normal children. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*(7), 703–710.

Muris, P., & Merckelbach, H. (1998). Perceived parental rearing behaviour and anxiety disorders symptoms in normal children. *Personality and Individual Differences, 25*(6), 1199–1206.

Muris, P., Merckelbach, H., Gadet, B., & Moulaert, V. (2000b). Fears, worries, and scary dreams in 4- to 12-year-old children: Their content, developmental pattern, and origins. *Journal of Clinical Child Psychology, 29*(1), 43–52.

Muris, P., Merckelbach, H., & Luijten, M. (2002a). The connection between cognitive development and specific fears and worries in normal children and children with below-average intellectual abilities: A preliminary study. *Behaviour Research and Therapy, 40*(1), 37–56.

Muris, P., Merckelbach, H., Meesters, C., & van den Brand, K. (2002b). Cognitive development and worry in normal children. *Cognitive Therapy and Research, 26*(6), 775–785.

Newman, S. C., & Bland, R. C. (2006). A population-based family study of DSM-III generalized anxiety disorder. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 36*(9), 1275–1281.

Ogliari, A., Citterio, A., Zanoni, A., Fagnani, C., Patriarca, V., Cirrincione, R., et al. (2006). Genetic and environmental influences on anxiety dimensions in Italian twins evaluated with the SCARED questionnaire. *Journal of Anxiety Disorders, 20*(6), 760–777.

Ohara, K., Suzuki, Y., Ochiai, M., Tsukamoto, T., Tani, K., & Ohara, K. (1999). A variable-number-tandem-repeat of the serotonin transporter gene and anxiety disorders. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 23*(1), 55–65.

Olsson, C. A., Byrnes, G. B., Anney, R. J., Collins, V., Hmphill, S. A., Williamson, R., et al. (2007). COMT Val^{158} Met and 5HTTLPR functional loci interact to predict persistence of anxiety across adolescence: Results from the Victorian adolescent health cohort study. *Genes, Brain, and Behavior, 6*, 647–652.

Orton, G. L. (1982). A comparative study of children's worries. *Journal of Psychology: Interdisciplinary and Applied, 110*(2), 153–162.

Paulussen-Hoogeboom, M. C., Stams, G. J. J. M., Hermanns, J. M. A., & Peetsma, T. T. D. (2007). Child negative emotionality and parenting from infancy to preschool: A meta-analytic review. *Developmental Psychology, 43*(2), 438–453.

Perez-Edgar, K., Bar-Haim, Y., McDermott, J. M., Tuscano, A., Pine, D., & Fox, N. A. (2010). Attention biases to threat and behavior inhibition in early childhood shape adolescent social withdrawal. *Emotion, 10*(3), 349–357.

Perris, C. (1980). Development of a new inventory for assessing memories of parental rearing behaviour. *Acta Psychiatrica Scandinavica, 61*(4), 265–274.

Pollock, R. A., Rosenbaum, J. F., Marrs, A., & Miller, B. S. (1995). Anxiety disorders of childhood: Implications for adult psychopathology. *Psychiatric Clinics of North America, 18*(4), 745–766.

Povinelli, D. J., Landau, K. R., & Perilloux, H. K. (1996). Self-recognition in young children using delayed versus live feedback: Evidence of a developmental asynchrony. *Child Development, 67*(4), 1540–1554.

Prior, M., Smart, D., Sanson, A., & Oberklaid, F. (2000). Does shy-inhibited temperament in childhood lead to anxiety problems in adolescence? *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 461–468.

Propper, C., & Moore, G. A. (2006). The influence of parenting on infant emotionality; a multi-level psychological perspective. *Developmental Review, 26*, 427–460.

Rapee, R. M. (2001). The development of generalized anxiety. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 481–503). New York: Oxford University Press.

Reeb-Sutherland, B. C., Vanderwert, R. E., Degnan, K. A., Marshall, P. J., Perez-Edgar, K., Chronis-Tuscano, A., et al. (2009). Attention to novelty in behaviorally inhibted adolescents moderates risks for anxiety. *Journal of Child Psychology and Psychiatry, 50*(11), 1365–1372.

Rettew, D. C., Doyle, A. C., Kwan, M., Stanger, C., & Hudziak, J. J. (2006). Exploring the boundary between temperament and generalized anxiety disorder: A receiver operating characteristic analysis. *Journal of Anxiety Disorders, 20*(7), 931–945.

Robichaud, M., & Dugas, M. J. (2005). Negative problem orientation (part II): Construct validity and specificity to worry. *Behaviour Research and Therapy, 43*(3), 403–412.

Robinson, E. J., Beck, S., Mitchell, P., & Riggs, K. J. (2000). *What is difficult about counterfactual reasoning? Children's reasoning and the mind* (pp. 101–119). Hove, England: Psychology Press/ Taylor and Francis.

Rosen, N. O., & Knäuper, B. (2009). A little uncertainty goes a long way: State and trait dfferences in uncertainty interact to increase information seeking but also increase worry. *Health Communication, 24*(3), 228–238.

Rosenbaum, J., Biderman, J., Hirshfeld-Becker, D., Kagan, J., Snidman, N., Friedman, D., et al. (2000). A controlled study of behavioral inhibition in children of parents with panic disorder and depression. *The American Journal of Psychiatry, 157*(12), 2002–2010.

Rosenbaum, J. F., Biederman, J., Bolduc, E. A., & Hirshfeld, D. R. (1992). Comorbidity of parental anxiety disorders as risk for childhood-onset anxiety in inhibited children. *The American Journal of Psychiatry, 149*(4), 475–481.

Rothbart, M. K. (2004). Commentary: Differentiated measures of temperament and multiple pathways to childhood disorders.

Journal of Clinical Child and Adolescent Psychology, 33(1), 82–87.

Rothbart, M. K., Posner, M. I., & Hershey, K. L. (1995). Temperament, attention, and developmental psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology, Vol. 1: Theory and methods* (pp. 315–340). Oxford: Wiley.

Rowe, D. C., Stever, C., Gard, J. M. C., Cleveland, H. H., Sander, M. L., Abramowitz, A., et al. (1998). The relation of the dopamine transporter gene (DAT1) to symptoms of internalizing disorders in children. *Behavior Genetics, 28*(3), 215–225.

Ruscio, A. M., & Borkovec, T. D. (2004). Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. *Behaviour Research and Therapy, 42*(12), 1469–1482.

Russell, A., Hart, C. H., Robinson, C. C., & Olsen, S. F. (2003). Children's sociable and aggressive behaviour with peers; A comparison of the US and Australia, and contributions of temperament and parenting styles. *International Journal of Behavioral Development, 27*, 74–86.

Rydell, A., Berlin, L., & Bohlin, G. (2003). Emotionality, emotion regulation, and adaptation among 5- to 8-year-old children. *Emotion, 3*(1), 30–47.

Saarni, C. (1999). *The development of emotional competence*. New York: Guilford Press.

Salters-Pedneault, K., Roemer, L., Tull, M. T., Rucker, L., & Mennin, D. S. (2006). Evidence of broad deficits in emotion regulation associated with chronic worry and generalized anxiety disorder. *Cognitive Therapy and Research, 30*(4), 469–480.

Samochowiec, J., Hajduk, A., Samochowiec, A., Horodnicki, J., Stępień, G., Grzywacz, A., et al. (2004). Association studies of MAO-A, COMT, and 5-HTT genes polymorphisms in patients with anxiety disorders of the phobic spectrum. *Psychiatry Research, 128*(1), 21–26.

Schrock, M., & Woodruff-Borden, J. (2010). Parent-child interactions in anxious families. *Child and Family Behavior Therapy, 32*(4), 291–310.

Schwartz, C. E., Snidman, N., & Kagan, J. (1999). Adolescent social anxiety as an outcome of inhibited temperament in childhood. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*(8), 1008–1015.

Shortt, A. L., Barrett, P. M., Dadds, M. R., & Fox, T. L. (2001). The influence of family and experimental context on cognition in anxious children. *Journal of Abnormal Child Psychology, 29*(6), 585–598.

Silberg, J., Rutter, M., Neale, M., & Eaves, L. (2001). Genetic moderation of environmental risk for depression and anxiety in adolescent girls. *British Journal of Psychiatry, 179*, 116–121.

Silverman, W. K., La Greca, A. M., & Wasserstein, S. (1995). What do children worry about? Worries and their relation to anxiety. *Child Development, 66*(3), 671–686.

Southam-Gerow, M. A., & Kendall, P. C. (2000). A preliminary study of the emotion understanding of youths referred for treatment of anxiety disorders. *Journal of Clinical Child Psychology, 29*(3), 319–327.

Strauss, C. C., Lease, C. A., Last, C. G., & Francis, G. (1988). Overanxious disorder: An examination of developmental differences. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology, 16*(4), 433–443.

Suarez, L., & Bell-Dolan, D. (2001). The relationship of child worry to cognitive biases: Threat interpretation and likelihood of event occurrence. *Behavior Therapy, 32*(3), 425–442.

Suveg, C., Morelen, D., Brewer, G. A., & Thomassin, K. (2010). The emotion dysregulation model of anxiety: A preliminary path analytic examination. *Journal of Anxiety Disorders, 24*, 924–930.

Suveg, C., Sood, E., Barmish, A., Tiwari, S., Hudson, J. L., & Kendall, P. C. (2008). 'I'd rather not talk about it': Emotion parenting in families of children with an anxiety disorder. *Journal of Family Psychology, 22*(6), 875–884.

Suveg, C., Sood, E., Comer, J. S., Comer, J. S., & Kendall, P. C. (2009). Changes in emotion regulation following cognitive-behavioral therapy for anxious youth. *Journal of Clinical Child and Adolescent Psychology, 38*(3), 390–401.

Suveg, C., & Zeman, J. (2004). Emotion regulation in children with anxiety disorders. *Journal of Clinical Child and Adolescent Psychology, 33*(4), 750–759.

Szabó, M., & Lovibond, P. F. (2004). The cognitive content of thought-listed worry episodes in clinic-referred anxious and nonreferred children. *Journal of Clinical Child and Adolescent Psychology, 33*(3), 613–622.

Tadic, A., Rujescu, D., Szegedi, A., Giegling, I., Singer, P., Moller, H., et al. (2003). Association of a MAOA gene variant with generalised anxiety disorder, but not with panic disorder or major depression. *American Journal of Medical Genetics Part B Neuropsychiatric Genetics, 117B*, 1–6.

Taghavi, M. R., Dalgleish, T., Moradi, A. R., Neshat-Doost, H. T., & Yule, W. (2003). Selective processing of negative emotional information in children and adolescents with generalized anxiety disorder. *British Journal of Clinical Psychology, 42*(3), 221–230.

Taghavi, M. R., Moradi, A. R., Neshat-Doost, H. T., Yule, W., & Dalgleish, T. (2000). Interpretation of ambiguous emotional information in clinically anxious children and adolescents. *Cognition and Emotion, 14*(6), 809–822.

Taghavi, M. R., Neshat-Doost, H. T., Moradi, A. R., Yule, W., & Dalgleish, T. (1999). Biases in visual attention in children and adolescents with clinical anxiety and mixed anxiety-depression. *Journal of Abnormal Child Psychology, 27*(3), 215–223.

Thayer, J. F., Friedman, B. H., & Borkovec, T. D. (1996). Autonomic characteristics of generalized anxiety disorder and worry. *Biological Psychiatry, 39*(4), 255–266.

Tincas, I., Benga, O., & Fox, N. A. (2006). Temperamental predictors of anxiety disorders. *Cognition, Brain, and Behavior, 10*, 489–515.

Tracey, S. A., Chorpita, B. F., Douban, J., & Barlow, D. H. (1997). Empirical evaluation of DSM-IV generalized anxiety disorder criteria in children and adolescents. *Journal of Clinical Child Psychology, 26*(4), 404–414.

Turk, C. L., Heimberg, R. G., Luterek, J. A., Mennin, D. S., & Fresco, D. M. (2005). Emotion dysregulation in generalized anxiety disorder: A comparison with social anxiety disorder. *Cognitive Therapy and Research, 29*(1), 89–106.

van der Bruggen, C. O., Bögels, S. M., & van Zeilst, N. (2010). What influences parental controlling behavior? The role of parent and child trait anxiety. *Cognition and Emotion, 24*(1), 141–149.

van der Bruggen, C. O., Stams, G. J. J. M., & Bögels, S. M. (2008). Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *Journal of Child Psychology and Psychiatry, 49*(12), 1257–1269.

van der Bruggen, C. O., Stams, G. J. J. M., Bögels, S. M., & Paulussen-Hoogeboom, M. C. (2010). Parenting behaviour as a mediator between young children's negative emotionality and their anxiety/depression. *Infant and Child Development, 19*, 354–365.

Vasey, M. W. (1993). Development and cognition in childhood anxiety: The example of worry. *Advances in Clinical Child Psychology, 15*, 1–39.

Vasey, M. W., Crnic, K. A., & Carter, W. G. (1994). Worry in childhood: A developmental perspective. *Cognitive Therapy and Research, 18*(6), 529–549.

Vasey, M. W., & Dadds, M. R. (2001). *The developmental psychopathology of anxiety*. New York: Oxford University Press.

Velez, C. N., Johnson, J., & Cohen, P. (1989). A longitudinal analysis of selected risk factors for childhood psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*(6), 861–864.

Wallace, M., & Rabin, A. I. (1960). Temporal experience. *Psychological Bulletin, 57*(3), 213–236.

Waters, A. M., Mogg, K., Bradley, B. P., & Pine, D. S. (2008). Attentional bias for emotional faces in children with generalized anxiety disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*(4), 435–442.

Weems, C. F., Silverman, W. K., & La Greca, A. M. (2000). What do youth referred for anxiety problems worry about? Worry and its relation to anxiety and anxiety disorders in children and adolescents. *Journal of Abnormal Child Psychology, 28*(1), 63–72.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(3), 301–320.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*(6), 585–594.

Whaley, S. E., Pinto, A., & Sigman, M. (1999). Characterizing interactions between anxious mothers and their children. *Journal of Consulting and Clinical Psychology, 67*(6), 826–836.

Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine, D. S., et al. (2009). Impact of behavior inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. *Journal of Abnormal Child Psychology, 37*, 1063–1075.

Wood, J. H., McLeod, B. D., Sigman, M., Hwang, W., & Chu, B. (2003). Parenting and childhood anxiety: theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 44*, 134–151.

You, J.-S., Hu, S.-Y., Chen, B., & Zhang, H.-G. (2005). Serotonin transporter and tryptophan hydroxylase gene polymorphisms in Chinese patients with generalized anxiety disorder. *Psychiatric Genetics, 15*(1), 7–11.

Zlomke, K. R., & Young, J. N. (2009). A retrospective examination of the role of parental anxious rearing behaviors in contributing to intolerance of uncertainty. *Journal of Child and Family Studies, 18*, 670–679.

Copyright of Clinical Child & Family Psychology Review is the property of Springer Science & Business Media B.V. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.