

2008

# The developmental continuity of a cognitive model of worry

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THE DEVELOPMENTAL CONTINUITY OF A COGNITIVE MODEL OF WORRY

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Psychology

by

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August 2008

## **ACKNOWLEDGEMENTS**

Thanks are due to my advisor and committee chair, Dr Thompson E. Davis, III for his assistance and guidance on this project. I'd also like to acknowledge my committee members, Dr. Johnny Matson, Dr. Amy Copeland, Dr. Carole Jurkewicz, and Dr. Juan Barthelmy, whose offering of time and thoughtful suggestions are greatly appreciated.

Nobody has been more important to me in the pursuit of this project and my educational endeavors than my parents, whose love and guidance has been with me throughout every choice I have made and every direction I have pursued. I thank them for teaching me the value of education, for their steadfast commitment to my future no matter the financial or emotional burden, and for their continual love, support, and encouragement in this journey and all other pursuits. They are my ultimate role models.

Finally, I would like to thank my future husband, Andy, who has provided distraction, comfort, encouragement, and the occasionally needed kick in the butt. He brought a sense of balance and calm to my life when it was so greatly needed. I look forward to our future adventures and a long life together.

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## ABSTRACT

Research on the construct of worry has increased dramatically in the past two decades. This research has also tended to focus on adults, with only a limited number of studies examining adolescent populations. With the continued dominance of developmental psychopathology and a lifespan approach to development, it has become apparent that downward extensions of adult models of psychopathology are inadequate (cf. Mash & Dozois, 2002). As a result, investigations in adolescents are essential due to the potential developmental differences and heterotypic continuity in worry between adolescents and adults. These developmental differences and changes associated with the period of adolescence may affect the presentation of worry and its relationship to anxiety and related variables. To this end, this dissertation examined the continuity of the components of a cognitive-behavioral model of worry (i.e., Dugas et al., 1998) in an adolescent and adult cross-sectional sample of 76 participants. Assessed constructs included including intolerance of uncertainty, negative problem orientation, erroneous beliefs regarding the usefulness of worry, and cognitive avoidance. Contrary to hypotheses, it was found that age did not significantly predict cognitive avoidance and beliefs about worry. Coping strategies, however, did serve as a moderator of the relationship between age and scores on measures of cognitive avoidance. Specifically, an interaction between age and avoidant coping was significantly predictive of cognitive avoidance. Implications for the continuity of the proposed cognitive-behavioral model of worry and directions for future research are discussed.

## INTRODUCTION

Since the addition of excessive worry as the primary diagnostic criterion for Generalized Anxiety Disorder (GAD) in the Diagnostic and Statistical Manual of Mental Disorders- 3<sup>rd</sup>-Edition-Revised (*DSM-III-R*; American Psychiatric Association [APA], 1987), the construct of worry has received considerable attention in the literature. Most of this attention, however, has focused on adult models of worry with occasional downward extensions of these models to children and little attention being offered to the developmental continuity of such models across the lifespan. Moreover, these downward extensions have often ignored the transitional period of adolescence. Due to the many developmental differences present between children, adolescents, and adults there is reason to believe that such differences may affect the phenomena of worry as well (i.e., heterotypic continuity; Vasey, 1993; Vasey & Daleiden, 1994). The Diagnostic and Statistical Manual of Mental Disorders-4<sup>th</sup> Edition (*DSM-IV*; APA, 1994) delineates worry as the primary diagnostic feature of GAD and researchers have often referred to worry as the basic component of anxiety in general (Barlow, 2002). Even so, what constitutes “worry” still remains controversial, with many definitions and conceptualizations present in the literature (e.g., Borkovec, Robinson, Pruzinsky, & Dupree, 1983; Davey, 1994; Matthews, 1990; MacLeod, Williams, & Bekerian, 1991; Tallis & Eysenck, 1994; Vasey & Daleiden, 1994; Wells, Davey, & Tallis, 1994). As the primary feature of GAD, worry has been described as uncontrollable thoughts and images with negative emotional connotation (Borkovec et al., 1983). Borkovec et al. (1983) continue to describe worry as a primarily future oriented ineffectual attempt at problem solving and a maladaptive process for the individual. In this view, worry is a negative and maladaptive cognitive strategy. Alternatively, Davey (1994) describes worry as an adaptive mechanism and a problem-focused coping response. In this view, worry may serve the function



of reducing trait anxiety. These two views highlight the centrality of worry in the human experience in that worry may serve both adaptive and maladaptive functions.

In adult samples, researchers using a cognitive-behavioral model have repeatedly demonstrated the influence of four factors on the development and maintenance of worry: intolerance of uncertainty, negative problem orientation, positive beliefs about worry, and cognitive avoidance (Dugas, Gagnon, Ladouceur, & Freeston, 1998; Dugas, Freeston, & Ladouceur, 1997; Dugas, Gosselin, & Ladouceur, 2001). Intolerance of uncertainty is often defined as a cognitive bias that influences one's perception, interpretation, and reaction to ambiguous or uncertain situations (Dugas et al., 1998; Laugesen et al., 2003). In turn, this intolerance of uncertainty is presented in the individual's cognitive, emotional, and behavioral reactions to these uncertain situations. Negative problem orientation, as the second component, refers to a set of metacognitive processes enacted in the face of problems. This negative cognitive set includes an individual's tendency to view problems as threatening and unsolvable as well as to doubt one's own competence in problem-solving (Maydeu-Olivares & D'Zurilla, 1996). The third component, positive beliefs about worrying, may be seen as related to the function of worry. This refers to an individual's erroneous beliefs that the worry process may have positive outcomes including improved problem solving, increases in motivation, and prevention of negative outcomes and emotions (Freeston, Rheume, Letarte, Dugas, & Ladouceur, 1994). Cognitive avoidance, as typically conceptualized in the cognitive-behavioral model of worry, refers to an individual's tendency to suppress unwanted thoughts or engage in distraction to avoid distressing thoughts and/or images (Dugas et al., 1998; Ladouceur, Blais, Freeston, & Dugas, 1998).

Four studies have demonstrated significant and unique relationships between each variable of the cognitive-behavioral model and worry (Dugas et al., 1998; Dugas et al., 2007; Dugas, Marchand, & Ladouceur, 2005; Laugesen, Dugas, & Bukowski, 2003). In a clinical sample, Dugas et al. (1998) demonstrated that all four variables contributed to the accurate classification of adult participants. In an extension of the Dugas et al. (1998) study, Dugas et al. (2005) again demonstrated that all four variables were significantly related to worry and accurately classified clinical participants. Additionally, Dugas et al. (2005) reported that intolerance of uncertainty was specific to participants with GAD as compared to participants with panic disorder with agoraphobia. Dugas et al. (2007) examined the predictive value of the cognitive-behavioral model for the severity of GAD diagnoses. Utilizing a clinical sample, Dugas et al. (2007) demonstrated that all components of the cognitive-behavioral model accurately predicted severity of GAD diagnosis, with intolerance of uncertainty again showing the strongest predictive value of the components. After controlling for age, gender, and depressive symptomatology, both intolerance of uncertainty and negative problem orientation were able to distinguish individuals with moderate and severe GAD (based on clinician rating) from individuals with more mild symptomatology.

In applying this cognitive-behavioral model to an adolescent sample, Laugesen and colleagues (2003) revealed three of the core variables (i.e. intolerance of uncertainty, positive beliefs about worry, and negative problem orientation) demonstrated significant and unique relations to adolescent levels of worry. Additionally, Laugesen et al. (2003) demonstrated that, when taken together, all four variables were effective in classifying moderate and high worriers into their respective groups in a discriminant analysis. Unlike previous research conducted with adult samples (i.e. Dugas et al., 1998; Dugas et al., 2005), the variable of cognitive

avoidance/thought suppression was not significantly related to worry in the adolescent sample reported by Laugesen et al. (2003). Moreover, on an individual basis, thought suppression and positive beliefs about worry were unable to discriminate between moderate and high adolescent worriers. Although not testing the four component model of worry, Gosselin et al. (2007) found that both cognitive avoidance and erroneous beliefs about worry were in fact related to worry in an adolescent sample. Gosselin et al (2007) examined specific cognitive avoidance strategies and found that only avoidance of worry triggers and thought substitution were related to worry whereas only the false belief that worry helps to avoid negative outcomes was associated with worry level. These results reported by Gosselin are directly contradictory to those reported by Laugesen et al. (2003). Important to note is that these two studies utilized different measures for the assessment of both cognitive avoidance and false beliefs about worry therefore results cannot be directly compared. Based on these preliminary findings, it cannot be assumed that the worry process or the cognitive-behavioral model of worry can be accurately applied downward from adults to an adolescent population.

Discussions of worry across the lifespan have brought up a number of issues relating to differences in worry among children, adolescents, and adults. One view holds that as a group, young adults are more inclined to worry, based on increased stressors associated with the transition from adolescence to early adulthood such as changing family and peer relationships, school transitions, educational demands, and decisions regarding careers (McMahon, Grant, Compas, Thurm, & Ey, 2003; Williams & McGillicuddy-De Lisi, 2000). In fact, Williams and McGillicuddy-De Lisi (2000) found that participants reported that worries grew in intensity over the lifespan and, in general, worries were more abstract and future oriented in older samples than for adolescents. A second view suggests that worry becomes more prevalent with age due to

advancing cognitive abilities, such as the ability to consider future events, threatening outcomes, and to elaborate on consequences (Vasey & Daleiden, 1994). This is not unexpected given developmental transitions from concrete to increasingly abstract thought throughout childhood and adolescence and into adulthood.

As a result, the purpose of this study was to examine the relationship between age (a rough proxy indicator of development) and components of the cognitive behavioral model of worry presented by Dugas et al. (1998; 2005). The relationships between age and the variables of intolerance of uncertainty, negative problem orientation, positive beliefs about worry, and cognitive avoidance will be examined as will the possible mediating or moderating roles of coping abilities. To this end, a developmental review of the literature from adolescence to early adulthood will be presented, followed by a description of the characteristics and functions of worry in adults, adolescents, and children. Finally, literature presenting and testing Dugas' model of excessive worry is reviewed in more detail, including the factors of intolerance of uncertainty, problem orientation, positive beliefs about worry, and cognitive avoidance. Finally, literature examining the development of coping strategies and age differences in the use of coping will be presented.

### **Adolescent and Adult Development**

Adolescence, as a developmental stage, is characterized by changes in biological/physical functioning, cognitive development, social roles, and environment (e.g., American Psychological Association, 2002; State of Oregon Department of Human Services, n.d; See Table 1).

Additionally, this time period is full of transitions and periods of change and adaptation such as between junior high to high school, high school to college or work, and living with parents to living independently (Compas, Davis, & Forsythe, 1985). Transitions during the period of

adolescence are typically categorized into three types: normative life events, non-normative events (major life events), and daily hassles (Compas et al., 1985). In addition, while adolescents deal with physical and cognitive maturation they, simultaneously, deal with changing family and peer relationships, educational demands and expectations, and decisions regarding school and career (Boekaerts, 1996; Frydenberg & Lewis, 1993; Rice, Herman, & Peterson, 1993). Part of this experience is also gaining autonomy, independent problem solving skills, and further developing one's self-concept. These new experiences and encounters force adolescents to adjust what they know and how they react to situations. This process of adjustment creates stress and anxiety for adolescents during an already challenging time.

The period of adolescence is also characterized as a time of emotional and cognitive development (Ward & Overton, 1990; Mueller, Overton, & Renee, 2001; Larson & Ham, 1993; Larson, Moneta, Richards, & Wilson, 2002). Cognitively, adolescence represents a shift from concrete thinking regarding what is seen and experienced to abstract thinking regarding thoughts and feelings. In the transition from concrete operations to formal operations, changes are seen in systematic problem solving abilities, hypothetico-deductive reasoning, meta-cognition, and meta-memory (Mueller et al., 2001). During this developmental period, adolescents learn new ways to think and process information. Adolescents gain the ability to imagine future possible and impossible events and consider multiple outcomes of a single situation as well as other's perspectives and appraisals.

An adolescent's social environment also changes during the transition to adulthood. Researchers suggest that younger adolescents experience greater changes and stress concerning their relationships with parent figures while older adolescents report greater concern regarding

**Table 1. Stages of Healthy Adolescent Development (State of Oregon Department of Human Services, n.d.)**

|                                | Early Adolescence<br>(ages 10-14 years)   | Middle Adolescence<br>(ages 15-17 years)   | Late<br>Adolescence/Young<br>Adulthood<br>(ages 18-21 years)   |
|--------------------------------|---|--|--|
|                                | <b>Characteristic Developmental Milestones and Tasks</b>  |  |  |
| <b>Physical Growth</b>         | <ul style="list-style-type: none"> <li>* Puberty: Rapid growth period</li> <li>* Secondary sexual characteristics appear</li> </ul>   | <ul style="list-style-type: none"> <li>* Secondary sexual characteristics advanced</li> <li>* 95% of adult height reached</li> </ul>   | <ul style="list-style-type: none"> <li>* Physical maturity and reproductive growth leveling off and ending</li> </ul>  |
| <b>Intellectual/ Cognition</b> | <ul style="list-style-type: none"> <li>* Concrete thought dominates “here and now”</li> <li>* Cause-effect relationships underdeveloped</li> <li>* Stronger “self” than “social” awareness</li> </ul>                             | <ul style="list-style-type: none"> <li>* Growth in abstract thought; reverts to concrete thought under stress</li> <li>* Cause-effect relationships better understood</li> <li>* Very self-absorbed</li> </ul> | <ul style="list-style-type: none"> <li>* Abstract thought established</li> <li>* Future oriented; able to understand, plan and pursue long range goals</li> <li>* Philosophical and idealistic</li> </ul>  |
| <b>Identity Development</b>    | <ul style="list-style-type: none"> <li>* Vocational goals change frequently</li> <li>* Begin to develop own value system</li> <li>* Emerging sexual feelings and sexual exploration</li> <li>* Desire for privacy</li> </ul>      | <ul style="list-style-type: none"> <li>* Experimentation: sex, drugs, friends, jobs, risk-taking behavior</li> </ul>   | <ul style="list-style-type: none"> <li>* Pursue realistic vocational goals with training or career employment</li> <li>* Relate to family as adult</li> <li>* Establishment of sexual identity</li> <li>* Establishment of ethical and moral value system</li> </ul> |
| <b>Autonomy</b>                | <ul style="list-style-type: none"> <li>* Challenge authority, family; “anti-parent”</li> <li>* Loneliness</li> <li>* Wide mood swings</li> <li>* Things of childhood rejected</li> <li>* Argumentative and disobedient</li> </ul> | <ul style="list-style-type: none"> <li>* Conflict with family predominates due to ambivalence about emerging independence</li> </ul>   | <ul style="list-style-type: none"> <li>* Emancipation:               <ul style="list-style-type: none"> <li>-- continued education and/or work</li> <li>-- adult lifestyle</li> </ul> </li> </ul>  |

academic stressors (Wagner, Compas, & Howell, 1988). Additionally, the nature of social relationships and social support develop and change throughout this period (Williams & McGillicuddy-de Lisi, 2000). The parent-child relationship is usually affected during this transition as peer groups gain importance in the life of an adolescent and young adult. During this period, the importance of parent discussions decrease and reliance on peer relationships increase. The events that often determine whether an individual is considered an “adolescent” versus an “adult” are aspects of an individual’s social environment. Often times, once graduated from high school, one is considered to have entered the “adult world” (Arnett & Turner, 2006); however, cultural rights of passage into adulthood vary. Along with the transition out of the high school environment, living situations are often altered as well as employment status.

Cognitive development and the ability to anticipate and reason about multiple possibilities appear to follow a predictable developmental course that is characterized by three stages across the lifespan (Piaget, 1965; Piaget & Inhelder, 1969). Prior to age 7 years, children are unlikely to consider more than a single solution to a problem and view the chosen action as the only possible solution. At this age, children are in what is termed the preoperational stage and their capacity to elaborate on potential negative outcomes is limited (Piaget & Inhelder, 1969; Muris, Merckelbach, Meesters, & von den Brand, 2002). However, in the concrete operational stage of middle childhood (7-11 years), the understanding of multiple possibilities increases and children are able to consider a larger number of possibilities, though these abilities are not fully developed (Vasey & Daleiden, 1994). Finally, according to Piagetian theory, the attainment of formal operations (age 12 years and on) brings the understanding that some problems have an infinite number of solutions. Unlike a concrete-operational child who lives primarily in the ‘here-and-now,’ adolescents begin to think about more far-reaching problems such as their future, the

nature of society, and justice, but lack the life experience and judgment to cognitively manage multiple solutions and alternatives (Siegler, 1994). Siegler (1994) reported that throughout adolescence, an individual grows in his or her ability to examine the environment and the reality of a situation from multiple perspectives, as well as, gains the ability to solve problems with multiple strategies. During this period of early adolescence, the ability to understand cause-effect relationships becomes more developed and a growth in abstract thought occurs. In later adolescence and early adulthood, the ability for abstract thought is firmly established and individuals become more future orientated, investing in long term plans and goals (Piaget & Inhelder, 1969). As a result of this cognitive development, children's and adolescent's worry may become increasingly complex because of the ability to reason about future possibilities, to consider multiple outcomes, and to elaborate on the potential negative consequences (Muris et al., 2002). Magnusson (1985) suggested that with the increased reasoning abilities of adolescence, a corresponding increase is seen in the ability to consider multiple threatening outcomes and to elaborate on the potential negative consequences of such outcomes.

In Piaget's theory, formal operations are the end point of cognitive development. Once formal operations are fully attained, cognitive maturation is complete. However, like many aspects of Piaget's theory, this view has been challenged and altered by contemporary research. Contrary to Piaget's theory, cognitive development often continues in important ways into early adulthood. This research has inspired theories of cognitive development beyond formal operations as proposed by Piaget, known as post-formal thinking (Sinnott, 1998; Labouvie-Vief, Schaie, & Lawton, 1998; LaBouvie-Vief et al., 1990). Post-formal thinking emphasizes that the problems faced in adult life often contain complexities and inconsistencies that cannot be addressed with the logic of formal operations. Researchers have reported that many individuals



continue to have difficulties with hypothetico-deductive tasks into adulthood (Markovits & Vachon, 1990). Abilities linked to the stage of formal operations are often specific to a situation or task. Individuals are more likely to think abstractly when in situations they have experience with (Lehman & Nisbett, 1990). DeLoache, Miller, and Pierroutsakos (1998) also suggest that individuals exhibit different cognitive skill levels and abilities corresponding to knowledge held about and experience with different domains. The theories of post-formal thinking take into account these findings and suggest that post-formal abilities are often linked to experience and include more “pragmatic thought” (LaBouvie-Vief et al., 1990). The idea of pragmatic thought suggests that personal experiences lead the way to increased abilities to think in rational, flexible, and practical ways when faced with novel situations.

According to Labouvie-Vief and colleagues (1990, 1998), cognitive development in young adulthood is distinguished from adolescent thinking by a greater recognition and incorporation of practical limitations to logical thinking. In this view, adolescents exaggerate the extent to which logical thinking will be effective in real life. In contrast, early adulthood brings a growing awareness of how social factors and factors specific to a given situation must be taken into account in approaching most of life’s problems. Labouvie-Vief et al. (1990) argues that formal operational thinking is useful when the adolescent has a need to explore and examine many life options. However, once an adult has made his/her initial choices he/she no longer has a need for formal operations; instead relies upon more specialized and pragmatic thinking. As young adults are increasingly exposed to ambiguous situations, their thinking must develop to handle such ambiguity. In post-formal thinking in young adulthood, individuals are able to see gray areas in addition to the childhood abilities of viewing solutions in terms of right-and-wrong.

Labouvie-Vief (2003) also suggests that the developmental period from adolescence to adulthood is a time of increasing cognitive-affective complexity. Young adults demonstrate enhanced self-reflective capacities that can alter their emotional experiences. In young adulthood, individuals become more adept at integrating cognition with emotion and, in doing so, make sense of discrepancies in life. Labouvie-Vief (2003) found that from adolescence through middle adulthood, individuals gained in cognitive-affective complexity or the awareness of positive and negative feelings and the coordination of them into complex organized structures. Incremental gains were observed between the ages of 10- to 15- years and from 15- to 20-year olds (Labouvie-Vief, 2003).

Aspects of cognitive development and social environmental changes provide evidence for corresponding changes in worry and coping in adolescence and young adulthood. During this developmental period, individuals develop greater skills in making inferences about emotional states, observational learning, increased awareness regarding available coping strategies, increases in problem-solving competence, increasing cognitive maturation, greater meta-cognitive awareness, and increasing emotional regulation (Eisenberg, Fabes, & Guthrie, 1997; Seiff-Krenke, 1993, Williams & McGillicuddy-De Lisi, 2000).

As mentioned above, many developmental changes occur during adolescence: cognitive development, increased autonomy, creation of social relationships, and continued emotional development. The presence of these factors highlights the importance of separating adolescents out for investigations of anxiety and worry and the potential for heterotypic continuity of worry over the lifespan. Much of what is known regarding anxiety in children and adults cannot necessarily be generalized to adolescents given these developmental differences.

## **Characteristics and Functions of Worry**

As presented above, “worry” is a complicated construct that has been conceptualized in numerous ways and as incorporating numerous processes, excesses, and deficits. Additionally, worry has been discussed as having both adaptive as well as maladaptive features. For example, worry has been described as having both adaptive as well as maladaptive features. For example, worry has been described as an anticipatory verbal process of repetitive thoughts related to possible threats and negative outcomes (Vasey & Daleiden, 1994). MacLeod et al.(1991) defined worry as a cognitive phenomena which is “...concerned with future events where there is uncertainty about the outcome, the future being thought about is a negative one, and this is accompanied by feelings of anxiety” (p. 478). Previous definitions have also referenced deficient problem solving in the conceptualization of worry. Borkovec et al. (1983) presented a definition of worry which referred to the worry process as “...an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes” (p. 10). These definitions emphasize the conceptualization of worry as a cognitive process, its focus on negative future outcomes, and the role of uncertainty (Laugesen et al., 2003).

In line with the diagnostic criteria for GAD, individuals with clinical levels of worry report greater frequency and intensity of worry, more difficulty controlling worry, and increased levels of impairment and depression (Menin, Heimberg, & Turk, 2004). Similarly, in a non-clinical population, high worriers also reported greater mood disturbance (i.e. subjective anxiety) and greater perceived impairment (Tallis et al., 1994). In terms of the content of worry, Tallis et al. reported that work and academic competency were the most frequently endorsed worry topics in a community sample. In a more recent report, Szabo and Lovibond (2002) found that in a community sample, 20% of naturally occurring worry episodes were concerned with anticipated

negative outcomes. Worry as an attempt at problem solving was endorsed by almost half of the participants (Szabo & Lovibond, 2002). Craske, Rapee, Jackal, and Barlow (1989) compared clinical worriers with diagnosed GAD to non-anxious controls. Similarities in content were observed between the two participant groups, although participants with GAD reported a greater number of worries and more worry about illness, health of self and others, injury, and minor/daily issues than controls. Other research with clinical samples (GAD) have found that worriers have less attentional control and report more negative daydreaming than non-clinical participants (Pruzinsky & Borkevec, 1990). High levels of worry were also reported to be associated with greater levels of anxiety, depression, and irritability (Borkevec et al., 1983) and greater social anxiety than non-worriers (Pruzinsky & Borkovec, 1990).

Many similarities and differences have been reported across the spectrum of worry, from individuals with low, non-clinical levels of worry to individuals with diagnosed GAD and clinical levels of worry. Early examinations have suggested that worry is a phenomenon common to the majority of adults. Tallis, Davey, and Capuzzo (1994) investigated the construct of worry in a community sample. A majority of their sample reported worry occurring on a daily basis. As suggested by the Borkovec et al. (1983) definition of worry, participants in the Tallis study reported that uncertainty of an outcome frequently provoked worry. Consistency in the content of worry has been reported across groups, with worries regarding performance being frequently endorsed but individuals in all groups and the majority of worry topics being self-referent in nature (Borkovec et al., 1983; Craske et al., 1989; Tallis et al., 1994). Worries referencing physical well-being and “minor” issues are more often reported in clinical samples (Craske et al., 1989; Tallis et al., 1994). Greater daily impairment and mood disturbance are also reported more often by individuals with clinically-elevated levels of worry than individuals with low levels of

worry (Borkovec et al., 1983; Tallis et al, 1994). Taken together, these findings highlight the importance of understanding the construct of worry, not just for the effective treatment of GAD but a better understanding of its impact on individuals across the spectrum of psychopathology and functioning.

Based on the various definitions and theories of “worry,” worry may serve either adaptive or maladaptive functions. Worry has been posited to serve a preparatory function by acting as an alarm to prompt an individual for possible threat or danger (Tallis & Eysenck, 1994). This adaptive role of worry assists an individual to appraise threatening situations and anticipate future problems (Mathews, 1990; Wells et al., 1994). In the definition and theory of worry presented by Davey (1994), worry functions as an attempt at problem-solving. In fact, research by Davey, Hampton, Farrell, and Davidson (1992) found non-clinical levels of worry to be positively correlated with adaptive, problem-focused coping.

Conversely, definitions of worry also suggest that it is maladaptive and at clinical levels disrupts the actual problem-solving process. Researchers suggest a lack of direct relationship between worry and actual problem solving ability, but a strong association between frequency and intensity of worry and problem solving confidence (Davey, 1994). High levels of worry are reported to be correlated with a negative problem orientation, or an individual’s lack of confidence in his/her own problem solving ability and ability to effectively implement solutions (Davey, 1994; Dugas, Letarte, Rheume, Freeston, & Ladouceur, 1995).

In sum, both adaptive and maladaptive functions of worry have been identified. Researchers such as Mathews (1990) and Tallis and Eysenck (1994) suggest that worry may serve a preparatory function; alerting and preparing individuals for possible threat. In terms of problem-solving, worry has been shown to be related to adaptive problem solving abilities at low

levels (Davey et al., 1992) and also to a lower confidence in one's problem solving abilities as well (Dugas et al, 1995).

### **Worry in Children and Adolescents**

Despite the fact that worry is a common phenomenon in both children and adults, few investigations regarding the worry process or the relationship of worry to other constructs have been conducted in adolescent populations. Investigations of worry in childhood primarily focus on the content of worry rather than on the process of worry. Much of the published literature on worry and the processes involved with the acquisition and maintenance of worry have been conducted with adult populations.

As worry is primarily defined as a cognitive process involving thoughts, it is reasonable to expect that a certain level of cognitive functioning must be present for the process of worry to engage. Vasey (1993) suggests that individuals must have the abilities to envision, anticipate, and conceptualize future events, as well as have the ability to extrapolate beyond what is directly observable (Laugesen et al., 2003). As discussed previously, these abilities are present to a certain extent in children but become more sophisticated through time and development (Piaget, 1965; LaBouvie-Vief et al., 1990). Given that worry is primarily defined as a cognitive process and that cognitive abilities are known to develop and sophisticate during development, the separate examination of worry in samples of children as well as adolescents is needed to discover what effects developmental changes may have on the phenomena of worry and its role in anxiety.

In the last two decades, researchers have begun to examine anxious cognitions such as worry from a developmental perspective. An information-processing model of anxiety in children has been proposed by Vasey (1993). Vasey's model suggests that anxiety, and

specifically worry, be examined within a developmental framework for a better understanding of how the expression of the cognitive component of anxiety (i.e. worry) is affected by a child's developmental level. Vasey takes an information-processing model and combines it with a developmental psychopathology approach to address the acquisition, maintenance, and observed changes in worry content and the worry process in children.

The characteristics of worry, the actual process of worry, and the role that worry plays in pathological anxiety may be dependent on the cognitive development of a child and therefore the age of a child, argues Vasey (1993). Cognitive development, including the ability to anticipate threat and to reason and elaborate on threatening possibilities as well as memory, language, and development of self-concept are all factors that Vasey proposes are involved in worry and therefore influence the acquisition, presentation, and maintenance of worry. One cognitive ability with a hypothesized relationship to worry included in Vasey's model is the ability to anticipate future events (Vasey, 1993). Developmental literature suggests that even at the age of two years, children possess the basic ability to predict concrete, immediate events. By the period of adolescence, this ability progresses to the point where adolescents are able to visualize and possess an abstract understanding of the more distant future (Vasey, 1993; Piaget & Inhelder, 1969).

Catastrophic thinking is proposed by some theorists to be an important factor in the etiology and maintenance of anxiety disorders (Barlow, 2002). Catastrophizing as a thought process requires the cognitive abilities of anticipating the future as well as reasoning and elaborating on possible future outcomes. Vasey, Crinc, and Carter (1984) found that children over the age of five years were able to verbalize the possibility of negative future events and consequences. Developmental and clinical literature suggest that with advanced reasoning

abilities, adolescents will be able to produce more elaborate and a greater number of possibilities, both abstract and concrete (Vasey & Daleiden, 1994). Muris, Merckelbach, and Luijten (2002) and Muris, Merckelbach, Meesters et al. (2002) found clear correlations between reported worry level and worry elaboration with child developmental level as measured by various conservation tasks. In a sample of 3-14 year olds, Muris, Merckelbach, Meesters et al. (2002) found that the older participants passed a greater number of conservation tasks as well as reported a larger number of worries, more frequent worry, and were able to elaborate more on the potential negative outcomes of various situations. Additionally, Muris, Merckelbach, and Liutjen (2002) found a significant relationship between reported anxiety levels of cognitive development based on a conservation task. Vasey's developmental model of anxiety suggests that with the development of abstract reasoning skills and increased abilities to anticipate future possibilities a corresponding increase in the ability to worry is likely. This conceptualization of the development and maintenance of childhood worry has been supported to some extent by the increased prevalence of problematic worry and GAD as children age (Kashani & Orvaschel, 1988; Last, Hersen, Kazdin, Finkelstein, & Strass, 1987; Strauss, Lease, Last, & Francis, 1988).

The information-processing model of worry proposed by Vasey (1993) also considers the role of self-concept and meta-cognitive abilities. Studies with adults provide evidence that worry is predominantly concerned with threats to one's self (Craske et al, 1989; Tallis et al, 1994). Some evidence exists that this is also true in children. Muris, Meesters, Merckelbach, Sermon, and Zwakhalen (1998) reported that the most frequently reported intense worries in a non-clinical sample of 8-13 year old children were concerns about threats to their own personal well-being. In this sample, the most common topics of worry concerned school, health, dying, and social relationships. Other studies have replicated these results, suggesting that the worries of



younger children are primarily self-referent (Vasey, 1994; Weems, Silverman, & LaGreca, 2000; Silverman, LaGreca, & Wasserstein, 1995). Vasey's model proposes the ability to worry and the content of worry is impacted by the development of self-concept and an individual's changing perceptions of self, others, and the world in general. According to this model, children of differing ages will worry about different topics to varying degrees, with the content of worry reflecting the child's self-perception and current physical and social environment. Vasey proposes the content of worry should change as children gain more complex cognitive abilities, with younger children's worries focusing on physical threat and progressing to more psychological and abstract threat through time. Content changes with age have been observed in children's fears (Ollendick & Francis, 1988; Ollendick, King, & Frary, 1989) and to an extent in children's worries (Henker, Whalen, & O'Neil, 1995; Vasey et al, 1994; Muris, Merckelbach, & Liutjen, 2002; Muris, Merckelbach, Meesters et al., 2002). Vasey et al. (1994) reported that as concerns regarding one's physical well-being and safety decreased with age, corresponding increases were seen in worries regarding behavioral, academic, and social competence. Muris, Merckelbach, Meesters et al. (2002) found a significant correlation between age and prevalence of worry as well as between age and worry elaboration, with older children reporting worrying more often, a greater number of worry topics, and increased reports of possible negative outcomes. In an investigation with a wider-age range than previously used (6-16 years), Weems et al. (2000) found that youth in the higher end of the age range (i.e. 12-16 years) continued to report worries regarding their performance and appearance, but additionally reported frequent worries about their future and daily hassles.

Based on Vasey's (1993) conceptualization of anxiety in youth and LaBouvie-Vief's theory of post-formal cognitive development, it follows that the cognitive aspect of anxiety,

worry, will become more prevalent as individuals' develop more advanced cognitive abilities through the developmental period of adolescence. A handful of investigations (Vasey et al., 1994; Muris, Merckelbach, Meesters et al., 2002) have empirically investigated Vasey's developmental model of anxiety and worry, although the majority of reported samples were restricted to those under the age of 14 years. It appears that both cognitive processes such as worry and cognitive content such as negative self-talk or automatic thoughts are sensitive to changes in a child's cognitive development.

The process of worry in children and adolescents, as well as the parameters of worry such as number, content, and frequency, has been examined in the research literature. Firm conclusions regarding the experience of worry specifically in adolescents cannot be made based on past research due to the use of restricted age groups. Based on multiple research studies, it is apparent that worry is a phenomena present in children as young as age seven. In a non-clinical sample of 7-12 year olds, Silverman et al. (1995) reported that on average children worried about almost eight different topics, with the most worries in the areas of health, school performance, and personal harm. In general, it appears children in non-clinical samples report the most worry about health and safety issues, school, and social concerns (Henker et al., 1995; Kaufman, Brown, Graves, & Henderson, 1993; Muris et al., 1998; Silverman et al., 1995; Simon & Ward, 1982). Children in clinical samples have also reported worry regarding those same areas, but also frequently endorse worry in the areas of more social/environmental issues such as war, disasters, and the safety of family members and friends (Weems et al, 2000). Older and younger children differ in reported worry content, with younger children worrying more about physical harm, and older children reporting more academic and social concerns (Henker et al., 1995; Silverman et al; 1995; Vasey et al; 1994). In addition, older children (e.g. 12-15 years olds) provided more detail

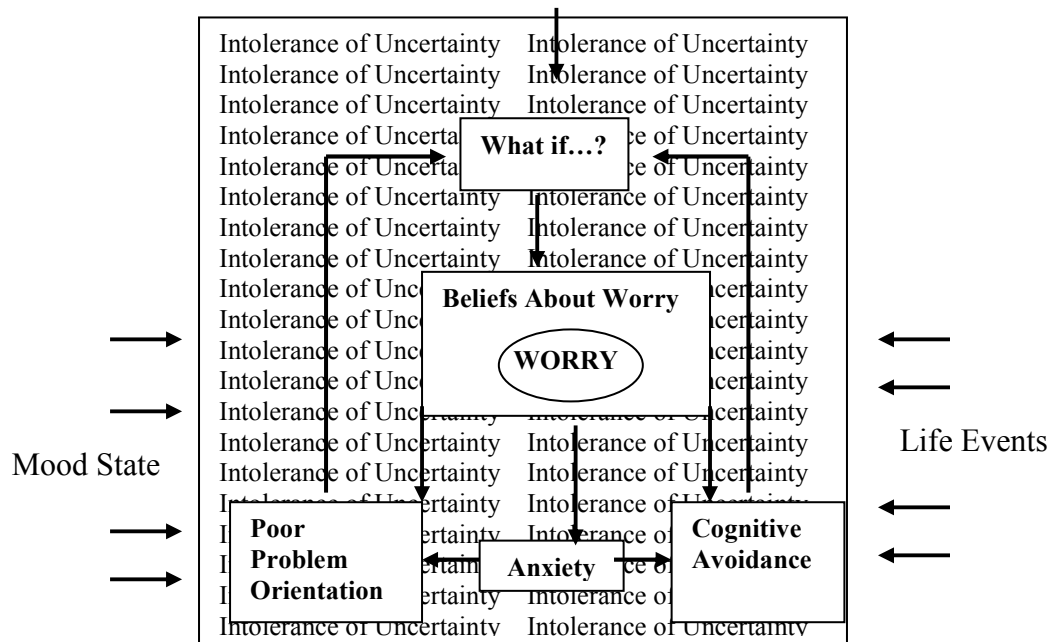
when describing their worries (Vasey et al., 1994) and reported a larger variety of worry topics (Henker et al., 1995).

Vasey's model of worry is supported to some extent by the above conclusions. As predicted by his model, differences between the worries of older and younger children are frequently reported. These findings provide evidence that worry may be explicitly linked to cognitive development.

### **Cognitive Behavioral Model of Worry**

Multiple theories exist hypothesizing the maintaining variables for excessive or pathological worry (i.e. Barlow, 2002; Borkovec, Davey, & Tallis, 1995). The cognitive-behavioral model of worry presented by Dugas et al. (1998) integrates many established theories of worry into a cohesive, theoretically sound model. A number of studies are present in contemporary research literature examining the cognitive-behavioral model of worry and its individual components. Unfortunately, although there are a number of studies examining this model in adult samples, only one study exists utilizing an adolescent population. The theory presented by Dugas et al (1998) delineates four cognitive variables as important for the development and maintenance of excessive and uncontrollable worry in adults. These variables include: 1) intolerance of uncertainty, 2) negative problem orientation, 3) positive beliefs about worry, and 4) cognitive avoidance/thought suppression (see Figure 1).

Intolerance of uncertainty is often seen in the cognitive, emotional, and behavioral reactions of individual to ambiguous or uncertain situations. Intolerance of uncertainty is best thought of as a cognitive bias through which individuals perceive, interpret, and react to ambiguous conditions (Dugas et al., 1998). The second component included in the Dugas model of worry is negative problem orientation. Negative problem orientation is not a specific skill or



**Figure 1. Conceptual Model of GAD (Dugas, Gagnon, Ladouceur, & Freeston, 1998)**

problem solving ability, but a set of beliefs and cognitive processes activated by an individual in the face of everyday problems (Maydeau-Olivares & D’Zurilla, 1996). Included in this negative cognitive set, described as a poor or negative problem orientation, is the tendency to view problems as threatening, unsolvable, and uncontrollable as well as the tendency to doubt one’s own problem-solving abilities (Robichaud & Dugas, 2005a). Positive beliefs about worry are the third component of the cognitive-behavioral model of worry. Positive beliefs about worry refer to the beliefs that the worry process may be beneficial and that worry has protective and preparatory functions of such as avoiding disappointment, finding better solutions to problems, and avoiding negative outcomes (Freeston et al., 1994). The fourth component of the Dugas et al. (1998) model is cognitive avoidance. Cognitive avoidance, as typically conceptualized in the cognitive-behavioral model of worry, refers to an individual’s tendency to suppress unwanted thoughts or engage in distraction to avoid distressing thoughts and/or images (Dugas et al., 1998;

Ladouceur et al., 1998). These four central components of the Dugas et al. (1998) cognitive-behavioral model of the development and maintenance of excessive worry will be discussed in depth below.

**Intolerance of Uncertainty.** Intolerance of uncertainty is often described as the central component of the cognitive-behavioral model of worry and has shown specific and unique relationships with worry levels and the remaining three components of the model. Intolerance of uncertainty reflects a cognitive bias that affects an individual's perceptions, interpretation, and response to situations deemed uncertain or ambiguous (Buhr & Dugas, 2002). Individuals with elevated levels of intolerance of uncertainty tend to react negatively on an emotional, cognitive, and behavioral level to uncertain events and situations (Freeston et al., 1994). Additionally, individuals with heightened levels of uncertainty view uncertain or ambiguous situations as stressful and upsetting and deem such events as negative and needing to be avoided. In the face of uncertainty, individuals with an intolerance of uncertainty may be unable to proceed or effectively engage in the decision-making or problem solving process (Buhr & Dugas, 2002). Intolerance of uncertainty has consistently emerged as possessing a strong relationship with and as the best predictor of worry level across clinical and non-clinical populations alike (Dugas et al., 1998; Laugesen et al., 2003; Buhr & Dugas, 2006). In non-clinical samples, the correlation between intolerance of uncertainty and worry range from .60 (Buhr & Dugas, 2002) to .70 (Dugas et al., 1997). Additionally, research has demonstrated that intolerance of uncertainty makes a unique contribution to the prediction of worry above and beyond age, gender, and levels of psychopathology (Buhr & Dugas, 2002; Dugas et al., 1997) and that targeting intolerance of uncertainty is related to changes in levels of pathological worry (Ladouceur, Gosselin, & Dugas, 2000).

Previous research on characteristics of worriers suggests that high worriers hold heightened evidence requirements for decision making during the problem solving process (Tallis, Eysenck, & Mathews, 1991). In this sense, high worriers require additional information prior to making a decision. By requiring additional evidence, this lowers the level of uncertainty present when faced with a problem or decision. Other experimental research has found that worriers exhibit greater difficulty completing ambiguous tasks and are more distressed during such tasks than non-worriers (Metzger, Miller, Cohen, Sofka, & Borkovec, 1990). From these results, it seems that high worriers are slower at processing ambiguous stimuli and acting in ambiguous situations. In a similar experimental research study, Butler and Mathews (1983) found that worriers tended to interpret ambiguous situations as negative, dangerous, and threatening and that these interpretations were related to greater difficulty in completing ambiguous experimental tasks. Experimental research along these lines, suggests that individuals with heightened levels of worry have greater difficulty in the face of ambiguous situations and often interpret these situations as negative or threatening. Current research suggests that the construct of intolerance of uncertainty is also related to cognitive biases in the processing of ambiguous information (Dugas et al., 2005). Dugas et al. (2005) found that increased intolerance of uncertainty was related to a recall bias for ambiguous stimuli and increased the likelihood of interpreting such stimuli as threatening. Taken together with previous research on worry and ambiguity, this suggests that individuals who are intolerant of uncertainty have a cognitive bias favoring the threatening interpretation of all information, but that this bias is particularly important when it comes to ambiguous information, interpretation of such information, and as it is related to cognitive, behavioral, and emotional responses to such situations.

Targeting intolerance of uncertainty has been shown to influence worry level (Dugas & Ladouceur, 2000; Ladouceur et al., 2000). Ladouceur et al., (2000) experimentally manipulated intolerance of uncertainty and observed related changes in reported worry levels as well. When intolerance of uncertainty was increased through experimental manipulations, increased levels of worry were reported. Additionally, during the course of cognitive-behavioral therapy, researchers have shown that when intolerance of uncertainty is targeted, worry levels are affected (Dugas & Ladouceur, 2000). Overall, researchers show that as intolerance of uncertainty increases, corresponding changes in worry levels are observed.

The positive correlation between intolerance of uncertainty and worry has been repeatedly demonstrated. An early study by Freeston et al. (1994) found that intolerance of uncertainty was related to trait worry and that the significant relationship remained after controlling for reported levels of anxiety and depression. Research in non-clinical samples has supported strong positive correlations between intolerance of uncertainty and worry. Buhr and Dugas (2002) found that intolerance of uncertainty was able to discriminate between non-clinical participants meeting criteria for GAD according to questionnaire data from participants reporting moderate worry but not meeting GAD criteria. Additionally, intolerance of uncertainty has also been shown to discriminate successfully between participants with diagnosed GAD and moderate worriers (Dugas et al. 2001; 2005). Intolerance of uncertainty has also been shown to be a construct with a specific relationship to GAD as compared to other anxiety disorders, such as obsessive-compulsive disorder, panic disorder, or social phobia (Dugas et al., 2001; Dugas et al., 2005). Similarly, Dugas et al. (2001) found that intolerance of uncertainty is most strongly related to worry, compared to reports of obsessions, compulsions, and panic sensations. Furthermore, although symptoms of anxiety and depression have been shown to be related to

reported levels of worry in non-clinical samples, intolerance of uncertainty has emerged as a better predictor of worry in both adolescents and adults than either anxious or depressive symptoms (Laugesen et al., 2003; Dugas et al., 1997). Overall, it has been found that intolerance of uncertainty is a strong predictor of worry levels, even after controlling for age, gender, and symptoms of anxiety and depression.

Although research has repeatedly demonstrated that a significant relationship exists between intolerance of uncertainty and worry, the two constructs are hypothesized to be theoretically distinct. The relationship between intolerance of uncertainty and worry has been shown not to be influenced by overlap with symptoms of anxiety and depression (Dugas et al, 1997; Freeston et al., 1994). Ladouceur, Talbot, and Dugas (1997) used a series of experimental tasks to determine the relationship and distinctiveness of intolerance of uncertainty and worry. Information required prior to making a decision on these uncertain tasks was shown to be significantly related to intolerance of uncertainty and unrelated to measured levels of worry. Using factor analytic methods, Ratto, Sexton, Robichaud, and Dugas (2005) demonstrated the statistical distinctiveness of measures of intolerance of uncertainty and worry. The minor overlap observed between the constructs appeared to be related to behavioral and emotional expressions of worry.

In terms of the other variables of Dugas' model of worry (i.e. problem orientation, beliefs about worry, and cognitive avoidance), intolerance of uncertainty has been shown to be the most salient predictor of worry levels, above other model variables in clinical and non-clinical samples in a variety of ages (Dugas et al., 1998; Laugesen et al., 2003; Robichaud, Dugas, & Conway, 2003). Significant correlations between intolerance of uncertainty and the remaining three variables of the Dugas model have also been reported (Dugas et al., 1998; Laugesen et al., 2003;



Dugas et al, 2005). Although multiple studies exist demonstrating the relationship of worry to intolerance of uncertainty in adult samples, only one study has investigated the construct in an adolescent sample (Laugesen et al., 2003). Laugesen et al. (2003) demonstrated a significant correlation between intolerance of uncertainty and worry in an adolescent sample as well as showed that intolerance of uncertainty was the most importance factor in discriminating moderate and high adolescent worriers.

**Negative Problem Orientation.** Past theories have proposed that the function of worry is related to problem solving (Davey, 1994). Worry has been suggested to be an attempt to problem solve, and therefore can be a constructive process. However, worry can also be associated with pathology and maladaptive responses in the face of real world problems. Problem orientation is not a specific skill involved in problem solving but a “generalized cognitive-affective-behavioral set that the person brings to specific problematic situations” (D’Zurilla & Nezu, 1990 p. 157). Often times, definitions of problem orientation refer to an individual's general response set when faced with problems (Dugas et al., 1997) and include reference to problem-solving confidence. Confidence in problem solving abilities has been shown to be related to GAD symptomatology and worry. Dugas et al., (2005) reported that individuals with diagnosed GAD exhibited poorer problem solving confidence than individuals with panic disorder; whereas Dugas et al., (1998) found that clinical participants reported less confidence in their problem solving abilities than non-clinical controls.

Negative problem orientation, a component of social problem solving, is comprised of a set of meta-cognitive processes that reflect one’s awareness and appraisal of problem’s faced in daily life combined with an individual’s ability and confidence in problem solving. This set of processes includes problem perception, attribution, and appraisal as well as an individual's

beliefs regarding personal control over the problem solving process and emotional responses in the face of problems (D’Zurilla & Nezu, 1971). Robichaud and Dugas (2005a) defined negative problem orientation as a “disruptive cognitive emotional set, or attitude toward problems that includes perceived threat of problems to well-being, self-efficacy, or doubt over one’s problem solving ability, the tendency to be pessimistic about the outcome, and low frustration tolerance” (pg. 392). Research has shown that negative problem orientation is related to worry (Dugas et al., 1998) and intolerance of uncertainty (Dugas et al., 1997), and has greater specificity to worry than depression (Robichaud & Dugas, 2005b).

Negative problem orientation and intolerance of uncertainty have been shown to be closely related in a number of studies (Dugas et al., 1997; Dugas et al., 1998; Laugesen et al., 2003; Dugas et al., 2005). Although worry has not been shown to be significantly related to actual problem solving skills or abilities, it has been shown to be related to decreased confidence in problem solving abilities and low perceived control of the problem-solving process (Davey, 1994). Negative problem orientation has been related to worry in clinical (Dugas et al., 1998) and non-clinical samples (Dugas et al., 1995) of adults. Laugesen et al. (2003) demonstrated a significant correlation between negative problem orientation and worry as well as with intolerance of uncertainty in a sample of adolescents. In this adolescent sample, negative problem orientation was significantly correlated to worry and intolerance of uncertainty, as well as with positive beliefs about worry and cognitive avoidance. Additionally, problem orientation successfully discriminated between moderate and high adolescent worriers.

**Positive Beliefs about Worry.** According to Dugas et al. (1998), beliefs regarding the function of worry play a significant role in the etiology and subsequent maintenance of excessive

worry in adults. Researchers have investigated the perceived functions and consequences of worry among clinical and non-clinical adult populations.

Contemporary research has identified a number of positive beliefs about worry individuals may hold such as the belief that worry enhances problem solving, increases motivation, prevents bad things from happening, protects against negative emotions, and is a positive personality trait (Francis & Dugas, 1999; Holowka, Dugas, Francis, & Laugesen, 2000). Although studies have demonstrated a relationship between worry and positive beliefs about worry, the exact nature of the relationship is not clearly delineated. While some studies have found that positive beliefs about worry are related to excessive or pathological worry (Freeston et al., 1994), others have demonstrated that positive beliefs about worry were significantly related to worry at low levels of worry and unrelated to worry at higher levels (Holowka et al., 2000; Stöber, 2000). Freeston et al. (1994) found that positive beliefs about worry were related to levels of worry and individuals with GAD believe that worrying is useful in finding solutions and preventing negative outcomes. Similarly, Dugas et al. (2005) found that patients with GAD held more beliefs regarding the usefulness of worry than non-patients. Borkovec and Roemer (1995) reported that non-clinical high worriers could be differentiated from control participants on the basis of rating worry as distraction from more emotional topics. Both GAD and control participants reported that worry was used to compel them to accomplish tasks, to prepare for possible aversive events, and to create methods to avoid or prevent aversive events. The GAD group recounted greater utilization of worry to divert their attention from more emotional topics. Alternatively, Roemer and Borkovec (1993) reported that clinical participants and high worriers hold more beliefs about the usefulness of worry in problem solving and in the prevention of future negative outcomes than non-worriers. Additionally, GAD patients often claim that

worrying helps them to be prepared for negative outcomes, even if these outcomes are generally improbable (Roemer & Borkovec, 1993). In such cases, positive beliefs about the functions of worry may be negatively reinforced by the non-occurrence of such feared events.

Overall, research in the area of positive beliefs about worry indicates that a relationship does exist between levels of worry and beliefs held regarding the positive functions and/or consequences of worry. In a study utilizing an adolescent sample, Laugesen et al. (2003) failed to find differences between moderate and high worriers based on responses to a measure of positive beliefs regarding worry, although beliefs about worry were significantly associated with reported worry levels. Whereas positive beliefs about worry did not distinguish between high and moderate adolescent worriers, the beliefs did contribute to the prediction of worry levels. A follow-up study by Gosselin et al. (2007) further investigated the relationship of positive beliefs about worry in an adolescent sample. No differences in reported beliefs about worry were found according to age, though adolescents with high levels of reported worry did hold significantly more positive beliefs about worry than moderate or low worriers. Additionally, scores on the measure of beliefs about worry made a significant contribution in the prediction of worry.

**Cognitive Avoidance.** Cognitive avoidance has been shown to be an important process variable of worry in adult samples (Borkovec, Ray, & Stober, 1998; Dugas et al, 1998). Two conceptualizations of cognitive avoidance are prominent in the literature. First, cognitive avoidance is referred to as an automatic process of avoiding threatening/fearful images and reducing/avoiding physiological arousal. Secondly, cognitive avoidance is thought of as an effortful process engaged in by an individual to suppress unwanted and distressing thoughts.

Borkovec (1994) has developed an avoidance theory of worry that examines cognitive avoidance and worry in terms of avoiding arousal provoking mental images. In Borkovec's

theory, worry is characterized as a predominately verbal activity, rather than composed of mental images (Borkovec & Inz, 1990). Additional research by Freeston, Dugas, and Ladouceur (1996) replicated the idea that worry is primarily composed of verbal activity or thoughts rather than mental images. . Borkovec and Hu (1990) showed that while worrying, individuals displayed a decreased heart rate response when exposed to fearful imagery. This contradicts responses seen in relaxed participants and participants without clinical levels worry, who show an increased heart rate when exposed to anxiety provoking images. The cognitive avoidance theory of worry posits that by engaging in the worry process, individuals avoid exposure to arousal provoking images. The result of this process is negative reinforcement of worry (Borkovec, Alcaine, & Behar, 2004). Borkovec and Hu (1990) suggest that by engaging in worry, the individual is focused on verbal thoughts, rather than the images, and the aversive somatic activity associated with the anxiety-provoking images is reduced or avoided. In essence, worry serves as a way to avoid images of stressful or negative affectively laden situations and the somatic anxiety that might be associated with such situations. In addition, worry is negatively reinforced by the success of avoiding these aversive experiences as well as avoiding the physiological arousal in the short-term although the long-term consequences are the decreased emotional processing of the aversive images and threatening stimuli (Foa & Kozak, 1986). Borkovec's theory of the avoidant function of worry is partially supported by research indicating a reduced variability in autonomic arousal in patients with GAD rather than increased autonomic symptoms that are seen in most other anxiety disorders (i.e. panic disorder and specific phobia). Autonomic activation has been proposed to facilitate cognitive activation (Lang, 1979) and emotional processing (Foa & Kozak, 1986). Thus, worry has been proposed as a means of controlling emotional

experiences by substituting verbal activity (worry) for more emotionally and physiologically arousing visual images.

A second way cognitive avoidance has been conceptualized is as an effortful strategy to suppress unwanted thoughts. At the present, there are limited methods available for the assessment of cognitive avoidance in terms of avoidance of fearful/anxiety provoking images, therefore the majority of research on the cognitive avoidance in anxiety and worry focuses on the role of cognitive avoidance in suppressing distressing or worrisome thoughts.

Studies report that high worriers and individuals with GAD report active attempts at suppressing thoughts relating to worry triggers (Wells & Papageouriou, 1995). Thought suppression refers to the attempts and acts aimed at eliminating unwanted or distressing thoughts from one's current awareness (Borkovec et al., 2004). Research suggests that the majority of individuals are not effectively able to suppress unwanted thoughts. Additionally, the majority of individuals report an actual increase in the number of unwanted thoughts following attempts at thought suppression (Wegner, Schneider, Carter, & White, 1987). Thought suppression is thought to have two negative consequences. First, Lavy and van den Hout (1990) suggest that suppression of worry may lead to an "enhancement effect," or an immediate surge in the target thought that is activated by a monitoring process induced through the act of suppression. Secondly, researchers have suggested that thought suppression may lead to a "rebound effect" (Merckelbach, Muris, van den Hout, & de Jong, 1991). This "rebound effect" suggests that attempts at thought suppression may lead to the increased occurrence of target thoughts in periods following the activity suppression attempt. Based on these two proposed negative effects of thought suppression, it is possible that thought suppression of worries may ultimately maintain worries.

Cognitive avoidance in the form of thought suppression has been shown to be associated with levels of reported worry in both clinical and non-clinical samples (Dugas et al., 1998; Dugas et al., 2005). Participants with diagnosed GAD have been effectively discriminated from non-diagnosed controls using thought suppression alone (Dugas et al., 1998). In adolescent samples, there is mixed evidence for the role of thought suppression in the development and maintenance of anxiety and worry. Laugesen et al. (2003) reported that cognitive avoidance in the form of thought suppression was significantly correlated with worry, intolerance of uncertainty, negative problem orientation, and beliefs about worry but failed to find that thought suppression effectively discriminated moderate and high worriers or that thought suppression predicted worry levels. Adolescent high and moderate worriers were found to differ on reported use of avoidance strategies by Gosselin et al. (2007). High worriers reported using each of five types of cognitive avoidance strategies more frequently than moderate worriers. The strongest relationship reported by Gosselin et al. (2007) was found between worry levels and the avoidance of unpleasant thought provoking stimuli and thought substitution. Reported use of distraction, thought suppression, and transformation of mental images were not predictive of worry levels (Gosselin et al., 2007).

Although cognitive avoidance is present in adolescents, the relationship of cognitive avoidance and thought suppression to worry does not parallel what is seen in adults and certain avoidance strategies are more closely related to worry in adolescents than others. These conclusions leave many questions as to the role of cognitive avoidance in the development and maintenance of excessive worry within adolescent populations.

## **Coping in Adolescents and Adults**

Across the lifespan, individuals deal with a variety of stressors and use different coping strategies to address these challenges. The coping strategies used by individuals during different phases of development (adolescence, young adulthood, adulthood) are likely to vary with cognitive abilities and with the particular life demands and social supports that are characteristic of each developmental period. As an individual developmentally progresses through childhood to adolescence and even to adulthood, coping abilities are thought to shift from external, behavioral strategies to more internal, cognitively focused coping skills (Aldwin, 1994). The importance of coping strategies is highlighted in the reported moderating role of coping strategies on psychological distress and psychopathology in children and adolescents (Compas, Orosan, & Grant, 1993; Kraaij et al., 2003). Coping in general is viewed as an effortful response enacted by the individual to deal with external or internal stressors that are determined to be demanding or trying (Folkman & Lazarus, 1980). Coping can include both cognitive and behavioral responses to the situation and are not always successful (Halstead, Johnson, & Cunningham, 1993). Specific coping efforts are the particular strategies used in stressful situations and are dichotomized into problem-focused (i.e. efforts to change the person-environment relations) and emotion-focused (i.e. efforts to regulate the individual's stress-related emotional response) strategies (Folkman & Lazarus, 1980). Problem-focused strategies are aimed at modifying the stressful situation whereas emotion-focused strategies reflect strategies directed towards regulating stress-related negative emotions. Compas, Malcarne, and Fondacaro (1988) reported that problem-focused coping strategies were negatively related to psychological symptoms in a child and adolescent sample. Conversely, emotion-focused coping was positively-related to psychopathology. Therefore, children and adolescents with psychopathology were less likely to



engage in problem-focused coping strategies and more likely to engage in emotion-focused strategies when presented with stressful or challenging situations.

Several findings suggest that the types of coping strategies used by adolescents do change with age. Adolescence is an especially important time in terms of the development of more cognitive oriented coping skills. As discussed previously, many important cognitive changes occur during the developmental period of adolescence. Cognitive changes observed during adolescence include the ability to consider situations in the abstract and in terms of multiple possibilities as well as to engage in a type of meta-cognition whereby the adolescent is able to monitor his or her own cognitive activity during the process of thinking. The ability to engage in meta-cognition or to possess insight regarding one's own cognitive processes emerges in adolescence (Flavell, Flavell, & Green, 2001; Flavell, 1999). Ormond, Luszcz, Mann, and Beswick (1991) found that individuals in middle to late adolescence demonstrated greater metacognitive knowledge than early adolescence. With these cognitive developments, an adolescent is better able to take the perspective of others, plan for future possibilities, consider multiple consequences, and provide alternative reasons for outcomes and events (Garnefski, Legerstee, Kraaij, van den Kommer, & Teerds., 2002; Labouvie-Vief et al., 1990; 1998). Such thoughts and cognitive abilities are important for the ability to manage, regulate, and control one's own feelings. Such abilities assist an individual not to become overwhelmed by emotions during or after a stressful experience (Garnefski et al., 2002).

Multiple researchers have found that there is a significant positive relationship between age and emotion-focused coping for 5 to 17 years (Compas et al., 1988; Frydenberg & Lewis, 1993). Frydenberg and Lewis (1993) found that younger adolescents reported that they directly deal with sources of stress by working more or engaging in problem-solving, whereas older

adolescents report that they often use tension reduction techniques to manage the internal effects of stress. Other research has found that the use of distraction as a coping strategy decreases from childhood to middle adolescence (Hampel & Peterman, 2005). These findings are consistent with Compas et al.'s (1993) conclusion that emotion-focused coping strategies such as withdrawal and the expression of negative feelings increase in frequency throughout development (Williams & McGillicuddy-De Lisi, 2000). In contrast, individuals of all ages frequently rely upon problem-focused coping strategies that involve concrete actions such as making decision and planning solutions to remedy the problem. Research suggests that problem focused coping strategies emerge in late childhood or early adolescence and do not appear to change across later development (Compas et al., 1993). Williams and McGillicuddy-De Lisi (2000) found that the problem-focused strategy of confrontive coping (assertive efforts to alter the situation) did not vary across age groups in a sample of adolescents, whereas more emotion-focused strategies (i.e. accepting responsibility, self-control) were reported less often by the youngest adolescents compared to the older adolescents.

Research conducted by Garnefski, Kraaij, and Spinhoven (2001), Garnefski et al. (2002), as well as other researchers (Compas et al., 1993; Folkman & Lazarus, 1988; Halstead et al., 1993) have identified various coping strategies that individuals may use to manage and regulate emotions during times of stress. As defined by Folkman and Lazarus (1988) coping includes both cognitive and behavioral strategies “to manage specific external and/or internal demands appraised as taxing or exceeding the resources of the individual” (p. 468). Cognitive coping has been defined as a cognitive way of managing the intake of emotionally arousing information that involve thoughts as well as behavior that help to manage or regulate emotions (Thompson, 1991). Garnefski et al. (2001) and Garnefski et al. (2002) identified nine conceptually distinct coping

strategies: self-blame, other-blame, rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance, and refocus on planning. The strategies presented by Garnefski essentially address the cognitive efforts described by Folkman & Lazarus (1980; 1988). Folkman and Lazarus (1988) identified eight specific coping strategies that encompass both cognitive and behavioral facets of coping responses: confrontation, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal.

Although the use of advancing thought and emotion regulation is universal, there are larger differences in the amount of cognitive activity and cognitive content in response to stress across age groups (Garnefski et al., 2002). In a cross-sectional study of non-clinical adolescents, Garnefski et al. (2001) found that cognitive coping strategies such as self-blaming, catastrophizing, and rumination were all important in explaining the relationship between negative life events, maladjustment, and depression. A later study conducted by Garnefski et al. (2002) examined the use of cognitive coping strategies and symptoms of depression and anxiety in both adolescent and adult samples. In a direct comparison of adults and adolescents, the study revealed that adolescents reported significantly less use of cognitive coping than adults overall. The largest reported difference was found for the strategy of “positive reappraisal,” suggesting that adolescents are less likely to attempt to create a positive meaning to a negative life event than adults (Garnefski et al., 2002). In terms of the relationship of cognitive coping to symptoms of psychopathology (i.e. depression and anxiety), it was shown that a significant amount of variance in symptoms of depression and anxiety could be explained by the use of cognitive coping strategies. A stronger relationship was demonstrated between endorsed coping strategies and symptoms of anxiety and depression in the adult sample as compared to the adolescent. A

greater number of strategies predicted anxiety symptoms in the adults than the adolescents (Garnefski et al., 2002). A recent study conducted by Garnefski and Kraaij (2006) compared cognitive coping strategies across five distinct samples and found that all strategies were reported to a lesser extent by the young adolescent sample (12-15 years) than the older adolescents (16-18 years). In turn, the older adolescents reported significantly less reliance on cognitive coping strategies than the general adult population and elderly sample (Garnefski & Kraaij, 2006). Overall, these results suggest that cognitive coping strategies, although present in adolescence, become more refined and matured across time (Garnefski et al., 2002).

Williams and McGillicuddy-De Lisi (2000) examined the use of coping strategies by early adolescents, older adolescents, and young adults. Young adults reported use of a greater variety of coping strategies, specifically problem focused strategies aimed at directly reducing the impact of stressors and strategies that involved a cognitive component (i.e. planful problem solving, positive reappraisal). Whereas the strategies of confrontation, distancing, and escape-avoidance did not significantly differ across the three age groups, the use of planful problem solving, accepting responsibility, and self-control strategies significantly increased across the age groups.

Overall, the literature on coping suggests that adolescents and young adults have several strategies for responding to stressors in their environment, but that there are important age differences. This body of research suggests that as children develop into adolescents and young adults, reliance on problem-focused coping strategies remains stable while strategies aimed at regulating one's own emotional state increase (Garnefski et al., 2002; Hampel & Petermann, 2005; Garnefski & Kraaij, 2006; Williams & McGillicuddy-De Lisi, 2000). Findings suggest that adolescents develop new coping strategies that increase in flexibility and range of responses to

stress (Williams & McGillicuddy-De Lisi, 2000). The types of strategies that increase in use within the adolescent to adult transition tend to have a cognitive component and are more active attempts to deal with distress and manage stress related problems as compared to the avoidant strategies reported by younger adolescents (i.e. distancing, escape-avoidance).

### **Summary and Rationale of Current Study**

A cognitive-behavioral model of the development and maintenance of excessive worry has been developed and tested in multiple adult samples. Intolerance of uncertainty, positive beliefs about worry, negative problem orientation, and cognitive avoidance are significantly correlated to worry and each other and have the ability to predict levels of worry in clinical and non-clinical populations (Dugas et al., 1998; Dugas et al., 2005; Robichaud et al., 2003). The current study is based on a cognitive-behavioral model of worry as is presented by Dugas and colleagues. This empirically based model integrates a number of well-established theories on the development and maintenance of worry such as Borkovec's emotional processing model (Borkovec, 1994; Borkovec & Hu, 1990; Foa & Kozak, 1986); Tallis and Eysenck's (1994) model of threat and appraisal, the meta-cognitive model (Wells, 1995; 1999), as well as D'Zurilla and colleagues (1990) model of problem-solving. As the cognitive-behavioral model presented by Dugas and colleagues incorporates many of the cognitive variables found within the previously mentioned models, the cognitive-behavioral model has been able to fill in many gaps in the literature, specifically in terms of the functions of worry and maintenance of problematic worry within a comprehensive cognitive-behavioral framework. Although this model is relatively new, a moderate amount of literature has amassed support for the theory in clinical and non-clinical adults. Unfortunately, limited research has been conducted using this model in adolescents and the research which does exist is not consistent with adult findings. Due to these

discrepancies, it cannot be assumed that the development and maintenance of worry within adolescents follows what is found in adult samples. Laugesen et al. (2003) demonstrated that the variables of Dugas' cognitive-behavioral model of worry are significantly correlated with the tendency to worry in adolescents, similar to findings in adult samples. In contrast to adult research, the Laugesen et al. study failed to find predictive value of thought suppression for worry levels and reported a lack of ability to discriminate between moderate and high adolescent worriers for the variables of positive beliefs about worry and thought suppression. A recent study examining the relationship of cognitive avoidance and positive beliefs about worry contradicts previous research by Laugesen et al. (2003). Gosselin et al. (2007) reported that five types of cognitive avoidance (avoidance of triggers, thought substitution, distraction, thought suppression, and transformation of images) were significantly related to the tendency to worry in adolescents and were reported at higher levels by high worriers than moderate worriers. Positive beliefs regarding the outcomes and consequences of worry were also predictive of worry levels. These studies provide preliminary support for the theory that erroneous beliefs about the benefits and functions of worry and cognitive avoidance, or more specifically thought suppression, may be important constructs for an understanding of excessive worry in adolescents. As can be seen within this body of research, the cognitive components of worry do play an important role in excessive worry in adult populations and are suggested to play a role in adolescent worry. What is currently unknown is if a relationship is present between age and these variables.

Research in the area of coping suggests coping abilities and strategies are related to both age (Compas et al., 1993; Williams & McGillicuddy-De Lisi, 2000) and symptoms of anxiety and other psychopathology (Garnefski et al., 2002). In general, adults report a greater variety and flexibility in the use of coping strategies. Additionally, the types of strategies relied upon may

differ across development. Hampel and Petermann (2005) reported that adolescents reported less adaptive (problem focused) and greater maladaptive (emotion focused) coping than children. Similarly, Williams and McGillicuddy-De Lisi (2000) found that functional coping decreased with age whereas emotional coping increased. Other researchers have also found that emotion-focused coping increases in the developmental period of adolescence and young adulthood (Compas et al., 1993).

Previous research demonstrates that the variables of intolerance of uncertainty, negative problem orientation, cognitive avoidance, and beliefs about worry are important predictors of worry in adult samples and exhibit significant relationships with worry in adolescent samples, but differences in the strengths of these relationships are presently unaccounted. The largest discrepancy in this body of research is regarding the role of cognitive avoidance in the prediction of worry. Despite demonstration of a significant and unique relationship between cognitive avoidance and worry and the ability of cognitive avoidance to discriminate high and moderate adult worriers, these same results have not been replicated in adolescent samples. Given the available research on cognitive development across the adolescent to young adult transition (e.g., Labouvie-Vief et al., 1990; Labouvie-Vief et al., 1998) and the documented increases in metacognitive knowledge (e.g., Ormond et al., 1991) and cognitive coping abilities (e.g., Garnefski et al., 2002) within early adulthood, it may be that the role of cognitive avoidance in the predication of worry changes at some point during the adolescent to adult transition. Additionally, research supports the notion that coping strategies change and develop in the transitional period between adolescence and adulthood. Consequently, one may extrapolate that cognitive avoidance may serve a coping function and account for discrepancies in the literature regarding the role of cognitive avoidance in the prediction of worry across adolescent and adults.

Past research examining specific components of the cognitive-behavioral model of worry have been equivocal on the role of erroneous beliefs about the usefulness of worry in the prediction of worry in both adult and adolescent samples. More specifically, whereas Laugesen et al. (2003) failed to find support for beliefs about worry in the prediction of worry Gosselin et al. (2007) reported that beliefs that worry helps to avoid negative outcomes was significantly related to adolescent worry. Given these discrepant findings, further investigation of the role of erroneous beliefs regarding the usefulness of worry are appropriate. The present study will focus on this issue examining the relationship between age and the model variables as well as the potential mediating or moderating role of coping abilities in said relationships.

### **Purpose**

The overall purpose of this study was to examine the developmental continuity of the Dugas et al. (1998) cognitive-behavioral model of worry. Only one study to date has examined the cognitive-behavioral model of the acquisition and maintenance of worry in adolescents, and it failed to replicate results found in previous adult samples (Laugesen et al., 2003). Therefore, age differences may be present and require further exploration to establish patterns of worry and coping mechanisms in an adolescent population. The question of greatest concern is at what point in an individual's lifespan does the proposed model begin to take form. The proposed study examined two specific questions: (1) Does age alone predict scores on measures of the cognitive components of worry as presented by Dugas (1998), and (2) If age were to predict levels of intolerance of uncertainty, negative problem orientation, cognitive avoidance, or beliefs about worry, do coping strategies account for or influence the relationship between age and the cognitive variables? These questions are of critical importance in better understanding the developmental course of worry and how it appears in adolescents. Understanding these factors



should help the development of better methods to identify problematic worry and in formulating effective treatment strategies.

## **Research Hypotheses**

**1. Hypothesis:** It was predicted that scores on measures of cognitive avoidance and beliefs about worry would be positively predicted by age, whereas measures of intolerance of uncertainty and problem orientation would not be predicted by or correlated with age. Given the conflicting results reported in research with adult (e.g. Dugas et al., 1998; Dugas et al., 2005; Dugas et al., 2007) and adolescent (e.g. Laugesen et al., 2003; Gosselin et al., 2007) samples, it was predicted that cognitive avoidance and beliefs about worry would be predicted by age in that with increasing age, increased reports of cognitive avoidance and erroneous beliefs about worry would result. However, previous research with adults and adolescents has yielded consistent results regarding the relationship of intolerance of uncertainty and problem orientation with worry in both adolescent and adult samples. Therefore, a relationship between age and scores on measures of intolerance of uncertainty and problem orientation are not expected to be found.

**2. Hypothesis:** It was predicted that use of coping strategies would serve as a moderator of the relationship between age and scores on measures of cognitive avoidance and positive beliefs about worry rather than mediating the relationships. It was hypothesized that coping (specifically avoidant/emotional coping) will accentuate the relationship between age and cognitive avoidance/beliefs about worry but coping will not account for these relationships. More specifically, it was hypothesized that the relationship between age and the cognitive variables of cognitive avoidance and beliefs about worry will be greater at lower levels of reported coping than at higher levels of coping. In other words, it was predicted that age would

predict cognitive avoidance and beliefs about worry, but only in individuals who report lower degrees of coping.

## METHOD

### Participants

Chase and Tucker (1976) recommended that in behavioral sciences, for research with an a priori level of significance ( $\alpha$ ) of .05, power should be set at .80. Using GPOWER, a power analysis computer program (Erdfelder, Faul & Buchner, 1996), a sample of 77 participants was shown to be optimal to achieve a power of .80, using a medium effect size. The present study included 153 participants, which is a sufficient number to detect significant results, should such relationships exist.

Seventy-six adolescents between the ages of 12 and 18 (grades 6-12) and 77 young adults between the ages of 18 and 24 participated in this study. Participants had a mean age of 18.53 years ( $SD=3.14$ , range 12-24 years). The current sample included thirty-seven males (24%) and 116 females (76%). The sample consisted of 128 Caucasian participants (84%), 14 African American participants (9%), and 11 participants who identified their race as “Other” (7%). Stratified random sampling was used to select 18-24 year-old participants from a larger sample of approximately 1,200 participants enrolled at Louisiana State University (LSU). Chi square analyses were conducted to compare the demographic make-up of the samples across the two recruitment sites. Male and female participants were equally distributed across the recruitment sites,  $\chi^2(1)=.02, p >.05$ . The racial distribution of the sample did differ by recruitment site,  $\chi^2(2)=9.082, p <.05$ ; with a greater number of Caucasian participants enrolled from high schools. See Table 2 for demographic characteristics of all participants.

### Materials

All study instruments were administered in an on-line format. Permission to reproduce and use all instruments in an online format was obtained. The following questionnaires

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**Table 2. Demographic Characteristics of Participants (*n* =153)**

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|        |                  | N   | %    |
|--------|------------------|-----|------|
| Age    | 12               | 8   | 5.2  |
|        | 13               | 4   | 2.6  |
|        | 15               | 14  | 9.2  |
|        | 16               | 8   | 5.2  |
|        | 17               | 28  | 18.3 |
|        | 18               | 25  | 16.3 |
|        | 19               | 11  | 7.2  |
|        | 20               | 11  | 7.2  |
|        | 21               | 11  | 7.2  |
|        | 22               | 11  | 7.2  |
|        | 23               | 11  | 7.2  |
|        | 24               | 11  | 7.2  |
| Gender | Male             | 37  | 24.2 |
|        | Female           | 116 | 75.8 |
| Race   | African-American | 14  | 9.2  |
|        | Caucasian        | 128 | 83.7 |
|        | Other            | 11  | 7.2  |

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were utilized in this study and are described below:

- Cognitive Avoidance Questionnaire (CAQ; Sexton, Duags, & Hedayati, 2004)
- Coping Orientations to Problems Experienced Scale (COPE; Carver, Scheier, & Weintraub, 1989)
- Demographic Questionnaire
- Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994)
- Negative Problem Orientation Questionnaire (NPOQ; Robichaud & Dugas, 2005a; 2005b)
- Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990)
- Why Worry-II (WW-II; Holowka et al., 2000)

**Cognitive Avoidance Questionnaire (CAQ;** Sexton, Dugas, & Hedayati, 2004; see Appendix A). Although the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) has most often been used to examine the construct of cognitive avoidance in tests of the cognitive-behavioral model of worry (Dugas et al., 1998; Robichaud et al., 2003; Laugesen et al., 2003), more recent research has utilized the CAQ (Dugas et al., 2005; Dugas et al., 2007). As opposed to the WBSI, which primarily assesses the cognitive avoidance strategy of thought suppression, the CAQ assesses five distinct strategies. The CAQ contains 25 items to assess for the tendency to use five cognitive avoidance strategies such as thought suppression, thought substitution, transformation of images into verbal thoughts, avoidance of stimuli that trigger unpleasant thoughts, and distraction in the face of bothersome or aversive thoughts. The CAQ is scored on a five-point Likert scale (1= not at all typical, 5= completely typical). Research has typically employed the CAQ overall scale score in analyses and has supported the reliability and validity of the instrument in adolescent samples (Gosselin et al., 2007; Sexton & Dugas, in press; Sexton et al., 2004;). The CAQ has demonstrated excellent internal consistency ( $\alpha = .92-.95$ ) and good test-retest reliability ( $r=.81$ ). Additionally, the CAQ has shown evidence of convergent and criterion-related validity (Sexton et al., 2004; Gosselin et al., 2007). Given that the goals of the present study did not include an examination of specific types of cognitive avoidance and the inter-correlation of individual scales (Gosselin et al., 2007), only the CAQ total scale score was retained for use in statistical analyses.

**Coping Orientations to Problems Experienced Scale (COPE;** Carver et al., 1989; See Appendix B). The COPE is a 60-item questionnaire assessing thoughts and actions individuals use to cope with daily hassles encountered during everyday life. The COPE has been used extensively in various clinical and research settings to assess specific coping styles and

behaviors. Participants indicate the frequency with which each of the 60 coping strategies is used. In the original psychometric report, 13 subscales summarize the relative use of cognitive and emotional coping strategies (Carver et al., 1989). Acceptable internal consistency has been reported in a number of studies and convergent and divergent validity have been shown to be adequate (Carver et al., 1989). Measures assessing coping styles have historically demonstrated less than ideal psychometric properties (i.e. large number of factors, poor reliability). Lynne and Roger (2000) conducted a reanalysis of the COPE and proposed a new scoring key and factor structure for the COPE. Utilizing item level analyses, Lyne and Roger (2000) arrived at a three factor solution. The factors that emerged included Active Coping, Avoidant Coping, and Emotional Coping. Cronbach's alpha estimates of internal consistency were in the adequate range ( $\alpha=.89$ ,  $\alpha=.83$ ,  $\alpha=.69$  respectively). Convergent and divergent validity were reported by Lyne and Roger (2000), with correlations between new COPE subscales and indices of health and psychological distress in expected directions. In the current study, participants were administered the COPE to assess the use of emotional and avoidant coping strategies in the face of everyday life stressors.

**Demographic Questionnaire** (see Appendix C). For purposes of the present study, a questionnaire was developed which probes typical demographic areas (e.g., name, age, grade, race, gender, SES). This questionnaire was administered online to all participants to gather general information on demographic variables that may contribute to between group differences.

**Intolerance of Uncertainty Scale** (IUS; Freeston et al., 1994; see Appendix D). The IUS is a 27-item instrument assessing ideas held by an individual that uncertainty in life is unacceptable, reflects badly, and leads to frustration. Sample items include, "I can't stand being undecided about my future" and "One should always look ahead so as to avoid surprises." All

items are rated on a 5-point Likert scale from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The IUS shows excellent internal ( $\alpha = .91$ ) and good test-retest reliability ( $r = .78$ ; Dugas et al., 1997). Additionally, the IUS has demonstrated acceptable convergent and divergent validity as it is more highly related to other measures of worry than to measures of obsessions or panic (Dugas et al., 2001). Only one study has examined the IUS in an adolescent sample; Laugesen et al. (2003) reported internal consistency of the IUS in an adolescent sample of  $\alpha = .92$ .

**Negative Problem Orientation Questionnaire (NPOQ;** Robichaud & Dugas, 2005a; 2005b; see Appendix E). The NPOQ is a 12-item questionnaire of negative beliefs regarding one's problem solving ability. The NPOQ assesses an individual's tendency to see problem situations as threatening, doubt their problem-solving abilities, and be pessimistic about the outcome of the problem solving process. Reported internal consistency of the NPOQ is excellent ( $\alpha = .90$ ) with adequate convergent and discriminant validity (Gosselin et al., 2007).

**Penn State Worry Questionnaire (PSWQ;** Meyer, Miller, Metzger, & Borkovec, 1990; see Appendix F). The PSWQ is a 16-item self-report of excessive and uncontrollable worry in adults. Item examples include, "My worries really bother me" and "I know I shouldn't worry but I just can't help it." All items are rated in a five-point Likert-type scale ranging from 1 (not at all typical of me) to 5 (very typical of me). The PSWQ possess good internal consistency,  $\alpha = .86-.95$ , and test-retest reliability,  $r = .74-.93$  (Molina & Borkovec, 1994). Additionally, research has demonstrated that the PSWQ has good convergent and divergent validity (Molina & Borkovec, 1994). Gosselin et al. (2007) reported support for the use of the PSWQ in an adolescent sample.

**Why Worry-II (WW-II;** Holowka et al., 2000; see Appendix G). The WW-II is a 25-item questionnaire of positive beliefs about worry. All items are rated on a 5-point Likert type

scale from 1 (strongly disagree) to 5 (strongly agree). An example item from the WW-II is “By worrying, I can find a better way to do things?” Five factors emerge suggesting five types of beliefs regarding worry including 1) worry as an aid to problem solving, 2) worry as a source of motivation, 3) worry as a way of preventing negative emotion, 4) worry as a way of preventing negative outcomes, and 5) worry as a positive personality trait. The WW-II demonstrates high internal consistency and adequate validity and reliability (Freeston et al., 1994; Dugas et al., 1995). Excellent internal consistency was reported by Laugesen et al. (2003) in an adolescent sample ( $\alpha = .90$ ). Given that the goals of the present study did not include an examination of specific types of beliefs about worry and the inter-correlation of individual scales, only the WW-II total scale score was retained for use in statistical analyses.

## **General Procedures**

**Adolescent Recruitment and Procedures.** The LSU Office of Admissions provided a list of the Baton Rouge middle and high schools typically found to have students graduate and enroll at LSU. Four schools in the Baton Rouge area from this list were approached for participation in the current study. Two schools agreed to participate and meetings were conducted with school administration to discuss the details of the study. A letter explaining the purpose and risks of the study was sent to parents/guardians of eligible participants (i.e. enrolled in grades 6-12 at participating schools; see Appendix H). Parents providing consent for their adolescent’s participation returned a signed copy of the informed consent along with a valid email address to the investigator at a designated local school location. Once informed consent had been obtained from the parent/guardian, the adolescent was emailed instructions for the on-line survey and a link to the website containing the survey. Assent from individual adolescent participants was obtained through the on-line survey (see Appendix I). Adolescents were able to



complete the survey on-line at their leisure prior to a specified date. Participants specified their homeroom class when completing the survey and the homeroom class with the highest percentage of responses for each grade and school received a pizza party following the completion of data collection.

**Young Adult Recruitment and Procedures.** LSU undergraduate students enrolled in psychology courses offering extra credit were able to sign up for the experiment using the PSYC Experiments web-based server. Participants completed the informed consent via the on-line survey (see Appendix J). By clicking ‘I Agree’ and entering their name, participants acknowledged receipt and provision of informed consent for participation in this study. Following completion of the study, participants were awarded extra credit points in accordance with the procedure set forth by the LSU Psychology Experiments system.

**Informed Consent Process.** The study received Institutional Review Board (IRB) approval from LSU. The informed consent process explained the participants’ right to decline participation and to remain confidential within the research. Parents of adolescent participants initially provided informed consent by signing and returning the official Informed Consent Release to the investigator. Adolescent assent was obtained through the on-line survey. The initial screen of the survey provided information regarding procedure, rights, risks, and benefits of participation. Adolescents provided assent by checking a box indicating that they had read and understood the conditions of participation and were agreeing to participate. Informed Consent for adult participants was conducted solely through the web-based survey as described above.

## RESULTS

### **Analytic Plan**

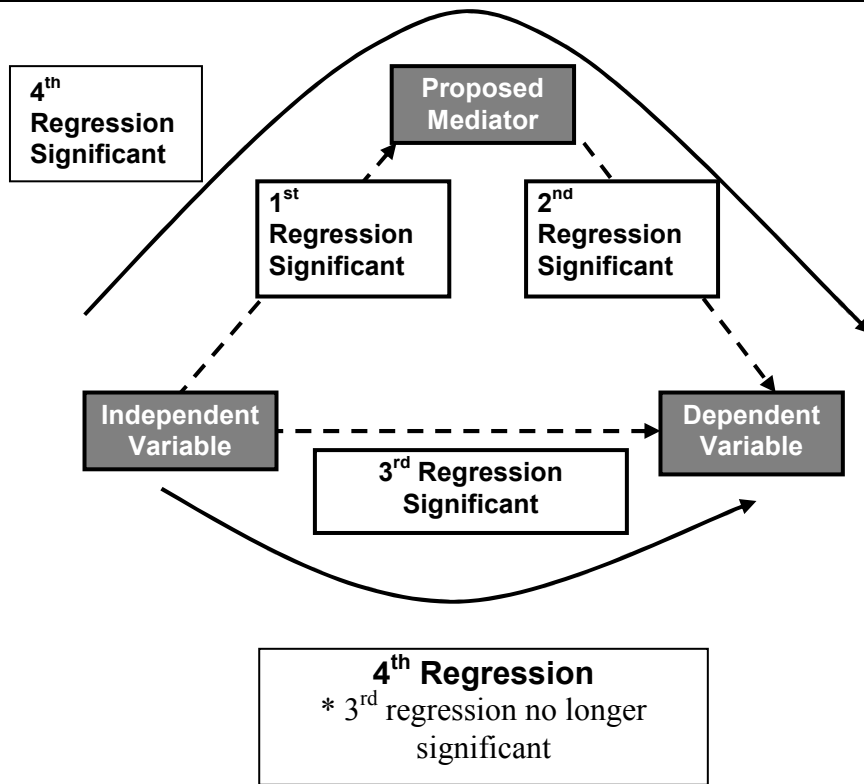
Three phases of analyses were conducted. First, descriptive analyses were conducted to examine unexpected group differences on study instruments by demographic variables as well as to evaluate the psychometric properties of internet-administered questionnaires. Next, to test Hypothesis 1 a series of four regression analyses were conducted. The final phase of analyses included a series of mediation and moderation analyses to test Hypothesis 2.

To examine the psychometric properties of the internet-administered questionnaires, Chronbach's alpha was calculated for each questionnaire to assess for internal consistency. Additionally, correlational analyses were conducted to test for inter-relationships among the demographic and worry-related variables and the model components. The variables of interest for testing the two study hypotheses included intolerance of uncertainty, negative problem orientation, beliefs about worry, cognitive avoidance, and coping (emotional, avoidant). The IUS, NPO, WW-II, CAQ, and COPE were used to measure these variables, respectively, because they are commonly used and often reported measures of these constructs in the literature. In the case of intolerance of uncertainty, the IUS is the only instrument available for assessing the construct. Worry as measured by the PSWQ was included in analyses for descriptive purposes only.

Regression analyses were performed to evaluate the two conceptual models proposed to explain how coping abilities influence the relation between age and cognitive components of worry. The first model- the mediation model- hypothesized that coping abilities would not account for the relationship between age and cognitive components of worry (i.e. cognitive avoidance, beliefs about worry). The second model- the moderation hypothesis- hypothesizes

that coping abilities acts as a buffer or influences the relationship between age and the cognitive components of worry.

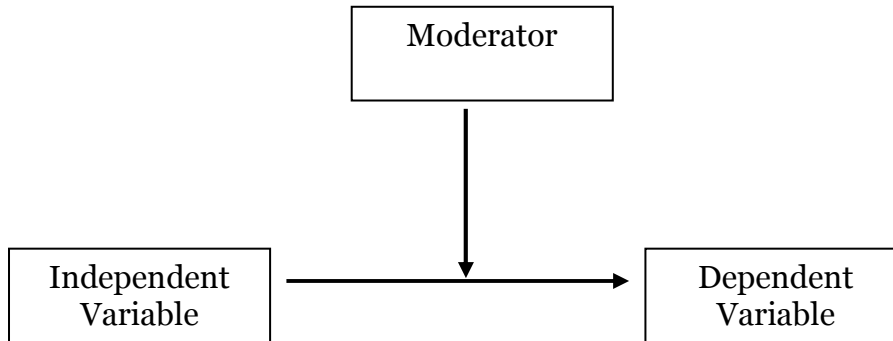
The first conceptual model- the mediation model- was evaluated using analytic procedures recommended by Baron and Kenny (1986). A visual portrayal of a mediation model is presented in Figure 2. To test for mediation, an initial series of three simple regression equations were tested for each cognitive component of worry targeted in the current study. First, the criterion variable (cognitive component of worry) was regressed onto the predictor variable (age). Second, the mediator variable (coping) was regressed on to the predictor variable (age). Third, the criterion variable (cognitive component) was regressed onto the mediator variable (coping). Finally, to demonstrate mediation, the criterion variable (cognitive component) was regressed onto the predictor variable (age) and the mediator variable (coping) simultaneously. Support for the mediating effect occurs when (a) the independent variable is significantly associated with the mediating variable, (b) the mediating variable is significantly associated with the dependent variable, (c) the independent variable is significantly associated with the dependent variable. Evidence for full mediation occurs when paths (a) and (b) are controlled for in a fourth regression equation and the previously significant relation between the predictor and the criterion variables is no longer statistically significant (Baron & Kenny, 1986). There is evidence of complete mediation if the relationship between the predictor and criterion variables is zero after controlling for the mediator variable in the fourth regression analysis or support for partial mediation if the significance of the relationship declines. In other words, full or perfect mediation is evidenced when the predictor variable no longer has an effect on the outcome/dependent variable when the mediator is controlled for (Baron & Kenny, 1986).



**Figure 2. Mediation Model**

To test the moderation model, the effects of the predictor variable (age) on the criterion variables (cognitive components of worry; cognitive avoidance and beliefs about worry) was hypothesized to change linearly with respect to the moderator variable (COPE; emotional and avoidant coping). According to Baron and Kenny (1986), the linear hypothesis is evaluated statistically by adding the cross-product (Age x COPE) of the moderator variable (coping) and predictor variable (age) to a regression equation that includes the predictor and moderator variables as predictors of the criterion variable (cognitive components). A significant moderator effect is indicated by a significant effect for the interaction term (Age x COPE) while the predictor (age) and the moderator (COPE) variables are controlled statistically (see Figure 3). Cohen and Cohen (1983) suggest that the various multiple regression strategies (i.e.

simultaneous, sequential, statistical) are appropriate for moderation analysis based on the investigator's conceptual framework.



**Figure 3. Moderation Model**

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### **Descriptive Analyses**

**Self-report Questionnaires.** As all study questionnaires were administered in an on-line format, psychometric properties of study instruments were statistically examined. Internal consistency and correlations were conducted to examine the psychometric properties of the on-line format of the study instruments. Table 3 presents means, standard deviations, and internal consistency estimates for included questionnaires as well as published means and standard deviations for comparison. Data from the current on-line administration was generally consistent with published results with two exceptions (CAQ, Avoidant COPE). Additionally, correlations between study questionnaires generally reflect observed relationships reported in the literature (cf. Dugas, Gosselin, & Ladouceur, 2001; Gosselin et al., 2007; Dugas et al., 2007).

**Relationships among Study Instruments: Pearson Correlations.** The relationships among study instruments as well as worry level were evaluated by correlation analysis. A correlation matrix including all study measures was calculated (see Table 4). Significant correlations were present between the PSWQ and all study measures, with the exception of

Rational and Avoidant coping. All subscales of the COPE significantly correlated with each other as expected. Significant correlations ranged from .175 to .654, with a mean of  $r = .37$ .

**Table 3. Descriptive Statistics**

| Scale                  | Observed Mean ( <i>SD</i> ) | Range  | Computed Internal Consistency (Chronbach's $\alpha$ ) | Adult Published Mean ( <i>SD</i> ) | Adolescent Published Mean ( <i>SD</i> ) |
|------------------------|-----------------------------|--------|---|------------------------------------|---|
| PSWQ                   | 45.29 (11.55)               | 19-73  | .86   | 44.77 (10.99)                      | 44.37 (11.34)                           |
| IUS                    | 58.78 (19.34)               | 28-103 | .94   | 54.78 (17.44)                      | 64.00(19.10)                            |
| NPOQ                   | 24.90 (9.13)                | 12-51  | .92   | 24.78 (9.46)                       | Not available                           |
| WWII                   | 51.27 (19.51)               | 25-100 | .96   | 45.89(18.82)                       | 56.25 (16.61)                           |
| CAQ                    | 71.29 (20.97)               | 25-122 | .95   | 59.16 (18.95)                      | 60.43(11.69)                            |
| Emotion Focused Coping | 20.28 (5.65)                | 9-32   | .90   | 19.97 (5.28)                       | Not available                           |
| Problem Focused Coping | 32.58 (9.17)                | 0-49   | .87   | 38.29 (8.74)                       | Not available                           |
| Avoidant Coping        | 21.27 (4.59)                | 14-34  | .68   | 33.70 (4.74)                       | Not available                           |

**Demographic Variables: Analysis of Variance.** Initially, a series of one-way analyses of variance (ANOVAs) were performed to determine whether significant differences existed between various demographic variables on study instruments. Additionally, demographic differences by participant age were calculated due to the inclusion of age as a predictor variable in subsequent analyses. Selected demographic variables were gender and race. A series of eight ANOVAs were conducted to identify any unpredicted group differences based on gender.

Examination of ANOVA results, with a Bonferroni correction ( $p < .05$ ;  $.05/8 = .006$ ) suggested no significant differences by gender were present. A second series of eight ANOVAs examined unplanned differences on study instruments by race. Additionally, differences in participant age by race were examined in this series of ANOVAs as well. Results after Bonferroni corrections yielded no significant differences by race. Due to the distinct nature of the two recruitment methods/sites (i.e. university vs. middle/high-school), a third series of ANOVAs was conducted to examine demographic differences between these two sites (i.e. gender and race). Results following Bonferroni corrections yielded no significant differences in demographic makeup of the recruitment sites.

**Table 4. Pearson Correlations**

|                     | 1  | 2     | 3     | 4     | 5     | 6      | 7     | 8     |
|---------------------|----|-------|-------|-------|-------|--------|-------|-------|
| 1. PSWQ             | -- | .57** | .43** | .37** | .29** | .06    | .24** | .13   |
| 2. IUS              |    | --    | .65** | .53** | .34** | .05    | .13   | .32** |
| 3. NPOQ             |    |       | --    | .46** | .41** | -.23** | .04   | .55** |
| 4. WW-II            |    |       |       | --    | .31** | .27**  | .07   | .31** |
| 5. CAQ              |    |       |       |       | --    | .05    | .20*  | .36** |
| 6. Rational Coping  |    |       |       |       |       | --     | .18*  | -.18* |
| 7. Emotional Coping |    |       |       |       |       |        | --    | .18*  |
| 8. Avoidant Coping  |    |       |       |       |       |        |       | --    |

Note: \*  $p < .05$ , \*\*  $p < .01$

### **Hypothesis 1: Prediction of Model Variables by Age**

A series of simple linear regression analyses were performed to determine the extent to which age predicts scores on the four measures of the cognitive components of worry (i.e. IUS,

NPOQ, CAQ, WW-II). Due to the increased chance of Type I error with multiple simple regressions, Bonferroni corrections were conducted ( $p=.05/4$ ) for a resulting value of  $p<.025$  needed for statistical significance. Participant age was entered as the predictor variable with scores on the model components (IUS, NPOQ, WW-II, CAQ) entered as dependent variables. Analyses failed to yield significant results, suggesting age was not a predictor of intolerance of uncertainty, negative problem orientation, beliefs about worry, or cognitive avoidance. These results are summarized in Table 5.

**Table 5. Summary Table for Simple Regressions: Prediction of Cognitive Variables by Age**

| <u>Variable</u> | <u>R<sup>2</sup></u> | <u>F</u> | <u>B</u> | <u>SE B</u> | <u>β</u> | <u>p</u> |
|-----------------|----------------------|----------|----------|-------------|----------|----------|
| IUS             | .03                  | 4.9      | 1.09     | .49         | .18      | .03      |
| NPOQ            | .01                  | 1.2      | .26      | .24         | .09      | .27      |
| WW-II           | .00                  | .02      | .07      | .51         | .01      | .89      |
| CAQ             | .01                  | .93      | .52      | .54         | .08      | .34      |

Note: \*  $p<.025$

### **Hypothesis 2: Testing for Mediation and Moderation**

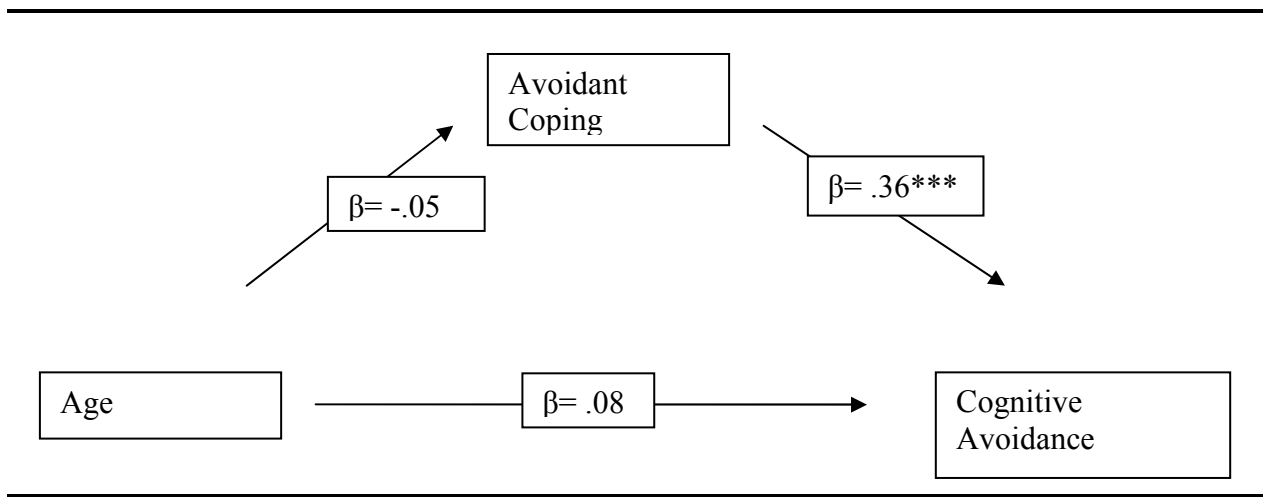
It was hypothesized that use of coping strategies would serve as a moderator of the relationship between age and scores on measures of cognitive avoidance and positive beliefs about worry rather than mediating the relationships. More specifically, it was predicted that the relationship between age and cognitive avoidance or beliefs about worry would be stronger at lower levels of self-reported coping as compared to the relationship between age and cognitive avoidance at higher levels of coping.

**Mediation Analyses.** Based on previous research, cognitive avoidance and beliefs about worry were used as dependent variables in the mediational models. Two forms of coping



(emotional and avoidant) were hypothesized as potential mediators of the relationship between age and the dependent variables, resulting in four mediational models. The four proposed mediation models are portrayed in Figures 4-7. Per the guidelines presented by Baron and Kenny (1986) and Holmbeck (1997), each mediation model was initially tested through a series of three standard regression equations.

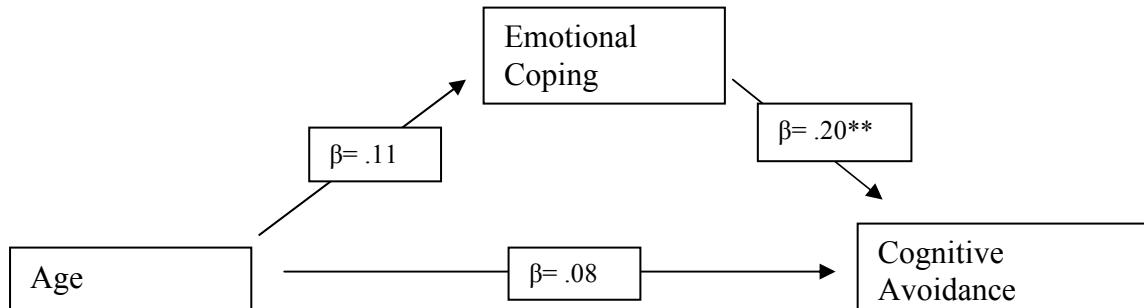
The Relationship between Age and Cognitive Avoidance/Beliefs about Worry. The first step in establishing mediation was to examine whether the predictor variable (age) was significantly related to the outcomes of cognitive avoidance and beliefs about worry. Standard regression analyses indicated that age was not a significant predictor for either cognitive avoidance,  $F(1, 151) = .93, p > .05$  or beliefs about worry,  $F(1, 151) = .02, p > .05$ . Therefore, the first step in both of the mediation models was not significant.



**Figure 4. Model of the Analysis of Avoidant Coping as Mediator Between Age and Cognitive Avoidance**

The Relationship between Age and Coping. The second step in establishing mediation was to examine the relationship between the predictor variable of age and the mediator variables of avoidant and emotional coping. Standard regression analyses indicated that age was not a

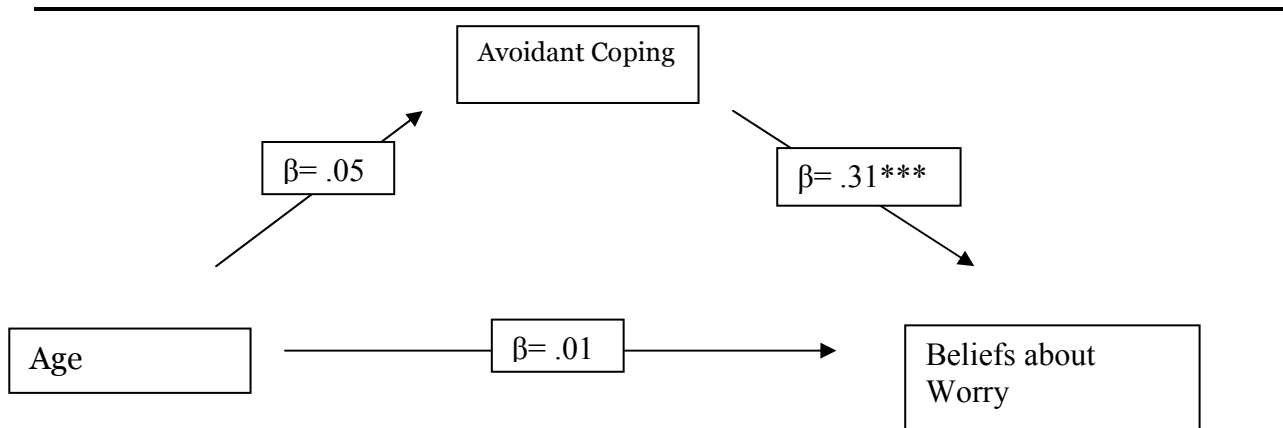
significant predictor for either avoidant coping,  $F(1, 151)=.35, p>.05$  or emotional coping,  $F(1, 151)=1.80, p>.05$ . Therefore, the second step of both the mediation models was not significant.



**Figure 5. Model of the Analysis of Emotional Coping as Mediator Between Age and Cognitive Avoidance**

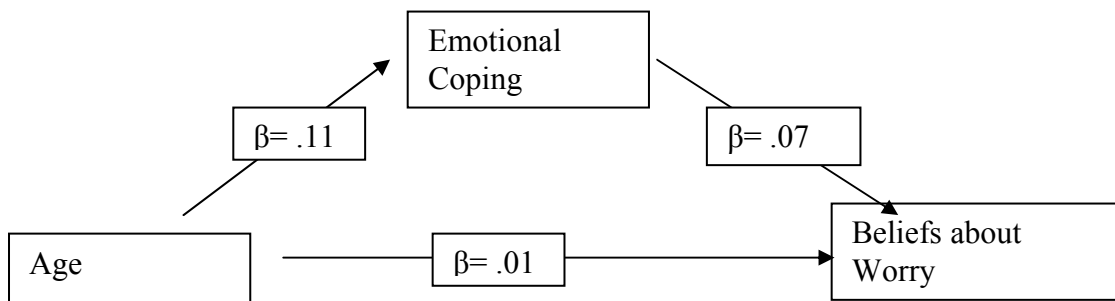
The Relationship between Coping and Cognitive Avoidance/Beliefs about Worry. The third set of equations examined the relationship between the proposed mediator variables and the dependent variables. Four separate analyses were conducted (i.e. one each for the relationship of avoidant coping-cognitive avoidance, emotional coping-cognitive avoidance, avoidant coping-beliefs about worry, emotional coping-beliefs about worry). The equation regressing cognitive avoidance onto avoidant coping was significant,  $F(1, 151)=22.89, p<.01$  as well as the equation regressing cognitive avoidance onto emotional coping,  $F(1, 151)=6.11, p<.01$ . Avoidant coping was found to significantly predict beliefs about worry (as measured by the WW-II),  $F(1, 151)=16.16, p<.01$ . Emotional coping did not significantly predict beliefs about worry,  $F(1, 151)=.70, p>.05$ . In summary, for step three of the mediation analyses, three of the four equations reached statistical significant (with the exception of emotional coping-beliefs about worry).

Tests of Mediation. As a result of the non-significant findings in steps one and two of the mediational tests, further analyses would be inappropriate given the independent/predictor



**Figure 6. Model of the Analysis of Avoidant Coping as Mediator Between Age and Beliefs About Worry**

variable of age was not shown to be significantly associated with either the outcome or mediator variables. See Figures 4-7 and Table 6 for summary of mediational analyses.



**Figure 7. Model of the Analysis of Emotional Coping as Mediator Between Age and Beliefs About Worry**

**Moderation Analyses.** For the current analyses, sequential/hierarchical multiple regression will be employed, with the predictor and moderator variables entered simultaneously in Step 1 of the equation and the interaction term (Age x COPE) entered in the subsequent step. Based on the previous analyses, it is known that age, in isolation, does not significantly predict the cognitive components of worry as investigated in the current study. Additionally, the main

effects for the predictor and moderator are not of direct importance to the moderation hypothesis (Baron & Kenny, 1983).

**Table 6. Summary of Regression Analyses for Testing Mediation Models**

| Model   | Predictor        | Criterion | $\beta$ | $t$     | $F$      |
|---|------------------|-----------|---------|---------|----------|
| Avoidant coping mediates cognitive avoidance  | Age              | CAQ       | .08     | .96     | .93      |
|   | Age              | Avoidant  | -.05    | -.58    | .35      |
|   | Avoidant Coping  | Coping    | .36     | 4.79*** | 22.89*** |
| Emotional coping mediates cognitive avoidance | Age              | CAQ       | .08     | .96     | .93      |
|   | Age              | Emotional | .11     | 1.35    | 1.8      |
|   | Emotional Coping | Coping    | .20     | 2.47**  | 6.11**   |
| Avoidant coping mediates beliefs about worry  | Age              | WW-II     | .01     | .13     | .02      |
|   | Age              | Avoidant  | -.05    | -.58    | .35      |
|   | Avoidant Coping  | Coping    | .31     | 4.02*** | 16.16*** |
| Emotional coping mediates beliefs about worry | Age              | WW-II     | .01     | .13     | .02      |
|   | Age              | Emotional | .11     | 1.35    | 1.8      |
|   | Emotional Coping | Coping    | .07     | .84     | .70      |
|   |                  | WW-II     |         |         |          |

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

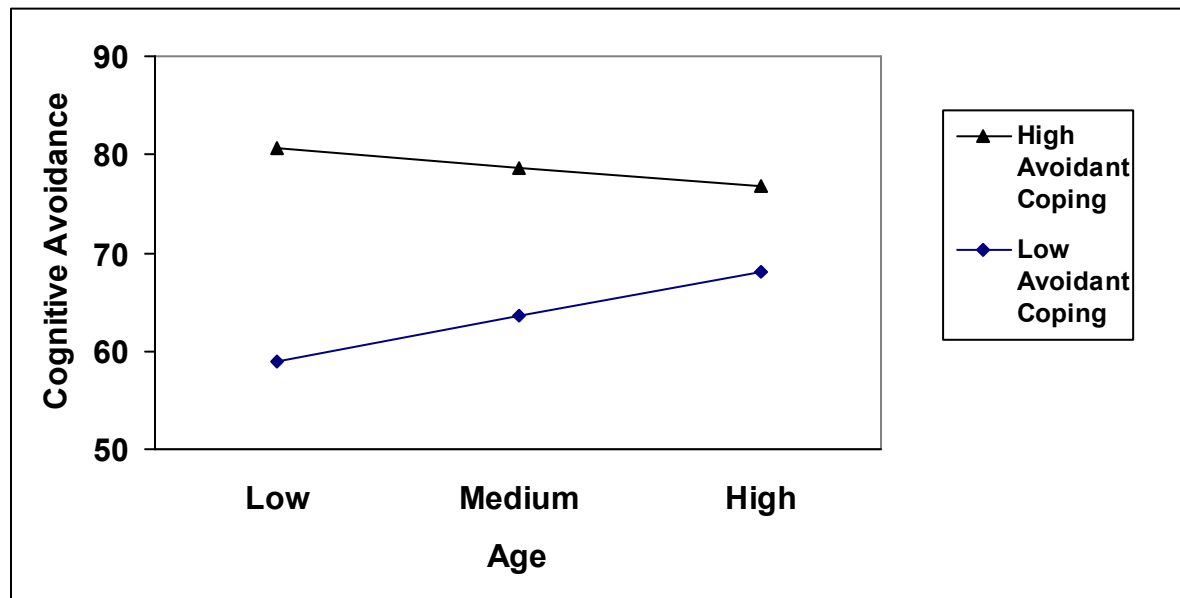
Four multiple regression analyses were conducted to examine the moderation hypotheses, and predictors and proposed moderator variables were centered to reduce multicollinearity with the interaction term (see Aiken & West, 1991). In these regression equations, the age (predictor) and coping (moderator) were entered simultaneously in Step 1, and the cross-product (interaction) of age and the moderator was entered on the second step. Consistent with suggestions provided by Aiken and West (1991) and Holmbeck (2002), significant interactions were more closely examined with the use of post-hoc probing of simple effects.

Three of the four hierarchical multiple regression analyses examining moderation of the age-cognitive component of worry relationship were significant. Emotional coping was not

found to serve as a moderator of the relationship between age and beliefs about worry (see Table 7 for summary of all moderation models).

The regression equation testing the moderation hypothesis that avoidant coping moderates the relationship between age and cognitive avoidance was found to be statistically significant,  $F(3, 149)=9.90, p<.001$ , and explained 17% of the variance in cognitive avoidance. The interaction term, Age x Avoidant Coping, was further evaluated to determine if avoidant coping is a moderator variable for the relation between age and cognitive avoidance and was found to be statistically significant,  $\beta=-.16, p<.05$ , while controlling for the main effects of age and avoidant coping. More specifically, while results revealed no significant main effect for age ( $t=.82, ns$ ), a significant main effect for avoidant coping ( $t=4.84, p<.001$ ) and the Age x Avoidant Coping interaction ( $R^2 \text{ change}=.025, p<.001$ ) in the prediction of cognitive avoidance was demonstrated. Post-hoc analyses (Holmbeck, 2002) revealed that age is significantly related to cognitive avoidance only in individuals with lower levels of avoidant coping ( $t=2.29, p<.05$ ), but not in individuals with high levels of self reported avoidant coping (See Table 7, Figure 8). The prediction of cognitive avoidance by age does in fact depend on the level of avoidant coping, but only for individuals with low levels of reported avoidant coping. This finding provides empirical support for the moderation model that avoidant coping influences the relationship between age and cognitive avoidance.

The regression equation testing the moderation hypothesis that emotional coping moderates the relationship between age and cognitive avoidance was found to be statistically significant,  $F(3, 149)=3.24, p<.05$ , and explained 6% of the variance in cognitive avoidance.



**Figure 8. Interaction of Age and Avoidant Coping on Cognitive Avoidance**

The interaction term, Age X Emotional Coping, was evaluated to determine if emotional coping is a moderator variable for the relation between age and cognitive avoidance and was not found to be statistically significant,  $\beta = -.15, p > .05$ , while controlling for the main effects of age and emotional coping. More specifically, while results did reveal a main effect for emotional coping ( $t = 2.49, p < .05$ ); neither a main effect for age ( $t = .054, ns$ ) nor a significant Age x Emotional Coping interaction ( $R^2$  change = .02, ns) in the prediction of cognitive avoidance was not found. Although the model including the interaction term was statistically significant, a non-significant  $R^2$  change, suggests the interaction does not account for a significant amount of variance above and beyond the main effects of age and emotional coping (see Table 7). This finding failed to find empirical support for the moderation model that emotional coping influences the strength or direction of the relationship between age and cognitive avoidance.

The regression equation testing the moderation hypothesis that avoidant coping moderates the relationship between age and beliefs about worry was found to be statistically

significant,  $F(3, 149)=5.36, p<.05$ , and explained 10% of the variance in beliefs about worry. The interaction term, Age x Avoidant Coping, was evaluated to determine if avoidant coping is a moderator variable for the relationship between age and beliefs about worry and was not found to be statistically significant,  $\beta= -.01, p>.05$ , while controlling for the main effects of age and avoidant coping. More specifically, while results did reveal a main effect for avoidant coping ( $t=4.00, p<.001$ ); neither a main effect for age ( $t=.307, ns$ ) nor a significant Age x Avoidant Coping interaction ( $R^2$  change=.00, ns) in the prediction of beliefs about worry was not found (see Table 7). This finding failed to find empirical support for the moderation model that avoidant coping influences the relationship between age beliefs about worry.

The regression equation testing the moderation hypothesis that emotional coping moderates the relationship between age and beliefs about worry was not found to be statistically significant,  $F(3, 149)=.41, p>.05$ , and explained less than 1% of the variance in beliefs about worry. Due to the non-significant nature of the overall regression model, further inspection of main effects would be inappropriate (see Table 7). This finding failed to find empirical support for the moderation model that emotional coping influences the strength or direction of the relationship between age and beliefs about worry.

**Table 7. Summary of Regression Analyses for Testing Moderation Model**

| Predictor   | Criterion | <i>F</i> | <i>R</i> <sup>2</sup> | $\Delta R^2$ | $\beta$               |
|---|-----------|----------|-----------------------|--------------|-----------------------|
| Age<br>Avoidant Coping<br>Age x Avoidant Coping   | CAQ       | 9.90***  | .17                   | .03*         | .06<br>.36**<br>-.16* |
| Age<br>Emotional Coping<br>Age x Emotional Coping | CAQ       | 3.24*    | .06                   | .02          | .01<br>.20*<br>-.15   |
| Age<br>Avoidant Coping<br>Age x Avoidant Coping   | WW-II     | 5.36*    | .10                   | .00          | .02<br>.31***<br>-.01 |
| Age<br>Emotional Coping<br>Age x Emotional Coping | WW-II     | .41      | .01                   | .00          | .03<br>.06<br>.06     |

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$



## DISCUSSION

The main purpose of the present study was to examine the developmental continuity of the Dugas model of excessive worry. The first hypothesis, which predicted that age would significantly predict cognitive avoidance and beliefs about worry was not supported. The second hypothesis, which proposed that coping strategies would serve as a moderator of the relationship between age and scores on measures of cognitive avoidance and positive beliefs about worry rather than mediating the relationships was partially supported.

### **Prediction of Cognitive Components**

As mentioned above, the first hypothesis examined whether participant age could predict intolerance of uncertainty, negative problem orientation, cognitive avoidance, or beliefs about worry in a sample of adolescents and young adults. This hypothesis was not supported. Specifically, the data indicated that age did not significantly predict scores for negative problem orientation or on the process measures of interest: cognitive avoidance and beliefs about worry. Interestingly, the prediction of intolerance of uncertainty by age neared significance with a  $p$  value of .03 ( $p < .025$  needed for significance). Accordingly, it can be concluded that the cognitive components of worry as laid out by Dugas do not significantly change across this period of development as examined in the current study. These results are somewhat consistent with previous research in that Laugesen et al. (2003) demonstrated that relationships between the cognitive variables and worry mirrored those found in adults with the exception of cognitive avoidance and beliefs about worry, though without direct comparison of the model between the two groups conclusions cannot be drawn.

Although age in an adolescent and adult sample may simply not play a role in the prediction of the cognitive components of worry, a possible explanation for the findings may be

the methodology used. In the current study participant age was used as a proxy variable for cognitive development. Based on the research supporting changes in the ability to conceptualize and anticipate future events across the lifespan, and specifically within the adolescent to adult transition, the current study tested the hypothesis that cognitive development, as measured by age, would predict the cognitive components of worry.

Based on Vasey's (1993) conceptualization of anxiety in youth and LaBouvie-Vief's theory of post-formal cognitive development, it follows that the cognitive aspect of anxiety, worry, will become more prevalent as individuals' develop more advanced cognitive abilities through the developmental period of adolescence. It appears that both cognitive processes such as worry and cognitive content such as negative self-talk or automatic thoughts are sensitive to changes in a child's cognitive development (Vasey et al., 1994; Muris, Merckelbach, & Liutjen, 2002; Muris, Merckelbach, Meesters et al., 2002). Given the current study focused on a constricted age range of 13 to 25 year-olds, it is possible that such changes in cognitive abilities occur outside of the selected range or alternatively that age is not an appropriate proxy for cognitive development.

### **The Role of Coping**

The second hypothesis explored the possible mediating and moderating roles of coping abilities on the relationship between age and cognitive avoidance as well as between age and beliefs about worry. The hypothesis that coping abilities would moderate, rather than mediate, the relationship between age and the cognitive variables was partially supported. Specifically, due to the non-significant prediction of outcome variables (i.e. coping, cognitive avoidance, and beliefs about worry) by the predictor variable of age mediation of the relationship between age and the measures of cognitive avoidance and beliefs about worry was not found.

Interestingly, avoidant coping was found to significantly predict both cognitive avoidance and beliefs about worry whereas emotional coping was found to only predict cognitive avoidance. Accordingly, avoidant coping demonstrated predictive value for both cognitive avoidance and beliefs about worry whereas emotional coping demonstrated predictive value for cognitive avoidance. In previous studies with adolescent samples, emotion-focused coping was found to be positively related to symptoms of anxiety and depression (Compas, Malcarne, and Fondacaro, 1988). The current findings add evidence that emotion focused coping strategies are related to specific maladaptive cognitive processes (i.e. cognitive avoidance) involved in anxiety.

Regarding the moderational analyses, although emotional coping was not found to be a moderator for the age-cognitive avoidance or age-beliefs about worry relationships or for the role of avoidant coping for the age-beliefs about worry relationship; avoidant coping was found to moderate the relationship between age and cognitive avoidance. This finding supports an interaction between age and avoidant coping in the prediction of the cognitive process variable examined. Specifically, a significant positive relationship was observed between age and cognitive avoidance at lower levels of coping, whereas a negative, although insignificant, trend was observed at higher levels of avoidant coping. In essence, at lower levels of avoidant coping, the relationship between age and cognitive avoidance was more salient.

Specifically, the relationship between cognitive avoidance and age was only significant for lower levels of avoidant coping. Low reported levels of avoidant coping were associated with a significant positive relationship between age and cognitive avoidance. This particular pattern of results provides partial support for the moderating role of coping in the relationship between age (as a proxy for cognitive development) and the cognitive component of worry, more specifically of cognitive avoidance. These results suggest that at higher levels of avoidant coping, a

relationship does not exist between age and cognitive avoidance that is otherwise present in lower levels of avoidant coping. Importantly, this is a main goal of developmental psychopathology, to determine various developmental trajectories for maturation.

Potentially, this finding that cognitive avoidance increases with age in individuals with lower levels of avoidant coping may be related to these individual's behavioral responses when faced with stressful, uncertain, or emotionally laden situations. Based on previous research previous research (cf. Compas et al., 1988; Garnefski et al., 2001; Garnefski et al, 2002) and current findings, there is a negative correlation or inverse relationship between the use of avoidant coping strategies and more rational, behavioral approach coping strategies. In the current study, a negative correlation was found between avoidant coping and rational coping ( $r = -.18, p < .01$ ). Therefore it may be assumed that individuals who are low in avoidant coping strategies may actually engage in more rational coping strategies and approach problems or stressful situations with adaptive, activate coping strategies. In theory, these individuals who are low in the use of avoidant coping strategies may behaviorally engage in the face of uncertainty or fully approach problem or stressful situations, they may engage in higher levels of cognitive avoidance to refrain from experiencing the negative emotions associated with such situations. As such, individuals who are low in avoidant behaviors may continually engage in approach behaviors and enter environments that are stressful and worry provoking. Mowrer's (1960) two-factor theory of the acquisition and maintenance of fear can help explain this possible paradigm. Although they are behaviorally approaching these stressful or emotion-inducing environments they may be utilizing cognitive avoidance to refrain from becoming emotionally aroused. As such, the use of cognitive avoidance strategies is reinforced over time by the prevention of emotional arousal and individuals will be more likely to engage in cognitive avoidance when

entering stressful situations in the future. Overtime, the reinforcing property of avoidance of negative emotions is strengthened and the individuals continue, and possibly increase, the use of cognitive avoidance strategies when faced with stressful or worry provoking situations. The developmental period assessed in this project, namely adolescence and young adulthood, is a period in which an individual must face a number of changes and stress. Many of these changes are unavoidable, such as physical development and educational/vocational transitions. When faced with such unavoidable stressful or worry provoking situations, individuals may engage in cognitive avoidance strategies to decrease their level of emotional discomfort (Gosselin et al., 2007). In such situations, individuals are not able to utilize more behaviorally based avoidant coping strategies and may engage in cognitive avoidance strategies to avoid and escape the experience of negative emotional states (i.e. worry and anxiety). As such, through the negative reinforcement of cognitive avoidance and the continued approach and confrontation of stressful situations, cognitive avoidance increases throughout the developmental period of adolescence and young adulthood. Further examination of the role of rational coping in the current data may shed light on this hypothesized process.

The lack of significant findings for the prediction of cognitive variables by age may be that even though the two specific groups sampled are both facing changes in life responsibilities, important choices that influence their future, and other significant life stressors the impact of these changes and stressors are experienced similarly across the developmental stages sampled. Adolescents are facing physical and emotional development as well as increased autonomy. Additionally, adolescents are faced with conflicts and choices that accompany greater independence. Young adults also face a new found freedom and additional responsibility as well as important decisions regarding their future including their education, vocation, and marital

status. It is possible that when adolescents and young adults are faced with worry and anxiety regarding these responsibilities and choices, they rely on avoidant coping as well as cognitive avoidance to decrease their discomfort. Research reported by Stöber and Joorman (2001) found that worry, both everyday and clinical worry, was significantly correlated to behavior and decisional procrastination. This finding, along with the Gosselin et al. (2007) finding that adolescent report of avoidance of unpleasant thought provoking stimuli is predictive of non-clinical worry, suggests that cognitive avoidance may serve a coping functioning through actual behavioral procrastination. Future research should examine and attempt to parse out the role of cognitive avoidance in terms of coping and procrastination behavior as it relates to worry.

### **Limitations**

A few important cautions should be applied to the results of the present study. First, although all questionnaires used in this study have been validated in adult samples, explicit examination of the psychometric properties of the questionnaires in adolescent populations is lacking. Previous research (Laugesen et al., 2003; Gosselin et al., 2007) has reported internal consistency and preliminary reliability of IUS, CAQ, and WW-II and the current study examined these properties as well. Internal consistency of study questionnaires within the sample of adolescent participants was acceptable (Chronbachs  $\alpha=.92-.96$ ). Unfortunately, the significant moderational findings were based on two instruments which did not conform to published standards (i.e. CAQ, Avoidant COPE). The mean for the CAQ in the current study was 71.29 (*SD* 20.97) whereas published research reports means of  $M=59.16(18.95)$  and  $M=60.43(11.29)$  (cf. Gosselin et al., 2007; Sexton & Dugas, in press). Important to note is that these two studies are the only available studies examining the CAQ in non-clinical samples, therefore the discrepancy between the observed means in the current study and published means should be

interpreted with caution. Additionally, the observed mean for the Avoidant COPE ( $M=21.27$ ) appeared to be discrepant from reported means by Lyne and Roger (2000;  $M=33.70$ ).

Importantly, Lyne and Roger (2000) present the only available adult data based on the revised scoring key of the COPE and no published psychometric data are available for the COPE in an adolescent sample. The current study adds to the research literature by providing information regarding psychometric properties of these measures in a cross-sectional samples of adolescents and young adults.

In addition to the lack of psychometric data for such instruments in adolescent samples, the current study utilized an internet methodology. Although no data currently exists for the reliability or validity of the current study questionnaires in an internet-administered form, research on internet administration of self-report inventories suggest that reliable and valid data are gathered (Buchanan, 2000) and that psychometric properties of traditional questionnaires are typically replicated although not identical (Buchanan & Smith, 1999). When data has been available for paper-and-pencil versions of online instruments, research has shown that the online questionnaires do assess the same constructs as the traditional paper versions (Carlbring et al., 2007). In cases of instruments that have only an internet version available, there is evidence that the online instruments possess construct validity (Buchanan & Smith, 1999; Buchanan, 2000; Carlbring et al., 2007) in that they measure the traits proposed. Internal consistency of the study instruments was evaluated and found to be acceptable. Also, correlations between study instruments mirrored those reported in the literature utilizing paper-and-pencil administration of questionnaires.

A final limitation of the current study may be the restricted age range as assessed. The restricted range observed in the dependent variables (outcomes) may be attributable to the

restricted range of predictors (age range: 12-24 years) rather than absence of predictive relations. The cognitive development occurring during the developmental period assessed may in fact be a period of refinement of cognitive abilities rather than significant gains or changes that is more typically seen in late childhood or early adolescence. In fact, the National Institute of Health (NIH) and the World Health Organization (WHO) both recognize a larger age range as encompassing “adolescence” than is typically presented in the research literature. All individuals ages 21 years and younger are classified as ‘child’ participants for NIH related research and purposes (NIH, 1998) whereas WHO recognizes individuals between the ages of 10 and 24 years as young people (Goodburn & Ross, 1995). Additionally, WHO specifies the period of adolescence of encompassing the ages of 10 through 19 years.

### **Future Directions**

This study has important implications for both future research and for the development and administration of clinical programs for the prevention and treatment of excessive worry in adolescents and young adults. Given the lack of significant findings in the current study regarding the prediction of the cognitive components of worry by age in an adolescent to young adult sample, one could suggest that it is not necessary to continue to separate adolescents from young adults in research investigating worry, at least in studies examining non-clinical worry. However, this would be premature based on these limited findings. Also, the question remains that if there is no developmental variance in the cognitive components of worry or in the expression of non-clinical worry, are differences present in cases of clinical or excessive worry? Future studies should address the interactions between developmental factors, worry, and the cognitive components of worry in clinical samples (i.e. those diagnosed with GAD) that vary across the lifespan.



An area lacking within the literature is in the prospective prediction of adult worry from adolescent worry. Preliminary evidence suggests that clinical levels of worry begin to develop within the late adolescent period (Dugas et al., 1998; Rapee, 1991). Approximately 50 percent of adults seeking treatment for GAD report that their problematic worry began in childhood or adolescence, but the proportion of children or adolescents with this disorder who retain such difficulties into adulthood is unknown. (Noyes, Clancey, Hoenk, & Slymen, 1980). Given these reports of childhood worries continuing into adulthood and morphing into more impairing clinical symptoms, additional research is needed on the process involved in the development of excessive or maladaptive worry across the lifespan.

### **Concluding Remarks**

A plethora of evidence exists citing differences between adolescents and adults in terms of life events, stress, coping abilities, and cognitive abilities but just as much research also exists blurring the lines between adolescents and adults. The current study sought to examine the developmental continuity of four variables posited to contribute to the development and maintenance of worry in adolescents and adults. Even though previous research has tested this model in the two age groups separately and found disparate results, there may not be a need to separate the groups for further examination of this model. Using age as analogous to cognitive development, this study failed to find predictive value of age for the cognitive variables hypothesized to contribute to worry. Although age failed to significantly predict outcomes on intolerance of uncertainty, negative problem orientation, cognitive avoidance, or beliefs about worry, moderation analyses suggested that coping, specifically avoidant coping, interacts with age to predict cognitive avoidance.

Taken together, the results of the current study and those of previous researchers (i.e.

Laugesen et al., 2003; Gosselin et al., 2007) suggest that the cognitive-behavioral model of worry (Dugas et al., 1998) can be effectively applied to adolescents and that the principle components of the model do not vary across the adolescent to young adult developmental period. However, an important discovery was the interaction between a developmental variable (i.e. age) and avoidant coping in the prediction of cognitive avoidance. Such findings suggest that at younger ages coping strategies may be a protective factor (or vulnerability) for cognitive avoidance and in turn for worry. Future research should continue to investigate the role cognitive, social, and emotional development as well as experienced life events and transitions in the development of worry across the lifespan.

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## VITA

Kimberly Rae Zlomke earned her Bachelor of Science degree in psychology in May 2001 from Saint Louis University in St. Louis, Missouri. She later earned a Master of Science degree in behavior analysis and therapy from Southern Illinois University-Carbondale in Carbondale, Illinois in, August 2003. Ms. Zlomke subsequently attained the status of a Board Certified Behavior Analyst and is a Provisionally Licensed Mental Health Professional for the State of Nebraska. She is currently a candidate for the degree of Doctor of Philosophy at Louisiana State University and Agricultural and Mechanical College in Baton Rouge, Louisiana. Her area of specialization is child clinical psychology under the direction of Thompson E. Davis III, Ph.D. Ms. Zlomke has pursued a number of research interests, including brief cognitive behavioral interventions for specific phobias, the relationship between specific cognitive components of anxiety and coping within a developmental perspective, and investigations of the interrelationships between parent behaviors and functioning to predict social outcomes among adolescents with chronic medical conditions. Ms. Zlomke is completed a pre-doctoral residency in psychology at the University of Mississippi Medical Center in Jackson, Mississippi. There she provided clinical services to youth with a variety of chronic medical condition through the Pediatric Psychology Service and the outpatient Child Health Clinics. In September 2008, Ms. Zlomke will begin a Leadership and Education in Adolescent Health (LEAH) fellowship in the Adolescent Medicine Division of the Department of Pediatrics at Baylor College of Medicine/Texas Children's Hospital in Houston, Texas, where she can continue her involvement in both clinical and research activities.