

## META-WORRY AND GENERALIZED ANXIETY DISORDER

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META-WORRY AND GENERALIZED ANXIETY DISORDER

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META-WORRY AND GENERALIZED ANXIETY DISORDER

Jacinda Celeste Hammel

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## VITA

Jacinda Celeste Hammel, daughter of Agnes A. Stigall, Jack D. Stigall, and H. Thomas Hammel, was born July 14, 1973, in Bedford, Indiana. In 1994, she earned a Bachelor of Science in Business with an emphasis in accounting from Indiana University. Returning to Indiana University for further education, she graduated *cum laude* with a Bachelor of Science in Psychology in May 2001. In February 2004, she earned a Master of Science in Psychology at Auburn University. The current dissertation is in fulfillment of requirements for a Doctorate of Philosophy in Clinical Psychology at Auburn University.

DISSERTATION ABSTRACT  
META-WORRY AND GENERALIZED ANXIETY DISORDER

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Worry is predominantly a language-based activity that involves thoughts about anticipating and preventing negative outcomes. In generalized anxiety disorder, worry is conceptualized as pathological due to its chronic use and deleterious effects. Meta-worry, which involves beliefs about the positive and negative effects of worry, is considered to have a functional role in the development and maintenance of GAD. The present research was conducted to elucidate the relation between worry beliefs and GAD. Worry beliefs of 263 undergraduate students were used to predict excessive worry as measured by the Penn State Worry Questionnaire (PSWQ), pathological worry as measured by the Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV), and a diagnosis of GAD as assessed by the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV). Continuous and dichotomous means of scoring the PSWQ and the GAD-Q-IV were used as criteria. The Consequences of Worrying Scale (COWS) was

used to measure five worry beliefs, including beliefs that worry disrupts performance, exaggerates problems, causes emotional distress, helps analytical thinking, and motivates behavior.

Particular meta-worries, as assessed by the COWS, were differentially associated with pathological features of GAD. Excessive worry, as measured by the PSWQ, was predicted by beliefs that worry exaggerates problems and helps analytical thinking. Pathological worry, as measured by the GAD-Q-IV, was predicted by beliefs that worry exaggerates problems and disrupts performance. For selected participants administered a semi-structured interview, only the belief that worry disrupts performance was predictive of a diagnosis of GAD. Beliefs that worry motivates behavior and causes emotional distress were non-specific, i.e., these beliefs were associated with both normative and pathological worry. These findings have implications about the beliefs that are most relevant to GAD pathology and to treatment of GAD.

Criterion-related diagnostic validity of the questionnaires was also examined for each of the five GAD-Q-IV scoring methods (i.e., dichotomous, continuous cutoff, sum total response cutoff, continuous, and sum total response) and the two PSWQ scoring methods (i.e., continuous and continuous cutoff). Dichotomous GAD-Q-IV scoring was most specific of a diagnosis of GAD and continuous cutoff GAD-Q-IV scoring was the most sensitive. The highest overall predictive power was shown by continuous cutoff GAD-Q-IV scoring and sum total cutoff GAD-Q-IV scoring. These findings about diagnosis of GAD have implications about the use of the GAD-Q-IV and the PSWQ in participant selection and in clinical screening.

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## I. INTRODUCTION

Generalized anxiety disorder (GAD) is one of the most commonly occurring mental disorders in the community and in primary care settings (Kessler & Wittchen, 2002). Despite this, GAD remains understudied, particularly as compared to panic disorder, posttraumatic stress disorder, and obsessive-compulsive disorder (Dugas, 2000). The most common explanations for the paucity of research on GAD are the residual status of the diagnosis historically and the degree of change in the diagnostic criteria. GAD and panic disorder were introduced into the nomenclature when separated from anxiety neuroses in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1980). This division was based on differential medication responses; GAD symptoms responded to benzodiazepines and panic disorder symptoms responded to imipramine (Klein, 1964). Until the publication of the DSM-III-R in 1987 (APA), diagnosis of GAD was restricted to residual status. Despite the late introduction of GAD into the nomenclature, the criteria for GAD have been changed more than those of any other anxiety disorder (Brown, 1999) in efforts to improve diagnostic reliability and validity. These changes have affected the assessment of prevalence, construction of theories about the development and maintenance of GAD, and development of effective treatment models.

Due to the intractable nature of GAD, i.e., lack of response to standard cognitive behavioral techniques (Brown, O'Leary, & Barlow, 2001), and the changes in diagnostic

criteria, misconceptions of GAD have abounded. For example, GAD has been erroneously viewed as causing only mild disability and as being indistinct from mood disorders (Brown et al., 2001, Kessler, Keller, & Wittchen, 2001). The misconception regarding disability associated with GAD arose in part because individuals with GAD generally do not seek mental health treatment. More commonly, they present to primary care physicians or do not seek any treatment because they view their difficulties as a basic part of their personality that is not amenable to change (Roth & Eng, 2002). Improved reliability in the diagnosis of GAD has enabled investigators to establish a clearer picture of the prevalence, course, associated impairment, and onset of GAD. Still, questions remain regarding the criteria for episode duration (Kessler, Brandenburg et al., 2005) and excessiveness of worry (Ruscio et al., 2005).

#### Epidemiology of Generalized Anxiety Disorder

According to the DSM-IV (American Psychiatric Association, 2000), GAD is characterized by excessive, uncontrollable worry about a number of life events or activities, such as finances, work, and family matters. During the six months prior to diagnosis, worry is accompanied by at least three of six symptoms occurring more days than not: restlessness, fatigue, impaired concentration, irritability, muscle tension, and sleep disturbance. The focus of worry is not associated with another disorder such as worry about contamination (obsessive-compulsive disorder), worry about experiencing a panic attack (panic disorder), or worry that one's physical ailments signify a life-threatening illness (hypochondriasis).

A commonly occurring disorder in the general population, GAD typically has an early age of onset, a chronic course, and is associated with significant psychosocial impairment. In the general population, the lifetime prevalence of GAD ranges from 4% to 7% (Blazer, Hughes, George, Swartz, & Boyer, 1991; Kessler, Berglund, Demler, Jin, & Walters, 2005; Kessler, Chiu, Demler, & Walters, 2005; Kessler & Wittchen, 2002). Recent data from the National Comorbidity Survey Replication (NCS-R), using DSM-IV criteria, place the current prevalence of GAD at 1.8%, 12-month prevalence at 3.1%, and lifetime prevalence at 5.7%. The prevalence of GAD is significantly higher when episodes of one and three months are considered; specifically, the current prevalence would range from 2.1 to 2.6%, 12-month prevalence from 3.9-5.5%, and lifetime prevalence from 8.0-12.7% (Kessler, Brandenburg, et al., 2005). Comparing individuals across episode durations at time of assessment in the NCS-R study, there were no differences with respect to age of onset, persistence, impairment, comorbidity, parental GAD, or SES correlates. Participants with 6-month GAD reported greater impairment in home management, but not in work performance, personal relationships, or social life. Thus, the requirement that an episode be 6 months or longer may be arbitrary and may in fact hamper recognition and treatment efforts.

Psychiatric comorbidity of GAD is high, particularly with mood disorders, other anxiety disorders, and ADHD. In the NCS-R study (Kessler, Chiu, et al., 2005), 85% of individuals with a DSM-IV diagnosis of GAD met criteria for another Axis I disorder. The most commonly comorbid disorders were major depressive disorder (62%), dysthymia (55%), bipolar disorder (49%), social phobia (47%), panic disorder (46%),



ADHD (46%), agoraphobia (45%), and PTSD (44%). Approximately 75% of individuals with a principal DSM-III-R diagnosis of GAD have a comorbid anxiety or mood disorder (Brawman-Mintzer et al., 1993; Brown & Barlow, 1992; Massion, Warshaw, & Keller, 1993). Utilizing DSM-IV criteria with a clinical sample, Brown, Campbell, Lehman, Grisham, and Mancill (2001) reported significant comorbidity with posttraumatic stress disorder (23%), panic disorder (19%), panic disorder with agoraphobia (16%), social phobia (13%), and obsessive-compulsive disorder (12%). Axis II disorders most commonly comorbid with GAD include avoidant, dependent, and obsessive-compulsive personality disorders (Massion et al., 2002).

GAD generally has an earlier and more gradual onset (i.e., average age of onset 18-21 years) than mood disorders and other anxiety disorders (Brown, 1999; Brown, O'Leary, & Barlow, 2001; Sanderson & Wetzler, 1991). Although the mean onset is early, data from the NCS-R study indicate that GAD symptoms can emerge throughout the lifespan (Kessler, Berglund, et al., 2005). Earlier onset of GAD significantly predicts greater severity of GAD (i.e., uncontrollability of worry rated by clinician, percentage of the day spent worrying by self-report, symptomatology rated by clinician, and interference/distress rated by the clinician; Campbell, Brown, & Grisham, 2003). Consistent with these findings, the age of onset for individuals with a primary diagnosis of GAD, i.e., temporally primary to the onset of another Axis I disorder, is significantly earlier than if GAD is secondary to another disorder (Rogers et al., 1999). In this study, 13.1 years was the average age of onset for primary GAD patients versus 30.1 years for secondary GAD patients.

The course of GAD is typically chronic with an 18% to 38% probability of full remission during the course of five years and a 27% likelihood of relapse within three years of full remission (Kessler et al., 2001; Woodman, Noyes, Black, Schlosser, & Yagla, 1999; Yonkers, Dyck, Warshaw, & Keller, 2000; Yonkers, Warshaw, Massion, & Keller, 1996). The comparison of the current and lifetime prevalence rates of GAD from community samples (1.5-3.0% and 4-7%, respectively) suggests a lack of episodic recovery, such that “people with a history of GAD spend much of their lifetimes in episodes” (Kessler et al., 2001, p.22). In the Harvard Brown Anxiety Research Program (HARP; Yonkers et al., 1996), the average length of illness was 20 years. Expectedly, remission is less likely when GAD is comorbid with one or more personality disorders; however, remission of GAD is related to particular personality disorders (Massion et al., 2002). In the HARP study, only avoidant and dependent personality disorders were associated with a lower likelihood of remission of GAD. Furthermore, alcohol abuse and dependence were not predictive of remission of GAD. Other data suggests that GAD also impacts the course of major depressive disorder such that when depression and GAD are comorbid, depressive episodes are generally longer and remission less likely (Kessler, DuPont, Berglund, & Wittchen, 1999). In another vein, when GAD is effectively treated, depressive symptoms are also significantly reduced (Gould, Safren, Washington, & Otto, 2004).

Contributing to a resurgence of literature on GAD are findings that GAD is associated with significant psychosocial impairment (Kessler et al., 2001; Olfson et al., 1997; Sanderson & Andrews, 2002; Stein, 2001; Wittchen et al., 2002; see also Ballenger

et al., 2001, Massion et al., 1993; Wittchen et al., 1994). In the National Comorbidity Survey, 82% of individuals with GAD reported significant impairment in lifestyle and physical functioning (Wittchen et al., 1994). The disability associated with GAD outweighs that associated with many other mental health and chronic physical conditions. In the Midlife Development in the United States Survey (Kessler, Keller, & Wittchen, 2001), GAD was associated with a higher degree of work impairment than all other mental and physical conditions (e.g., major depression, panic attacks, substance dependence, arthritis, hypertension, asthma, diabetes, and ulcers). Surtees, Wainwright, Khaw and Day (2003) also found that GAD negatively impacts physical functioning to a degree equivalent to that of chronic medical conditions, including cancer, diabetes, myocardial infarction, and stroke, and exhibits a significantly greater negative impact on emotional, social, and role functioning. Comparing mood, anxiety, and substance use disorders, only GAD and MDD were strong independent predictors of disability when controlling for physical illness and sociodemographic factors (Sanderson & Andrews, 2002).

Pure cases of GAD, which typically account for 33% of cases in the general population, are not often seen in therapeutic settings (Kessler et al., 2001; Zimmerman & Mattia, 2000). This has led to the misinformed perception that impairment is due to the disabling effects of comorbid diagnoses such as major depressive disorder. To the contrary, pure GAD and pure depression are similar with respect to the degree of impairment (Kessler et al., 1999; Wittchen, 2002) and, furthermore, the symptoms of each disorder have been shown to reflect separate latent factors (Brown, Chorpita, &

Barlow, 1998). Impairment is comparable whether GAD is temporally primary or secondary to major depression (Kessler, 2000; Rogers et al., 1999).

Individuals with GAD more commonly present to primary care physicians, i.e., family medicine, internal medicine, and emergency rooms, than to mental health specialists (Hidalgo & Davidson, 2001; Wang, Berglund, & Kessler, 2000; Wang et al., 2005; Wittchen, 2002). In the United States, the prevalence of GAD in primary care ranges from 7.0% to 14.8% (Didden, Philbrick, & Schorling, 2001; Olfson et al., 2000; Spitzer et al., 1994) with the highest estimate resulting from a study of 1007 patients in a primary care practice that predominantly serves low-income immigrants. That finding is expected given that GAD is more commonly diagnosed among disadvantaged socioeconomic groups (Kessler & Wittchen, 2002). An international study including 14 countries and 25,916 primary care patients indicated a prevalence of 8% (Ormel et al., 1994). Notably, the prevalence of GAD in primary care settings is more than double the 12-month prevalence in the general population and GAD is also the most common anxiety disorder in primary care (Wittchen, 2002).

In primary care, GAD generally goes unrecognized and untreated due to physician knowledge deficits, insurance regulations, time pressures, and symptom misattribution (Culpepper, 2002; Kessler & Wittchen, 2002; Wittchen, 2002; Wittchen et al., 2002). Expounding on one reason for the underrecognition of GAD is that presenting complaints are generally somatic (47.8%) or pain-related (34.7%) rather than anxiety (13.3%) (Wittchen et al., 2002). Other common presenting complaints include depression and sleep disturbance. With or without a chronic medical illness, individuals

with GAD utilize primary care and emergency services more than the average U.S. citizen (Rodriguez, Weisberg, Pagano, Culpepper, & Keller, 2003) and physicians report that identified GAD patients require more time investment than patients with major depressive disorder and other psychological disorders (Wittchen et al., 2002). Many receive one or more medications and some type of psychological advice from their physician, but few are referred to mental health specialists. Referral is more likely when GAD and MDD are comorbid; still only 22% of these cases are referred. This is particularly troubling given that 64% of those with comorbid GAD and MDD and 25% with pure GAD reported suicidal ideation during the four weeks prior to assessment.

In summary, GAD is a chronic and disabling mental disorder, which often goes untreated due to the perceptions of both clients and physicians. The NCS-R study found that 17% of individuals with GAD have sought treatment with a non-psychiatrist mental health specialist, 25.5% with a psychiatrist or other mental health specialist, and 31.7% sought primary care services (Wang et al., 2005). Except for specific phobia, individuals with GAD are least likely to have engaged in mental health services in the past year. Clients, or patients, are often unaware of the link between their physical and social difficulties and their chronic worry, and physicians do not often recognize the presence of GAD symptoms, particularly when it is comorbid with MDD (Wittchen et al., 2002).

#### Worry: The Defining Feature of GAD

Unlike some other anxiety disorders, an anxiety-provoking stimulus, such as a snake, a panic attack, or a social encounter, is not evident for individuals with GAD. Worry, the defining feature of GAD (American Psychiatric Association, 2000), is a

predominantly language-based activity (Borkovec & Hu, 1990; Borkovec & Inz, 1990; Borkovec & Roemer, 1995; see also Borkovec, Alcaine, & Behar, 2004). Borkovec and Hu (1990) showed that worry primarily involves thought rather than imagery. Following effective therapy, GAD patients showed an increase in imaginal activity similar to the level reported by nonanxious controls. The study of naturally occurring worry episodes indicates that cognitive content reflects concerns about anticipated negative outcomes and attempts to identify means of preventing such outcomes (Szabó & Lovibond, 2002). In other words, worrisome thoughts are primarily related to potential aversive events and problem solving. However, with GAD these attempts at problem solving do not result in an effective solution or conclusion.

Worry, in itself, is not pathological. Non-anxious individuals generally report worry topics that are similar to those of GAD clients. Content differences are limited to individuals with GAD worrying about a greater number of worry topics (Abel & Borkovec, 1995; Craske, Rapee, Jackel, & Barlow, 1989) and worrying about minor matters (Sanderson & Barlow, 1990), such as punctuality and getting an oil change. Compared to individuals diagnosed with panic disorder, GAD patients report significantly more worries regarding interpersonal confrontation, competence, acceptance, and concern about others, whereas, panic disorder patients report significantly more cognitions regarding physical catastrophe (Breitholtz, Johansson, & Öst, 1999).

Intensity and frequency have generally been considered as the primary differentiations between normal and pathological worry. GAD patients “worry more

days than not” and “worry excessively,” whereas nonanxious participants rarely respond affirmatively to such an inquiry (Abel & Borkovec, 1995). Comparing nonanxious controls to GAD participants in mean time spent worrying per day, Dupuy, Beaudoin, Rhéaume, Ladouceur, and Dugas (2001) found that non-GAD participants worried 55 minutes per day on average and GAD participants worried 310 minutes, or over 5 hours per day.

While “empirical” differentiations based on intensity and frequency may be informative or even diagnostic, these differences may not coincide with individual’s perceptions about excessiveness and uncontrollability of their worry, which are primary criteria for GAD. For example, recent findings suggest that many college students worry excessively and uncontrollably, though deny the significant degree of distress or impairment from worry to warrant diagnosis of GAD (Ruscio, 2002). Assessing 1588 undergraduate students using the Penn State Worry Questionnaire (Meyer, Miller, Metzger, & Borkovec, 1990) and the Generalized Anxiety Disorder Questionnaire (Roemer, Borkovec, Posa, & Borkovec, 1995), Ruscio, Borkovec, and Ruscio (2001) showed that worry is best represented dimensionally rather than as binary phenomena of normal and pathological worry.

Another population of interest is individuals who experience significant distress and/or functional interference related to worry, but do not meet the excessiveness criterion for GAD. Notably, excessive worry is not required for a diagnosis of GAD via the 10th revision of the *International Classification of Diseases and Related Health Problems* (ICD-10; World Health Organization, 1992). Drawing from the NCS-R data,

Ruscio et al. (2005) studied 411 excessive GAD cases and 172 “non-excessive GAD” cases. The primary between group differences were that excessive GAD has an earlier onset and is more chronic than non-excessive GAD. Domains and degree of functional impairment were similar, except with respect to the degree of interference in close relationships, which was more pronounced for excessive GAD.

### Etiology of GAD

A consensus regarding the etiology of GAD is beginning to emerge. This consensus is based on the general diathesis-stress model and the role of worry in GAD (see Barlow, 2002; Borkovec et al., 2004; Borkovec & Roemer, 1995). According to that consensus, generalized biological and psychological vulnerabilities combine to form a pervasive diathesis for the development of emotional disorders. The biological domain entails a genetic vulnerability for negative affect that predisposes people to anxiety and related emotional disorders (such as depression). The psychological domain entails the effects of early experiences of uncontrollability and unpredictability usually vis-à-vis actions of caregivers. The consensus seems to be that both biological and psychological vulnerabilities are necessary to the genesis of GAD and other emotional disorders.

At the next level, the emerging consensus holds that the above vulnerabilities magnify responses to negative life events so that individuals with GAD become overly sensitive to even minor stressors and relatively likely to think of stressful events as unrealistically probable, unpredictable, and uncontrollable. Worry enters the picture as a means of avoiding catastrophic images and the aversive affect that cognitive catastrophizing would otherwise engender. Worry then becomes chronic because it is



negatively reinforced in at least two ways: worry about anticipated events is usually followed by the absence of such events, and worry forestalls the (aversive) affective correlates of the imaging that worry displaces. In the long run, worry is maladaptive; by forestalling emotional imaging it forestalls emotional processing, and by suppressing sympathetic arousal it contributes to autonomic inflexibility (see Borkovec et al., 2004; Borkovec & Roemer, 1995). Expounding on the concept of emotional processing, worry has been shown to reduce extinction effects during repeated exposure tasks. In effect, worry short-circuits an individual's emotional experience of events. Furthermore, thinking of stressful events as unpredictable and uncontrollable is maladaptive also because it fosters negative self-evaluation and slows the development of realistic problem-solving skills.

### Assessment of GAD

Methods available for diagnostic assessment of GAD include structured interviews, questionnaires, and self-monitoring. When assessing for GAD and other anxiety disorders, the structured or semi-structured interview of choice is the Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version, or ADIS-IV-L (Di Nardo, Brown, & Barlow, 1994) or the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994). The ADIS-IV-L assists in determining both lifetime and current GAD diagnoses. Additionally, the ADIS-IV-L and the ADIS-IV provide information about physical symptoms unique to GAD, content of worry, level of distress and functional interference, precipitants, and maintaining factors. The ADIS-IV-L is composed of modules specific to each of the anxiety disorders; it also provides

interview data about depression, psychosis, drug abuse, and organic symptoms. The ADIS-IV-L can be administered in its entirety, or modules may be selected that are germane to presenting problems and referral questions. In their study of interrater reliability of DSM-IV diagnoses, Brown, Di Nardo, Lehman, and Campbell (2001) obtained a kappa coefficient of .67 for 76 patients who had at least one GAD diagnosis. The ADIS-IV-L is particularly useful in differential diagnosis of GAD and obsessive compulsive disorder (OCD). The worries of GAD superficially resemble the obsessions of OCD. However, obsessional thoughts in OCD are ego-dystonic intrusions that differ in precipitants and content from the exaggerated everyday worries of GAD (cf., Turner, Beidel, & Stanley, 1992).

Two questionnaires can be used to screen for GAD: the Generalized Anxiety Disorder Questionnaire-IV (GADQ-IV; Newman et al., 2002) and the Penn State Worry Questionnaire (Meyer et al., 1990; Molina & Borkovec, 1994). The Generalized Anxiety Disorder Questionnaire-IV is a 9-item self-report diagnostic instrument for GAD that provides scores from 0 to 33 when used as a continuous measure. As a continuous measure or dichotomous diagnostic tool, it affords a diagnosis of GAD based on DSM-IV criteria and provides the clinician with the client's major worry themes in their own words. Data cited by Roemer (2001) point to good internal consistency and test-retest stability in a college sample. Roemer also cites evidence of strong correlations between the Generalized Anxiety Disorder Questionnaire-IV and the Penn State Worry Questionnaire as well as independent agreement for diagnoses based on the Generalized Anxiety Disorder Questionnaire-IV and the ADIS (kappa of .70).

In order to investigate the sensitivity and specificity of the GAD-Q-IV, Newman and colleagues (2002) devised a sum total response scoring method to reflect the aggregate diagnostic criteria for GAD with equal emphasis given to each DSM-IV criteria for GAD. Providing a sum total score ranging from 0 to 13, the dichotomous items (1-4, and 6) were scored as 0 or 1, the number of worries were divided by 3 for a score of 0 to 2, the number of endorsed symptoms was divided by 3 for a score of 0 to 2, and the distress and interference ratings were each divided by four and then summed for a score between 0 and 4. Scoring the GAD-Q-IV as a sum total response, a cutoff score of 5.70 yielded sensitivity of 83% and specificity of 89% vis a vis the diagnosis of GAD. In other words, using this cutoff, the rate of false positive diagnoses was 11% and the rate of false negative diagnoses was 17%. In samples of 29 individuals diagnosed with GAD according to the ADIS-IV, the mean total score on the GAD-Q-IV was 19.93 (SD = 7.84). Utilizing the GAD-Q-IV as a dichotomous diagnostic tool, individuals should respond yes to items 1-3 and 6, include 3 or more worry topics on item 5, endorse 3 or more symptoms on item 7, and score 4 or higher on item 8 or 9, which reflect interference or distress. Newman and colleagues found that this scoring procedure yielded 96% specificity and 67% sensitivity vis a vis the diagnosis of GAD.

The Penn State Worry Questionnaire or PSWQ is a 16-item self-report questionnaire that assesses the intensity and excessiveness of worry. It is widely used and has shown good to very good internal consistency, test-retest stability, and demonstrable construct validity (cf. Molina & Borkovec, 1994). Discriminant validity for GAD versus other anxiety-disorder groups was shown in a fairly large-scale study by

Brown, Antony, and Barlow (1992), who also provide normative data from clinic patients in various anxiety-disorder categories. When the PSWQ is used as a screening tool, the recommended cutoff scores differ based on whether the sample consists of clients or unselected undergraduate students. With selected client samples diagnosed via the ADIS-IV, a cutoff of 45 on the PSWQ has yielded excellent sensitivity (0.99) and specificity (0.98; Behar, Alcaine, Zuellig, & Borkovec, 2003). A cutoff score of 62 yielded moderate sensitivity (0.75) and high specificity (0.86) in an unselected sample of undergraduate students. Notably, GAD cases were identified via the GAD-Q-IV, which has a positive predictive power of 0.68. Thus, approximately 32% of the “GAD cases” would have been incorrectly identified as meeting DSM-IV criteria for GAD. Based on receiver operating characteristic (ROC) analysis, a PSWQ cutoff score of 62 also provides a reliable means of screening out cases of PTSD and depression, but not social phobia, in non-GAD samples. In a sample of GAD and social phobia patients diagnosed via the ADIS-IV-L, a PSWQ score of 65 reliably distinguished between individuals with GAD and individuals with social phobia (Fresco, Mennin, Heimberg, & Turk, 2003).

### Meta-Worry

Meta-worry, which might have a functional role in the maintenance of GAD, is something of a misnomer as it is generally used in the literature. It represents an individual’s beliefs about the effects of worry. Based on interviews with GAD patients, Borkovec, Hazlett-Stevens, and Diaz (1999; see also Borkovec & Roemer, 1995) delineated the following beliefs about the positive effects of worry: it prevents or reduces the likelihood of negative outcomes, prepares for the worst, distracts from more

emotional topics, motivates behavior that might bring relief from worried state, and serves as an effective means of solving problems. Worry has been shown to reduce physiological arousal (Hammel, Mulfinger, Smitherman, Gothard, & McGlynn, 2004; Lyonfields et al., 1995; Thayer, Friedman, & Borkovec, 1996; Thayer, Friedman, Borkovec, Johnsen, & Molina, 2000) and individuals with GAD report that worry, while associated with a degree of distress, serves as a distraction from more emotional topics (Borkovec & Roemer, 1995; Borkovec et al., 1999). Meta-worry might also include beliefs about the negative effects of worry, for example, worry is uncontrollable and worry might have catastrophic physical and mental consequences (Wells, 2002).

Wells (2004) theorizes that metaworry is central to the development and maintenance of GAD. In particular, their research has indicated that beliefs about the uncontrollability and dangerousness of worry predict development of GAD and that worry precludes emotional processing of stressful images (i.e., identifying, describing, and modulating the affect associated with actual and potential negative life events, which is a necessary component of exposure and healthy emotion regulation). Wells and colleagues have developed a complex model depicting the development and maintenance of GAD that includes, triggers, the activation of positive meta-worry, type one worry, the activation of negative meta-worry, type two worry, and consequent avoidant behaviors, thought control, and affect (for a pictorial explication of the model see Wells, 2002; Wells, 2004). Briefly, an image or negative thought in the form of a “What if?” interrogatory serves as a trigger for worry. Second, positive beliefs about the utility of worry, such as worry helps me to prepare or worry helps me to cope, are then activated.

These beliefs are viewed as a normative aspect of worry; i.e., associated with task-oriented worry. They are necessary, but not sufficient, components in the development and maintenance of GAD worry. Third, the individual engages in type one worry (i.e., thoughts about potential negative outcomes and attempts at problem-solving). During this type one worry, negative worry beliefs are also activated. These beliefs involve negative appraisal of the worry process and result in type two worry or meta-worry. This worry about worry results in avoidance behaviors (i.e., avoidance of situations, reassurance seeking, distraction, etc.), in efforts to control thoughts that further reinforce worry and the negative beliefs, and in arousal of worry-focused emotion and negative self-appraisal. Worry is viewed as a means of coping with threat and uncertainty. However, it interferes with the effective exposure because it inhibits affective and physiological responses, thereby maintaining and exacerbating worry and further reinforcing beliefs about worry due to evidence against these beliefs not being “experienced” when they are encountered.

Positive beliefs about worry, i.e., worry motivates behavior and assists in problem solving, are also central to other models of GAD, though in different ways. Dugas and colleagues’ cognitive-behavioral model of GAD centers around intolerance of uncertainty as a developmental and maintenance factor that interacts with positive beliefs about worry, poor problem orientation, and cognitive avoidance (Dugas, Marchand, & Ladouceur, 2005; Dugas, Gagnon, Ladouceur, & Freeston, 1998). Borkovec’s group has focused significant effort on experiential avoidance, particularly avoidance of emotions related to interpersonal situations (Borkovec, Newman, Castonguay, 2003; see also

Borkovec et al., 1999). In their evolving treatment model, emotional processing therapy is integrated with cognitive behavioral therapy. Using Borkovec's avoidance theory (e.g., Borkovec et al., 2004) as a point of departure, Mennin and colleagues (2002, 2004, & 2005) are examining the role of emotion dysregulation in GAD. They conceptualize individuals with GAD as using worry as a means to avoid processing of emotional stimuli due to emotional skill deficits and emotion dysregulation being core problems for these individuals. Rather than a useful source of information, emotions are viewed as threatening. The emotional experience of individuals with GAD is more intense and more difficult for them to identify and describe. Additionally, they react negatively to the experience of emotions and lack skills to manage or modulate their emotions. Initial research indicates greater intensity of emotional experience and reactivity, with marked difficulty for GAD patients in identifying their emotions and in self-soothing relative to controls (Mennin, Heimberg, Turk, & Fresco, 2005; Novick-Kline, Turk, Mennin, Hoyt, & Gallagher, 2005). Turk and colleagues (2005) compared social anxiety disorder and GAD. They found that GAD is associated with greater emotional intensity, but with similar levels of emotional expression (i.e., outward display through verbal and nonverbal behaviors) and comprehension (i.e., ability to identify and describe their emotional experience) relative to social anxiety disorder.

Questionnaires designed to assess the type and strength of beliefs about worry include the Meta-Cognitions Questionnaire (Cartwright-Hatton & Wells, 1997), the Consequences of Worrying Scale (COWS; Davey, Tallis, & Capuzzo, 1996), and the Why Worry Scale-II (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994).

Examples of positive worry beliefs are worry motivates, worry helps to prepare for the worst, worry aids in problem solving, and worry provides distraction from more emotional topics. On some of the measures, the scales for an individual belief have been characterized negatively, such as worry disrupts performance or worry exaggerates a problem. Subscale measures of these positive beliefs have shown positive correlations with the intensity and excessiveness of worry as measured by the PSWQ. However, there has been less research regarding the strength of worry beliefs in relation to diagnosed cases of GAD, particularly with regard to the COWS. Furthermore, the relationship between these beliefs and cardiovascular responsivity have not been examined.

The 29-item Consequences of Worrying Scale (COWS; Davey et al., 1996) assesses beliefs about the functions and consequences of worry. The measure provides five factor-analytically derived scale scores that quantify the strengths of negative beliefs that worry disrupts performance, exaggerates a problem, and causes emotional distress, as well as the strengths of positive beliefs that worry motivates and helps analytical thinking. Original research was conducted with undergraduate students and has yet to be replicated with a clinical sample or validated vis a vis structured diagnostic interviews (Davey et al., 1996). The three negative consequences scales showed significant moderate correlations with the State-Trait Anxiety Inventory, the Penn State Worry Questionnaire, the Worry Domains Questionnaire, and the Beck Depression Inventory. The higher-order factor scale scores, total negative and total positive consequences, were positively associated with significantly greater levels of pathological worry as assessed by the PSWQ. Scores on the total positive consequences of worry scale were



significantly correlated with measures of pathological worry (PSWQ), with a measure of trait worrying (Worry Domains Questionnaire; Tallis, Eysenck, & Matthews, 1992), and with frequency of negative cognitions (Cognition Checklist; Beck, Brown, Steer, Eidelson, & Riskind, 1987). To date, this measure has not been validated with a clinical sample, nor has criterion-referenced validity been examined through administration of a structured interview (Roemer, 2001).

### Treatment for GAD

In cognitive behavioral therapy for GAD, the cognitive distortions about the probability and adversity of catastrophic events are the primary targets. Catastrophic thinking generally reflects an individual's perception of personal inability to cope or ascribing dire consequences to minor events (Brown, O'Leary, & Barlow, 2001). In treatment, the client is asked to imagine the worst possible scenario and consider how he or she would cope with the event. Decatastrophizing ensues by instructing the client to consider realistic outcomes related to their worry themes. For example, decatastrophizing for a graduate student might be: What would really happen if I got a B in a class? For an undergraduate: What would really happen if I did not get accepted into graduate school the first try?

### Rationale of the Present Research

Worry is predominantly a language-based activity that involves thoughts about anticipating and preventing negative outcomes (Borkovec & Hu, 1990; Borkovec & Inz, 1990; Borkovec & Roemer, 1995; see also Borkovec et al., 2004). In GAD, worry is conceptualized as pathological due to its chronic use and deleterious effects. Evolving

consensus regarding the etiology of GAD suggests that worry becomes chronic because it is negatively reinforced by the absence of the anticipated negative outcomes and the absence of aversive affect associated with the imagery that worry displaces (see Barlow, 2002; Borkovec et al., 2004; Borkovec & Roemer, 1995). Meta-worry, beliefs about the effects of worry, might also have a functional role in the maintenance of GAD. As the term is more precisely used by Wells (2004), worry about worry results in avoidance behaviors (i.e., avoidance of situations, reassurance seeking, distraction, etc.), in efforts to control thoughts that further reinforce worry and the negative beliefs, and in arousal of worry-focused emotion and negative self-appraisal. In efforts to improve treatment for GAD and to understand the etiology of GAD, researchers have been working to delineate the perceived and actual functions of worry so that interventions can be designed to influence them (see Borkovec et al., 2003; Orsillo, Roemer, & Barlow, 2003).

The present research was conducted to elucidate the relation between worry beliefs and GAD. The Consequences of Worrying Scale (COWS; Davey et al., 1996) was used to assess individual's beliefs about the positive and negative effects of worry. Furthermore, the current sample is substantially larger than that used in the original validation of the COWS. Relations between meta-worry and GAD were examined in a sample of 263 undergraduate students. First, the strength of beliefs about the positive and negative consequences of worry was used to predict psychometrically defined cases of GAD versus non-GAD and continuous measures of pathological worry. These analyses will help to ascertain whether the positive and/or negative beliefs are characteristic of non-pathological and/or pathological worry. Using a subset of participants who were

“diagnosed” with a structured interview, the predictive value of each means of measuring GAD via self-report, i.e., the PSWQ and the GAD-Q-IV with their various scoring methods, was also investigated. Third, using this subset of participants, the strength of beliefs about the positive and negative consequences of worry was used to predict “diagnoses” via structured interview. These analyses will provide a test of the models that used pathological worry as a criterion.

## II. METHOD

The data were collected during two sessions. The first entailed completion of questionnaires regarding worry and GAD, including the Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002), the Consequences of Worrying Scale (COWS; Davey et al., 1996), and the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), which are reproduced in Appendix A. Two hundred and sixty three undergraduate students participated. In a second session, a selected subset of these participants was administered modules of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994). Fifty-one participants were included in the final analysis.

### Part I: Participants

As part of the screening process for a study of the cardiac autonomic effects of worry and GAD, undergraduate students were recruited via flyers and course announcements in the psychology department and received extra credit for their participation. (The informed consent documents for all participants and parental consent forms for participants under the age of 19 are reproduced in Appendix B.) Two hundred sixty three participants completed questionnaires regarding worry and GAD. Of the 263 students participating in the screening process, 194 were females (73.8%) and 69 were males (26.2%). Marital status was represented as follows: 95.4 % single, 2.3 % married, and 2.3% living with partner. Of the 256 participants who reported their age, the mean

was 20.68 years ( $SD = 2.832$ ), with ages ranging from 18 to 42. Ethnicity was represented as follows: 229 Caucasians (87.1%), 27 African Americans (10.3%), 1 Hispanic (0.4%), 3 Asians (1.1%), 1 Native American (0.4%), and 2 Mixed Ethnicity (0.8%). Academic class standing was evenly distributed between freshman (22.1%), sophomore (26.2%), junior (24.0%), and senior (27.8%). Ninety-six percent of the participants reported full-time college attendance; the remaining attended part-time. Three participants were working full-time (1.1%), 78 were working part-time (29.7%), and 182 were not employed (69.2%).

#### Part I: Procedures

As noted, the self-report instruments administered in the first session included the Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002), the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), and the Consequences of Worrying Scale (COWS; Davey et al., 1996), which are reproduced in Appendix A.

Three continuous and four dichotomous scoring methods were utilized to psychometrically define GAD and Non-GAD.

#### *Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV)*

The GAD-Q-IV is a 9-item self-report diagnostic instrument based on DSM-IV criteria for GAD that has three scoring methods (i.e., dichotomous, continuous, and sum total response; Newman et al., 2002; Roemer, 2001). The first four items entail yes/no responses about the quality of worry (e.g., excessiveness, intensity, uncontrollability, and worry about minor matters), the fifth item provides space for the individual to list up to six worries in their own words, the sixth item is a yes/no stop rule (i.e., worry more days

than not during the past six months; if yes, continue. If not, stop here.), the seventh item is a list of the six symptoms for GAD with yes/no responses for each, the eighth item is 0-8 likert scale about interference from worry and physical symptoms, and the ninth item is 0-8 likert scale about distress associated with worry and physical symptoms. For the interference likert scale, zero reflects no interference, or “none,” and eight “very severe” interference. Similarly for the distress likert ratings, zero reflects “no distress” and eight reflects “very severe distress.” Three scoring methods are recommended for the GAD-Q-IV: dichotomous, sum total response, and continuous (Newman et al., 2002; Roemer et al., 2001).

Dichotomous scoring. Using dichotomous scoring of the GAD-Q-IV, a diagnosis of GAD is determined on the basis of affirmative responses to items 1-3 and 6 (item 4 regarding worry about minor matters is not relevant to this scoring method), listing of three or more worry topics on item 5, endorsement of three or more symptoms on item 7, and a rating of four or higher on item 8 (i.e., interference from worry) or item 9 (distress associated with worry).

Sum total response scoring. A sum total response score for the GAD-Q-IV was achieved as follows: the dichotomous items (1-4, and 6) were scored as 0 or 1, the number of worries were divided by 3 for a score of 0 to 2, the number of endorsed symptoms was divided by 3 for a score of 0 to 2, and the interference and distress ratings were each divided by four and then summed for a score between 0 and 4. This provides for a sum total response score between 0 and 13.5. Dichotomous designations were also determined using this score. Newman and colleagues (2002) recommend a cutoff score

of 5.7 for determining GAD versus Non-GAD. In the present study, participants with a sum total response score less than 5.7 were defined as Non-GAD and those with a sum total response score greater than or equal to 5.7 were defined as GAD for purposes of the analyses.

Continuous scoring. Continuous scoring of the GAD-Q-IV provides a score of 0 to 33 and is scored as follows. Items 1-4 and item 6, which assess the quality of worry (i.e., excessiveness, uncontrollability, and intensity), worry about minor matters, and the presence during the past six months, are scored as zero for a no response and one for a yes response. The score range for item 5 is zero to six and is based on the number of worries that an individual lists. Item 7 is a list of symptoms associated with worry, a negative response is scored as zero and a positive response is scored as one for a total score of zero to six for the item. The scores for items 8 and 9, which assess interference and distress associated with worry, are the reported zero to eight likert scale ratings endorsed. Based on Newman and colleagues (2002), dichotomous designations were determined using the continuous score. Participants with a continuous score less than 5.7 were defined as Non-GAD and those with a continuous score greater than or equal to 5.7 were defined as GAD in the analyses.

#### *Penn State Worry Questionnaire (PSWQ)*

The PSWQ has 16 items that assess the intensity and excessiveness of worry (Meyer et al., 1990). The items are answered using a 1-5 likert scale rating where 1 is “not at all typical” and 5 is “very typical.” Five of the items (1, 3, 8, 10, and 11) are reverse scored such that a response of 1 is scored as a 5, a 2 as a 4, etc. The continuous

score has a maximum range of 16 to 80. Behar and colleagues (2003) found that with undergraduate students a score of 62 provided a reliable means of differentiating GAD and Non-GAD. Thus, a cutoff score of 62 was applied to determine excessive versus non-excessive worriers, such that participants with PSWQ scores below 62 were designated as non-excessive worriers and participants with PSWQ scores at or above 62 were designated as excessive worriers.

#### *Summary of Psychometric Definitions of Pathological Worry*

GAD, or more precisely, pathological worry was defined in seven ways. Three continuous methods were used and included continuous scoring of the GAD-Q-IV, sum total response scoring of the GAD-Q-IV, and continuous scoring of the PSWQ. Four dichotomous scoring methods were used and included dichotomous scoring of the GAD-Q-IV, application of a cutoff score of 5.7 to the continuous GAD-Q-IV score, application of a cutoff score of 5.7 to the sum total response GAD-Q-IV score, and application of a cutoff score of 62 to the continuous PSWQ score.

#### *Consequences of Worrying Scale (COWS)*

The COWS has 29 items where the individual is asked to indicate “how much you think each of the following statements describes you when you worry and are answered using a 1-5 likert scale where 1 represents “not at all” and 5 represents “a lot” (Davey et al., 1996). Five scales (three negative and two positive) were derived factor-analytically by Davey and colleagues (1996). The negative scales include worry disrupts performance (8 items with a scale score range of 8 to 40), worry exaggerates a problem (5 items with a scale score range of 5 to 25), and worry causes emotional distress (4 items



with a scale score range of 4 to 20). The positive scales include worry motivates (6 items with a scale score range of 6 to 30) and worry helps analytical thinking (6 items with a scale score range of 6 to 30).

### *Statistical Analyses*

The COWS scale scores were utilized as predictor variables in developing models for predicting pathological worry and nonpathological worry. Binary logistic regression analyses were conducted using each of the four psychometrically defined groups as dichotomous criterion variables (i.e., dichotomous GAD-Q-IV scores, continuous cutoff GAD-Q-IV scores, sum total response cutoff GAD-Q-IV scores, and continuous cutoff PSWQ scores). Multiple regression analyses were conducted using the three continuous measures of pathological worry as criterion variables (i.e., continuous GAD-Q-IV scores, sum total response GAD-Q-IV scores, and continuous PSWQ scores). Thus, regression analyses were conducted using each of the seven scoring methods for psychometrically defining GAD.

### Part I: Between Group Demographic Differences

Using the Crosstabs procedure in SPSS, Chi-square analyses were conducted to examine demographic differences between the groups as defined by each of the four dichotomous psychometric methods described above. A tabular summary of participant demographics by dichotomous questionnaire scoring method is presented in Appendix C.

#### *GAD-Q-IV Dichotomous*

There were significant group differences for age and marital status when using the GAD-Q-IV as a dichotomous instrument. The average age of the dichotomously-defined

GAD group was greater than that of the Non-GAD group,  $\chi^2 (11, 256) = 36.431, p < .001$ . A significantly greater number of participants in the GAD group were living with their partner (10.7%) or were married (3.6%) in comparison to the Non-GAD group, wherein 1.3% were living with their partner and 2.1% were married,  $\chi^2 (1, 263) = 10.307, p < .01$ .

#### *GAD-Q-IV Continuous Cutoff*

When using the 5.7 continuous score cutoff criterion for the GAD-Q-IV, there were no significant differences between groups for any of the demographic variables.

#### *GAD-Q-IV Sum Total Cutoff*

There were no significant demographic differences based upon the GAD-Q-IV sum total cutoff scoring method.

#### *PSWQ Cutoff*

When diagnostic status was defined by PSWQ cutoff of 62, there were significantly more women in the GAD group than the Non-GAD group,  $\chi^2 (1, 263) = 6.186, p < .05$ . No other demographic variables differed significantly between groups as defined by the PSWQ cutoff score.

### Part II: Procedure & Selection

A subset of the 263 participants in the first session was invited to participate in a second session, which involved administration of ADIS-IV modules for GAD, panic disorder, and major depression, and psychophysiological monitoring during worry and analog cognitive restructuring. The invitation was based on the absence of a major medical condition affecting cardiorespiratory functioning, absence of psychotropic prescription, and a GAD-Q-IV score of less than 3 or greater than 6. Based on these

criteria, 166 screened participants were excluded, 53 for medical and/or medication reasons and 113 due to mid range GAD-Q-IV scores. Of ninety-seven people invited, fifty-eight participated in the second portion of the study and received two hours of extra credit.

All participants in the second portion were administered the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994) modules for Panic Disorder, Generalized Anxiety Disorder, and Major Depressive Disorder by a clinical psychology graduate student. Participants were assigned to the Non-GAD group provided that the criteria for one of these three diagnoses was not met. Criteria for the GAD group included: (a) a principal diagnosis of GAD via administration of the ADIS-IV and (b) absence of panic disorder currently or in the past. Seven of these 58 participants were not assigned to one of the groups due to a diagnosis of panic disorder (n = 1), sub-clinical depression (n = 1), a primary diagnosis of major depressive disorder (n = 1), or sub-clinical GAD (n = 4). Administration of the three ADIS modules resulted in 27 individuals without a diagnosis of panic disorder, major depression, or GAD and 24 with a primary diagnosis of GAD (17 met criteria for GAD only and 7 met criteria for primary GAD with comorbid MDD).

Analyses were conducted to examine which of the psychometric assessment methods most closely matched the classification obtained through ADIS-IV administration and to examine the relation between meta-worry and GAD. First, the psychometric assessment methods were compared to ADIS-IV classification using logistic regression. The following classification parameters were computed for each

psychometric assessment method: 1) sensitivity (the percentage of individuals who met criteria for GAD based on ADIS-IV administration who were correctly identified by the self-report psychometric), 2) specificity (the percentage of individuals who did not meet criteria for GAD based on ADIS-IV administration that were correctly identified by the self-report psychometric as non-GAD), 3) positive predictive power (the percentage of individuals classified by the psychometric as having GAD who actually had GAD based on ADIS-IV administration), 4) negative predictive power (the percentage classified by the self-report psychometric as non-GAD who did not meet criteria for GAD based on ADIS-IV administration), and 5) overall predictive power (the percentage correctly classified by the self-report psychometric instrument as GAD or non-GAD based on ADIS-IV administration).

Second, the relationship between meta-worry and GAD was examined via logistic regression using ADIS-IV classification as the criterion and the COWS scales as predictors. These results were then compared to the results testing the relations between the self-report psychometric classification of GAD and non-GAD and the COWS scales.

## Part II: Participant Demographics

Of the fifty-one participants included in the analyses for part two, the mean age was 20.17 years ( $SD = 1.94$ ) with ages ranging from 19 to 31. Gender representation was 76.5% female ( $n = 39$ ) and 23.5% male ( $n = 12$ ). Ethnicity was represented as follows: 43 Caucasians (84.3%), 6 African-Americans (11.8%), and 2 Asians (3.9%). Academic class standing was relatively evenly distributed between freshman (25.5%), sophomore (31.4%), junior (21.6%), and senior (21.6%). Ninety-two percent of the participants

reported full-time college attendance; the remaining attended part-time. Two participants were working full-time (3.9%), 11 were working part-time (21.6%), and 38 were not employed (74.5%). One participant was married and 50 participants were single.

Based on Chi-square analyses, there were no significant differences between the Non-GAD and GAD groups on the following demographic variables: age, gender, marital status, work status, class standing, and student status (i.e., full or part time). Ethnicity was significantly different between groups,  $\chi^2(2, 263) = 7.734, p < .05$ . Ethnicity was represented as follows: 26 Caucasians (96.3%) and 1 Asian (3.7%) in the Non-GAD group and 17 Caucasians (70.8%), 6 African-Americans (25.0%), and 1 Asian (4.2%) in the GAD group.

### III. RESULTS

#### Descriptives: Psychometrically Defined GAD & Non-GAD

Seven scoring methods were utilized to psychometrically define GAD and Non-GAD in the first sample of 263 participants. These scoring methods, which were drawn from the literature described earlier, were based on two questionnaires, the GAD-Q-IV and the PSWQ. Four dichotomous scoring methods were used: GAD-Q-IV dichotomous scoring, GAD-Q-IV continuous cutoff scoring, GAD-Q-IV sum total response cutoff scoring, and PSWQ cutoff scoring. Three continuous scoring methods were used: GAD-Q-IV continuous scoring, GAD-Q-IV sum total response scoring, and PSWQ continuous scoring. The descriptive statistics for the groups formed with these scoring methods are presented below. Table 1 presents the results (GAD and non-GAD) of the four dichotomous scoring methods. Table 2 presents the means, standard deviations, observed range, and maximum range for the three continuous scoring methods.

Table 1 Dichotomous Scoring Methods – Descriptives; N = 263

|                           | Non-GAD     | GAD         |
|---------------------------|-------------|-------------|
| GADQ-IV dichotomous       | 235 (89.4%) | 28 (10.6%)  |
| GADQ-IV continuous cutoff | 145 (55.1%) | 118 (44.9%) |
| GADQ-IV sum total cutoff  | 202 (76.8%) | 61 (23.2%)  |
| PSWQ cutoff               | 209 (79.5%) | 54 (20.5%)  |

Table 2. Continuous Scoring Methods – Descriptives; N = 263

|                    | Mean (Std. Deviation) | Observed Range | Maximum Range |
|--------------------|-----------------------|----------------|---------------|
| GADQ-IV continuous | 7.48 (7.92)           | 0 – 30         | 0 – 30        |
| GADQ-IV sum total  | 3.42 (3.45)           | 0 – 12.50      | 0 – 13        |
| PSWQ continuous    | 48.63 (14.03)         | 17 – 80        | 16 – 80       |

Descriptives: COWS Scales – Meta-Worry

The five COWS Scales were used to assess meta-worry in the first and second phases of this study. As noted earlier, the COWS has three scales to assess negative worry beliefs and two scales to assess positive worry beliefs. The three negative scales are worry disrupts performance (DP), worry exaggerates a problem (EP), and worry causes emotional distress (CED). The two positive scales are worry motivates (MOT) and worry helps analytical thinking (HAT). For the participants in the first phase of this study (n = 263), the means, standard deviations, observed ranges, and maximum ranges for each of the COWS scales are presented in Table 3.

Table 3. COWS Scale Scores – Descriptives; N = 263

|                           | Mean (Std. Deviation) | Observed Range | Maximum Range |
|---------------------------|-----------------------|----------------|---------------|
| Disrupts Performance      | 17.83 (7.11)          | 8 – 39         | 8 – 40        |
| Exaggerates a problem     | 13.34 (4.49)          | 5 – 24         | 5 – 25        |
| Causes emotional distress | 13.19 (4.08)          | 4 – 20         | 4 – 20        |
| Motivates                 | 13.52 (4.86)          | 6 – 30         | 6 – 30        |
| Helps analytical thinking | 16.12 (4.48)          | 7 – 30         | 6 – 30        |

In order to examine the relation between the worry beliefs, bivariate correlations between the COWS scales were computed and are presented in Table 4. These results also provide information relevant to multicollinearity affecting regression analyses. As shown in Table 4, the three negative scales (disrupts performance, exaggerates a problem, and causes emotional distress) were highly and significantly correlated with one another and were moderately and significantly correlated with one of the positive scales, worry helps analytical thinking. The worry motivates scale was highly and significantly correlated with the helps analytical thinking scale and was significantly correlated with one of the negative belief scales, worry causes emotional distress.

Table 4. Correlations Between the COWS Scales in the Large Sample of 263

|                | <b>DP (N)</b> | <b>EP (N)</b> | <b>CED (N)</b> | <b>Mot (P)</b> | <b>HAT (P)</b> |
|----------------|---------------|---------------|----------------|----------------|----------------|
| <b>DP (N)</b>  | 1.00          | .831 **       | .734 **        | -.035          | .200 **        |
| <b>EP (N)</b>  |               | 1.00          | .827 **        | .095           | .361 **        |
| <b>CED (N)</b> |               |               | 1.00           | .155 *         | .364 **        |
| <b>Mot (P)</b> |               |               |                | 1.00           | .669 **        |
| <b>HAT (P)</b> |               |               |                |                | 1.00           |

Note. \*\* indicates the correlation was significant at the 0.01 level (2-tailed). \* indicates the correlation was significant at the 0.05 level (2-tailed). DP = Disrupts performance, EP = Exaggerates a problem, CED = Causes emotional distress, Mot = Motivates, and HAT = Helps analytical thinking.



Correlation Between COWS Scales & GAD Criterion Variables

Pearson correlations between scores on the five COWS scales and the results of the seven self-report scoring methods of psychometrically defining GAD are presented in Table 5 below.

Table 5. Pearson Correlations Between the COWS Scale Scores and the Results of the Seven Psychometric Scoring Methods for Measuring GAD

|         | GAD-Q-IV<br>Dichotomous<br>score | GAD-Q-IV<br>Continuous<br>cutoff | GAD-Q-IV<br>Sum total<br>cutoff | PSWQ<br>cutoff | GAD-Q-IV<br>Continuous<br>score | GAD-Q-IV<br>Sum total<br>score | PSWQ<br>score |
|---------|----------------------------------|----------------------------------|---------------------------------|----------------|---------------------------------|--------------------------------|---------------|
| DP (N)  | .500**                           | .437**                           | .482**                          | .377**         | .567**                          | .571**                         | .536**        |
| EP (N)  | .449**                           | .508**                           | .465**                          | .507**         | .574**                          | .604**                         | .707**        |
| CED (N) | .356**                           | .463**                           | .370**                          | .411**         | .481**                          | .507**                         | .624**        |
| MOT (P) | .024                             | .180**                           | .023                            | .153*          | .111                            | .137*                          | .281**        |
| HAT (P) | .134*                            | .281**                           | .146*                           | .321**         | .232**                          | .263**                         | .471**        |

Note. \*\* indicates the correlation was significant at the 0.01 level. \* indicates the correlation was significant at the 0.05 level. For the COWS scales, DP = Disrupts performance, EP = Exaggerates a problem, CED = Causes emotional distress, Mot = Motivates, and HAT = Helps analytical thinking.

The three negative COWS scales were significantly correlated,  $p < .01$ , with all seven of the psychometric methods of assessing GAD. The COWS worry motivates scale was significantly correlated with the GAD-Q-IV continuous cutoff score, the PSWQ cutoff score, the GAD-Q-IV sum total response score, and the PSWQ continuous

score. The COWS worry helps analytical thinking scale was significantly correlated with each of the seven methods. For each of the seven psychometric methods of assessing GAD, the strongest correlations with COWS scale scores are as follows in order of correlation strength: 1) GAD-Q-IV Dichotomous – Disrupts performance and Exaggerates a problem COWS scale scores, 2) GAD-Q-IV Continuous Cutoff – Exaggerates a problem and Causes emotional distress COWS scale scores, 3) GAD-Q-IV Sum Total Cutoff – Disrupts performance and Exaggerates a problem COWS scale scores, 4) PSWQ Cutoff – Exaggerates a problem and Causes emotional distress COWS scale scores, 5) GAD-Q-IV Continuous Score – Exaggerates a problem and Disrupts performance COWS scale scores, 6) GAD-Q-IV Sum Total Response Score – Exaggerates a problem and Disrupts performance COWS scale scores, and 7) PSWQ Continuous Score – Exaggerates a problem and Causes emotional distress COWS scale scores.

#### Relationship Between Meta-Worry & Psychometrically-Defined GAD

The meta-worry beliefs, i.e., beliefs about the consequences of worry as measured by the COWS, were used as predictors of psychometrically defined GAD versus non-GAD categorizations. Seven scoring methods for the assessment of GAD were utilized as criterion variables in assessing the predictive capacity of the five COWS scales with the large sample of 263 participants. Logistic regression was conducted for each of the dichotomous diagnostic methods, i.e., GAD-Q-IV dichotomous scoring, GAD-Q-IV continuous cutoff scoring, GAD-Q-IV sum total response cutoff scoring, and PSWQ cutoff scoring. For each of the continuous self-report methods, i.e., GAD-Q-IV

continuous scoring, GAD-Q-IV sum total response scoring, and PSWQ continuous scoring, multiple regression analyses were conducted with the COWS scale scores as predictor variables. Results of the regression analyses are summarized below by scoring method.

#### *GAD-Q-IV Dichotomously Scored*

A direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV dichotomous scoring method (i.e., positive endorsement of all requisite DSM-IV criteria for GAD) as outcome and scores on each of the five COWS scales as predictors. A test of the full model with all five predictors against a constant-only model resulted in a high likelihood that the predictors significantly contributed,  $\chi^2 (5, N = 263) = 71.50, p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and non-GAD as defined by dichotomous scoring of the GAD-Q-IV (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the aggregate independent variables do not contribute to the model). The Hosmer-Lemeshow statistic is a goodness of fit test where a good model produces a nonsignificant result. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 263) = 5.614, p = .690$ , indicating that the model reproduced the test correctly. The overall classification success rate was 91.3%; 97.9% of non-GAD cases and 35.7% of GAD cases were classified correctly. Table 6 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Only one predictor, the scale for worry disrupting performance, reliably predicted GAD status as defined by dichotomous scoring of the GAD-Q-IV,  $z = 8.231, p < .01$ .

Table 6. Logistic Regression Analysis of Worry Beliefs as Predictors of GAD versus Non-GAD Defined Via Dichotomous Scoring of the GAD-Q-IV

| Variables                 | B       | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|---------|---------------------|------------|
| Disrupts performance      | .195    | 8.231               | 1.215      |
| Exaggerates problem       | .197    | 2.291               | 1.217      |
| Causes emotional distress | -.004   | .001                | .996       |
| Motivates                 | .040    | .332                | 1.040      |
| Helps analytical thinking | .063    | .641                | 1.065      |
| (Constant)                | -11.310 | 28.649              | --         |

Using only the significant COWS scale predictor (i.e., Worry disrupts performance), a direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV dichotomous scoring method as the criterion. A test of this model against a constant-only model resulted in a high likelihood that the predictor significantly contributed,  $\chi^2(1, N = 263) = 64.00, p < .001$ . This indicates that the COWS Worry disrupts performance scale reliably distinguished between GAD and non-GAD as defined by dichotomous scoring of the GAD-Q-IV (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the predictor variable did not contribute to the model). The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2(7, N = 263) = 7.685, p = .361$ , indicating that the model reproduced the test correctly. The overall classification success rate was 89.7%; 96.6% of non-GAD cases and 32.1% of GAD cases were classified correctly. The predictor, the scale for worry disrupting

performance, reliably predicted GAD status as defined by dichotomous scoring of the GAD-Q-IV,  $z = 37.774$ ,  $p < .001$ . The constant was  $-7.841$  and the beta coefficient for the predictor was  $.255$ . The odds ratio for the COWS scale Worry disrupts performance was  $1.291$ . Thus, the odds of an individual being diagnosed with GAD via dichotomous scoring of the GAD-Q-IV increases 29% with a one-unit increase in the COWS scale Worry disrupts performance.

*GAD-Q-IV Continuously Scored with Cutoff of 5.7*

A direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV continuous cutoff scoring method (e.g., applying a 5.7 cutoff to continuous scores) as the outcome and scores on each of the five COWS scales as predictors. A test of the full model with all five predictors against a constant-only model resulted in a high likelihood that the predictors significantly contributed,  $\chi^2(5, N = 263) = 84.228$ ,  $p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and non-GAD as defined by GAD-Q-IV continuous cutoff scoring. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2(8, N = 263) = 5.991$ ,  $p = .648$ , indicating that the model reproduced the test correctly. The overall classification success rate was 71.9%; 73.8% of non-GAD cases and 69.5% of GAD cases were classified correctly. Table 7 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Only one predictor, the scale for worry exaggerating a problem, reliably predicted GAD status as defined by the GAD-Q-IV continuous cutoff scoring method,  $z = 7.199$ ,  $p < .01$ .

Table 7. Logistic Regression Analysis of Worry Beliefs as Predictors of GAD versus Non-GAD Defined Via Continuous Cutoff Scoring of the GAD-Q-IV

| Variables                 | B     | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|-------|---------------------|------------|
| Disrupts performance      | 0.033 | 0.758               | 1.033      |
| Exaggerates problem       | 0.198 | 7.199               | 1.219      |
| Causes emotional distress | 0.058 | 0.804               | 1.060      |
| Motivates                 | 0.067 | 2.589               | 1.069      |
| Helps analytical thinking | 0.021 | 0.184               | 1.021      |
| (Constant)                | 5.522 | 46.449              | --         |

Using only the significant COWS scale predictor (i.e., Worry exaggerates a problem), a direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV continuous cutoff scoring method as the criterion. A test of this model against a constant-only model resulted in a high likelihood that the predictor significantly contributed,  $\chi^2(1, N = 263) = 75.719, p < .001$ . This indicates that the COWS Worry exaggerates a problem scale reliably distinguished between GAD and non-GAD as defined by continuous cutoff scoring of the GAD-Q-IV (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the predictor variable did not contribute to the model). The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2(8, N = 263) = 6.843, p = .593$ , indicating that the model reproduced the test correctly. The overall classification success rate was 73.0%; 79.3% of non-GAD cases and 65.3% of GAD cases were classified correctly. The predictor, the COWS scale for worry

exaggerating a problem, reliably predicted GAD status as defined by continuous cutoff scoring of the GAD-Q-IV,  $z = 53.505$ ,  $p < .001$ . The constant was  $-4.103$  and the beta coefficient for the predictor was  $.288$ . The odds ratio for the COWS scale Worry disrupts performance was  $1.334$ . Thus, the odds of an individual being diagnosed with GAD via continuous cutoff scoring of the GAD-Q-IV increases 33% with a one-unit increase in the COWS scale Worry exaggerates a problem.

*GAD-Q-IV Sum Total Response with Cutoff of 5.7*

A direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV sum total response cutoff scoring method (e.g., application of a 5.7 cutoff to sum total response score) as outcome and scores on each of the five COWS scales as predictors. A test of the full model with all five predictors against a constant-only model was resulted in a high likelihood that the predictors significantly contribute,  $\chi^2 (5, N = 263) = 68.691$ ,  $p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and non-GAD as defined by GAD-Q-IV sum total response cutoff scoring (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the independent variables do not contribute to the model). The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 263) = 8.884$ ,  $p = .352$ , indicating that the model reproduced the test correctly. The overall classification success rate was 83.3%; 94.6% of non-GAD cases and 45.9% of GAD cases were classified correctly. Table 8 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Two of the scales significantly contributed to the prediction of GAD status as defined by

the sum total response cutoff criterion of 5.7, worry disrupts performance,  $z = 6.247$ ,  $p < .05$ , and worry exaggerates a problem,  $z = 4.573$ ,  $p < .05$ .

Table 8. Logistic Regression Analysis of Worry Beliefs as Predictors of GAD versus Non-GAD as Defined Via Sum Total Response Cutoff Scoring of the GAD-Q-IV

| Variables                 | B      | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|--------|---------------------|------------|
| Disrupts performance      | 0.106  | 6.247               | 1.112      |
| Exaggerates problem       | 0.183  | 4.573               | 1.201      |
| Causes emotional distress | -0.039 | 0.243               | 0.961      |
| Motivates                 | 0.015  | 0.100               | 1.015      |
| Helps analytical thinking | 0.018  | 0.111               | 1.018      |
| (Constant)                | -5.927 | 35.422              | --         |

Using only the two significant COWS scale predictors (i.e., Worry disrupts performance and Worry exaggerates a problem), a direct logistic regression analysis was performed on GAD defined via the GAD-Q-IV sum total response cutoff scoring method as the criterion. A test of this model against a constant-only model resulted in a high likelihood that the predictors significantly contributed,  $\chi^2(2, N = 263) = 67.976$ ,  $p < .001$ . This indicates that the two COWS scales reliably distinguished between GAD and non-GAD as defined by sum total response cutoff scoring of the GAD-Q-IV (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the aggregate predictor variables do not contribute to the model). The Hosmer-Lemeshow goodness of



fit test was not significant,  $\chi^2 (8, N = 263) = 3.392, p = .907$ , indicating that the model reproduced the test correctly. The overall classification success rate was 82.9; 94.6% of non-GAD cases and 44.3% of GAD cases were classified correctly. The COWS scale for worry disrupting performance reliably predicted GAD status as defined by sum total cutoff scoring of the GAD-Q-IV,  $z = 5.602, p < .05$  and beta coefficient of .094. The COWS scale for worry exaggerating a problem reliably predicted GAD status as defined by sum total cutoff scoring of the GAD-Q-IV,  $z = 6.518, p < .05$  and beta coefficient of .176. The constant was  $-5.636$ . The odds ratio for the COWS scale Worry disrupts performance was 1.098 and for Worry exaggerates a problem was 1.192. Thus, the odds of an individual being diagnosed with GAD via sum total response cutoff scoring of the GAD-Q-IV increases 10% with a one-unit increase in the COWS scale Worry disrupts performance and increases 19% with a one-unit increase in the COWS scale Worry exaggerates a problem.

#### *PSWQ with Cutoff of 62*

A direct logistic regression analysis was performed on GAD defined via the PSWQ cutoff scoring method (e.g., application of a 62 cutoff to the continuous scores) as outcome and scores on each of the five COWS scales as predictors. A test of the full model with all five predictors against a constant-only model resulted in a high likelihood that the predictors significantly contribute,  $\chi^2 (5, N = 263) = 90.239, p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and non-GAD as defined by PSWQ cutoff scoring (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the independent variables do not contribute to the

model). The overall classification success rate was 83.3%; 92.8% of non-GAD cases and 46.3% of GAD cases were classified correctly. Table 9 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Two predictors, worry exaggerates a problem and worry helps analytical thinking reliably predicted GAD status as defined by the PSWQ cutoff scoring method,  $z = 17.788$ ,  $p < .001$  and  $z = 4.890$ ,  $p < .05$ , respectively. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2(8, N = 263) = 3.691$ ,  $p = .884$ , indicating that the model reproduced the test correctly.

Table 9. Logistic Regression Analysis of Worry Beliefs as Predictors of GAD versus Non-GAD Defined Via PSWQ Cutoff Scoring

| Variables                 | B      | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|--------|---------------------|------------|
| Disrupts performance      | -0.048 | 1.151               | 0.953      |
| Exaggerates problem       | 0.417  | 17.788              | 1.518      |
| Causes emotional distress | 0.039  | 0.186               | 1.039      |
| Motivates                 | 0.016  | 0.112               | 1.017      |
| Helps analytical thinking | 0.133  | 4.890               | 1.143      |
| (Constant)                | -9.872 | 46.449              | --         |

Using only the two significant COWS scale predictors (i.e., Worry exaggerates a problem and Worry helps analytical thinking), a direct logistic regression analysis was performed on GAD defined via the PSWQ continuous cutoff scoring method as the criterion. A test of this model against a constant-only model resulted in a high likelihood

that the predictors significantly contributed,  $\chi^2 (2, N = 263) = 88.783, p < .001$ . This indicates that the two COWS scales reliably distinguished between GAD and non-GAD as defined by continuous cutoff scoring of the PSWQ (i.e., results of the likelihood ratio test indicate rejection of the null hypothesis that the aggregate predictor variables did not contribute to the model). The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 263) = 8.963, p = .345$ , indicating that the model reproduced the test correctly. The overall classification success rate was 84.0; 93.8% of non-GAD cases and 46.3% of GAD cases were classified correctly. The COWS scale for worry exaggerating a problem reliably predicted GAD status as defined by continuous cutoff scoring of the PSWQ,  $z = 40.170, p < .001$  and beta coefficient of .365. The COWS scale for worry helping analytical thinking reliably predicted GAD status as defined by continuous cutoff scoring of the PSWQ,  $z = 11.068, p < .01$  and beta coefficient of .160. The constant was  $-9.705$ . The odds ratio for the COWS scale Worry exaggerates a problem was 1.441 and for Worry helps analytical thinking was 1.174. Thus, the odds of an individual being diagnosed with GAD via continuous cutoff scoring of the PSWQ increases 44% with a one-unit increase in the COWS scale Worry exaggerates a problem and increases 17% with a one-unit increase in the COWS scale Worry helps analytical thinking.

#### *PSWQ Continuous Score*

A standard multiple regression was performed between PSWQ continuous scores as the criterion variable and the five COWS scale scores as predictor variables. The multiple correlation coefficient,  $R = .750$ , for the regression was significantly different from zero,  $F (5, 257) = 66.185, p < .001$ . Thus, the aggregate predictor variables

contributed to prediction of the PSWQ continuous scores. The total variability of the PSWQ scores explained by the COWS scale scores was 56% (55% adjusted). Two of the five COWS scales contributed significantly to the prediction of GAD as defined by continuous PSWQ scores: Worry exaggerates a problem  $t = 6.959, p < .001$ , and Worry helps analytical thinking  $t = 2.633, p < .01$ .

Multiple regression of a reduced model with only the two significant scale predictors produced a multiple correlation coefficient of  $R = .744, F(2, 260) = 160.813, p < .001$ . The total variability of the PSWQ scores explained by the two COWS scale scores was 55.3% (55.0% adjusted). Both of the tested COWS scales contributed significantly to the prediction of GAD as defined by continuous PSWQ scores: Worry exaggerates a problem  $t = 13.886, p < .001$ , and Worry helps analytical thinking  $t = 5.567, p < .001$ . The regression equation was as follows:  $Y = 10.437 + 1.927(EP) + .774(HAT)$ , where  $Y = PSQW$  score,  $EP = Exaggerates a problem$  scale, and  $HAT = Helps analytical thinking$  scale. Thus, a one-unit increase in the COWS Worry exaggerates a problem scale results in a 1.93-unit increase in the PSWQ continuous score. A one-unit increase in the COWS Worry helps analytical thinking scale results in a 0.77-unit increase in the PSWQ continuous score. The standardized regression coefficient for the COWS problem exaggeration scale was .617 and for the COWS helps analytical thinking scale was .248. Based on a comparison of the standardized regression coefficients, the COWS Worry exaggerates a problem scale was a stronger predictor of the PSWQ continuous scores.

### *GAD-Q-IV Continuous Score*

A standard multiple regression was performed between GAD-Q-IV continuous scores as the criterion variable and the five COWS scale scores as predictor variables. The multiple correlation coefficient,  $R = .604$ , for the regression was significantly different from zero,  $F(5, 257) = 29.464$ ,  $p < .001$ . Thus, the aggregate predictor variables contributed to prediction of the GAD-Q-IV continuous scores. The total variability of the GAD-Q-IV scores explained by the five COWS scale scores was 36.4% (35.2% adjusted). Two of the five COWS scales contributed significantly to the prediction of GAD as defined by continuous GAD-Q-IV scores: Worry disrupts performance,  $t = 3.590$ ,  $p < .001$ , and Worry exaggerates a problem,  $t = 2.936$ ,  $p < .01$ .

Multiple regression of a reduced model with only the two significant scale predictors produced a multiple correlation coefficient of  $R = .596$ ,  $F(2, 260) = 71.546$ ,  $p < .001$ . The total variability of the GAD-Q-IV scores explained by the two COWS scale scores was 35.5% (35.0% adjusted). Both of the tested COWS scales contributed significantly to the prediction of GAD as defined by continuous GAD-Q-IV scores: Worry disrupts performance  $t = 3.244$ ,  $p < .01$ , and Worry exaggerates a problem  $t = 3.714$ ,  $p < .001$ . The regression equation was as follows:  $Y = -6.107 + 0.324(DP) + 0.587(EP)$ , where  $Y =$  GAD-Q-IV continuous score,  $DP =$  Disrupts performance, and  $EP =$  Exaggerates a problem scale. Thus, a one-unit increase in the COWS Worry disrupts performance scale results in a 0.32-unit increase in the GAD-Q-IV continuous score. A one-unit increase in the COWS Worry exaggerates a problem scale results in a 0.59-unit increase in the GAD-Q-IV continuous score. The standardized regression coefficient for

the COWS problem exaggeration scale was .332 and for the COWS performance disruption scale was .291. Based on a comparison of the standardized regression coefficients, the COWS Worry exaggerates a problem scale was a stronger predictor of the GAD-Q-IV continuous scores.

*GAD-Q-IV as a Sum Total Response Continuous Variable*

A standard multiple regression was performed between GAD-Q-IV sum total response scores as the criterion variable and the five COWS scale scores as predictor variables. The multiple correlation coefficient,  $R = .626$ , for the regression was significantly different from zero,  $F(5, 256) = 33.173, p < .001$ . Thus, the aggregate predictor variables contributed to prediction of the GAD-Q-IV sum total response scores. The total variability of the GAD-Q-IV scores explained by the COWS scale scores was 39.2% (38.0% adjusted). Two of the five COWS scales contributed significantly to the prediction of GAD as defined by continuous GAD-Q-IV sum total response scores: Worry disrupts performance,  $t = 2.986, p < .01$ , and Worry exaggerates a problem,  $t = 3.674, p < .001$ .

Multiple regression of a reduced model with only the two significant scale predictors produced a multiple correlation coefficient of  $R = .616, F(2, 260) = 79.690, p < .001$ . The total variability of the GAD-Q-IV sum total response scores explained by the two COWS scale scores was 38.0% (37.5% adjusted). Both of the tested COWS scales contributed significantly to the prediction of GAD as defined by continuous GAD-Q-IV sum total response scores: Worry disrupts performance  $t = 2.537, p < .05$ , and Worry exaggerates a problem  $t = 4.776, p < .001$ . The regression equation was as follows:

$Y = -5.313 + 0.108 (DP) + 0.322 (EP)$ , where  $Y$  = GAD-Q-IV sum total score, DP = Disrupts performance, and EP = Exaggerates a problem scale. Thus, a one-unit increase in the COWS Worry disrupts performance scale results in a 0.11-unit increase in the GAD-Q-IV sum total response score. A one-unit increase in the COWS Worry exaggerates a problem results in a 0.32-unit increase in the GAD-Q-IV sum total response score. The standardized regression coefficient for the COWS problem exaggeration scale was .419 and for the COWS performance disruption scale was .223. Based on a comparison of the standardized regression coefficients, the COWS Worry exaggerates a problem scale was a stronger predictor of the GAD-Q-IV sum total response scores.

#### Summary of Regression Analyses for the Screening Sample

The COWS scales that significantly predicted GAD versus non-GAD differed based on the diagnostic instrument and calculation that was utilized to produce the criterion variable. Table 10 provides a summary of the COWS scales that were significant predictors for each of the psychometric definitions of GAD.

Table 10. Summary of Regression Analyses with Each of the Seven Psychometric Definitions of GAD

| Outcome Variable                   | Significant COWS Scale Predictor(s) |
|------------------------------------|-------------------------------------|
| GAD-Q-IV Dichotomously scored      | DP                                  |
| GAD-Q-IV with 5.7 cutoff criterion | EP                                  |
| GAD-Q-IV Sum total cutoff score    | EP & DP                             |
| GAD-Q-IV Continuous score          | EP & DP                             |
| GAD-Q-IV Sum total response score  | EP & DP                             |
| PSWQ with 62 Cutoff criterion      | EP & HAT                            |
| PSWQ Continuous score              | EP & HAT                            |

Note. COWS DP = Disrupts performance scale, COWS EP = Exaggerates a problem scale, COWS CED = causes emotional distress scale, COWS MOT = Motivates scale, and COWS HAT = Helps analytical thinking scale.

#### GAD Assessment in ADIS-Defined Groups

Administration of the three ADIS-IV modules in the second phase of the study resulted in 27 individuals without a diagnosis of GAD, panic disorder, or major depression, and 24 individuals with a diagnosis of GAD (7 of these participants also met criteria for MDD secondary to GAD). Sorted by diagnostic status, Table 11 provides the means and standard deviations for each of the three continuous GAD assessment methods. Table 12 provides descriptive statistics for each of the four dichotomous GAD assessment methods by diagnostic group.



Table 11. Means (and Standard Deviations) and Observed Ranges for the Three Continuous Psychometric Definitions of GAD by ADIS-IV Diagnostic Group

|                 | Non-GAD        |         | GAD            |           |
|-----------------|----------------|---------|----------------|-----------|
|                 | Mean (Std Dev) | Range   | Mean (Std Dev) | Range     |
| PSWQ Continuous | 41.4 (12.59)   | 22 – 67 | 58.2 (10.76)   | 35 – 73   |
| GADQ Continuous | 3.8 (6.04)     | 0 – 22  | 14.6 (8.95)    | 0 – 27    |
| GADQ Sum total  | 1.7 (2.90)     | 0 – 10  | 6.6 (3.77)     | 0 – 11.42 |

Table 12. Frequencies (and Percentages) of Each of the Four Dichotomous Psychometric Definitions of GAD by ADIS-IV Diagnostic Group

|                       | Non-GAD    |           | GAD        |            |
|-----------------------|------------|-----------|------------|------------|
|                       | No         | Yes       | No         | Yes        |
| PSWQ Cutoff           | 25 (92.6%) | 2 (7.4%)  | 15 (62.5%) | 9 (37.5%)  |
| GADQ Dichotomous      | 27 (100%)  | 0 (0.0%)  | 17 (70.8%) | 7 (29.2%)  |
| GADQ Cutoff           | 20 (74.1%) | 7 (25.9%) | 5 (20.8%)  | 19 (79.2%) |
| GADQ Sum total cutoff | 24 (88.9%) | 3 (11.1%) | 9 (37.5%)  | 15 (62.5%) |

*GAD only vs. GAD with MDD*

One-way analysis of variance was conducted comparing the GAD only group (n = 17) to the GAD with MDD group (n = 7) to assess group differences on each of the self-report instruments. For all of the GAD diagnostic self-report methods, the group mean for GAD with MDD was non-significantly higher than the mean for the GAD only group. On the COWS scales, there were also no significant differences between the GAD only and the GAD with MDD groups.

### Diagnosis of GAD: ADIS-IV vs. Self-Report Instruments

To assess the predictive power of each of the self-report methods, direct logistic regression analyses were conducted with the ADIS-IV groups (GAD,  $n = 24$ ; non-GAD,  $n = 27$ ) as the criterion variable and each of the self-report measures as predictors. When a dichotomous self-report diagnostic was used, the variable was entered as a categorical covariate using the simple contrast method.

#### *GAD-Q-IV Dichotomously Scored*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the GAD-Q-IV dichotomous scores as the predictor. The likelihood ratio test,  $\chi^2(1, N = 51) = 11.819, p < .01$ , indicated that the model was significantly different from the constant only model. However, the Wald test,  $z = .066, p = .797$ , indicates that the GAD-Q-IV dichotomous scores were not a significant predictor of GAD versus non-GAD as defined by the ADIS-IV. While the 27 non-GAD cases were correctly classified, only 7 of the 17 GAD cases were correctly classified by the GAD-Q-IV when it was scored dichotomously, i.e., positive responses to each criterion of GAD. Of the GAD cases correctly classified, three were diagnosed with comorbid MDD and four were diagnosed only with GAD. Thus, we reject the null hypothesis that the regression model was a good fit of the data, i.e., the model did not reproduce the ADIS-IV defined groups correctly.

#### *GAD-Q-IV Scored Continuously with 5.7 Cutoff*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the GAD-Q-IV continuous cutoff score as the

predictor. The likelihood ratio test,  $\chi^2(1, N = 51) = 15.215, p < .001$ , indicated that the model was significantly different from the constant only model. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 12.766, p < .001$ , odds ratio = .092. Seven false positives and five false negatives were observed (negative predictive power = 74.1% and positive predictive power = 79.2%). None of the incorrectly classified cases were diagnosed with comorbid MDD.

*GAD-Q-IV Sum Total Response with 5.7 Cutoff*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the GAD-Q-IV sum total cutoff score as the predictor. The likelihood ratio test,  $\chi^2(1, N = 51) = 15.631, p < .001$ , indicated that the model was significantly different from the constant only model. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 12.137, p < .001$ , odds ratio = .075. Three false positives and nine false negatives were observed (negative predictive power = 88.9% and positive predictive power = 62.5%). One of the nine false negative cases was diagnosed with comorbid MDD.

*PSWQ Score with Cutoff of 62*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the PSWQ cutoff score as the predictor. The likelihood ratio test,  $\chi^2(1, N = 51) = 7.168, p < .01$ , indicated that the model was significantly different from the constant only model. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 5.656, p < .05$ , odds ratio = .133. Two false positives and fifteen false negatives were observed

(negative predictive power = 92.6% and positive predictive power = 37.5%). Four of the fifteen false negative cases were diagnosed with comorbid MDD.

#### *GAD-Q-IV Continuous Score*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the GAD-Q-IV continuous scores as the predictor. The likelihood ratio test,  $\chi^2 (1, N = 51) = 19.547, p < .001$ , indicated that the model was significantly different from the constant only model. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (6, N = 51) = 8.734, p = .189$ , indicating that the model reproduced the test correctly. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 13.615, p < .001$ , odds ratio = 1.174. Five false positives and nine false negatives were observed (negative predictive power = 81.5% and positive predictive power = 62.5%). One of the nine false negative cases was diagnosed with comorbid MDD.

#### *GAD-Q-IV Sum Total Response Score*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the GAD-Q-IV sum total response scores as the predictor. The likelihood ratio test,  $\chi^2 (1, N = 51) = 19.769, p < .001$ , indicated that the model was significantly different from the constant only model. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (7, N = 51) = 6.336, p = .501$ , indicating that the model reproduced the test correctly. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 13.933, p < .001$ , odds ratio = 1.436. Five false positives and eight false negatives were observed (negative

predictive power = 81.5% and positive predictive power = 66.7%). One of the eight false negative cases was diagnosed with comorbid MDD.

#### *PSWQ Continuous Score*

A direct logistic regression analysis was performed using ADIS-IV defined groups as the criterion variable and the PSWQ continuous scores as the predictor. The likelihood ratio test,  $\chi^2 (1, N = 51) = 19.944, p < .001$ , indicated that the model was significantly different from the constant only model. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 51) = 9.106, p = .333$ , indicating that the model reproduced the test correctly. This self-report measure was a significant predictor of GAD versus non-GAD as defined by the ADIS-IV,  $z = 13.360, p < .001$ , odds ratio = 1.114. Eight false positives and seven false negatives were observed (negative predictive power = 70.4% and positive predictive power = 70.8%). One of the seven false negative cases was diagnosed with comorbid MDD.

#### *Summary of Predictive Diagnostic Validity of Self-Report Instruments*

Table 13 provides a summary of the predictive power of the self-report instruments with each of the recognized scoring methods. These data were based upon the logistic and multiple regression analyses using ADIS-IV-defined groups as the criterion variable. Thus, the GAD-Q-IV continuous cutoff score was the most sensitive, 80%, and the GAD-Q-IV sum total response cutoff score was the most specific, 83.3%. Overall predictive power was highest at 76.5% for the GAD-Q-IV when a cutoff criterion was applied to either the continuous score or the sum total response score.

Table 13. Diagnostic Classification by Self-Report Instrument

| Index (Model)          | Sensitivity | Specificity | PPP   | NPP   | Overall |
|------------------------|-------------|-------------|-------|-------|---------|
| GADQ Dichotomous       | 0.614       | 1.000       | 1.000 | 0.292 | 0.667   |
| GADQ Continuous cutoff | 0.800       | 0.731       | 0.741 | 0.792 | 0.765   |
| GADQ Sum total cutoff  | 0.774       | 0.833       | 0.889 | 0.625 | 0.765   |
| GADQ Continuous        | 0.710       | 0.750       | 0.815 | 0.625 | 0.725   |
| GADQ Sum total         | 0.733       | 0.762       | 0.815 | 0.667 | 0.745   |
| PSWQ Cutoff of 62      | 0.625       | 0.818       | 0.926 | 0.375 | 0.667   |
| PSWQ Continuous        | 0.731       | 0.680       | 0.704 | 0.708 | 0.706   |

Note. PPP = Positive predictive power, NPP = Negative predictive power, and Overall = Overall predictive power.

Meta-Worry: ADIS-IV Defined GAD vs. Non-GAD

Sorted by ADIS-IV diagnostic status (Non-GAD, n = 27; GAD, n = 24), Table 14 provides the means and standard deviations for each of the COWS scales. Figure 1 provides a graphical representation of the COWS scale scores by group. One-way analysis of variance tests conducted between groups showed significant differences on each of the negative COWS scales. The GAD group mean for the COWS Disrupts performance scale mean was significantly greater than that of the Non-GAD group,  $F(1,50) = 32.221, p < .001$ . Relative to the Non-GAD group, the COWS Exaggerates a problem scale mean for the GAD group was significantly greater for the GAD group,  $F(1,50) = 18.685, p < .001$ . The mean score for the COWS causes emotional distress scale was significantly greater for the GAD group compared to the Non-GAD group,  $F(1,50) =$

16.321,  $p < .001$ . There were no significant differences between groups on the positive COWS scales: worry motivates and worry helps analytical thinking.

Table 14. Means (and Standard Deviations) and Observed Ranges of the COWS Scales by ADIS-IV Diagnostic Status

|                           | Non-GAD        |        | GAD            |         |
|---------------------------|----------------|--------|----------------|---------|
|                           | Mean (Std Dev) | Range  | Mean (Std Dev) | Range   |
| Disrupts performance      | 13.85 (4.99)   | 8 – 27 | 22.96 (6.44)   | 14 – 35 |
| Exaggerates a problem     | 10.96 (4.00)   | 5 – 18 | 15.79 (3.79)   | 8 – 22  |
| Causes emotional distress | 10.85 (3.88)   | 5 – 20 | 15.25 (3.88)   | 6 – 20  |
| Motivates                 | 12.07 (4.16)   | 6 – 22 | 12.96 (5.19)   | 6 – 24  |
| Helps analytical thinking | 14.96 (4.65)   | 7 – 27 | 16.75 (4.42)   | 8 – 26  |

Note. The maximum ranges for the COWS scales were as follows: Disrupts performance 8-40; Exaggerates a problem 5-25; Causes emotional distress 4-20; Motivates 6-30; and Helps analytical thinking 6-30.

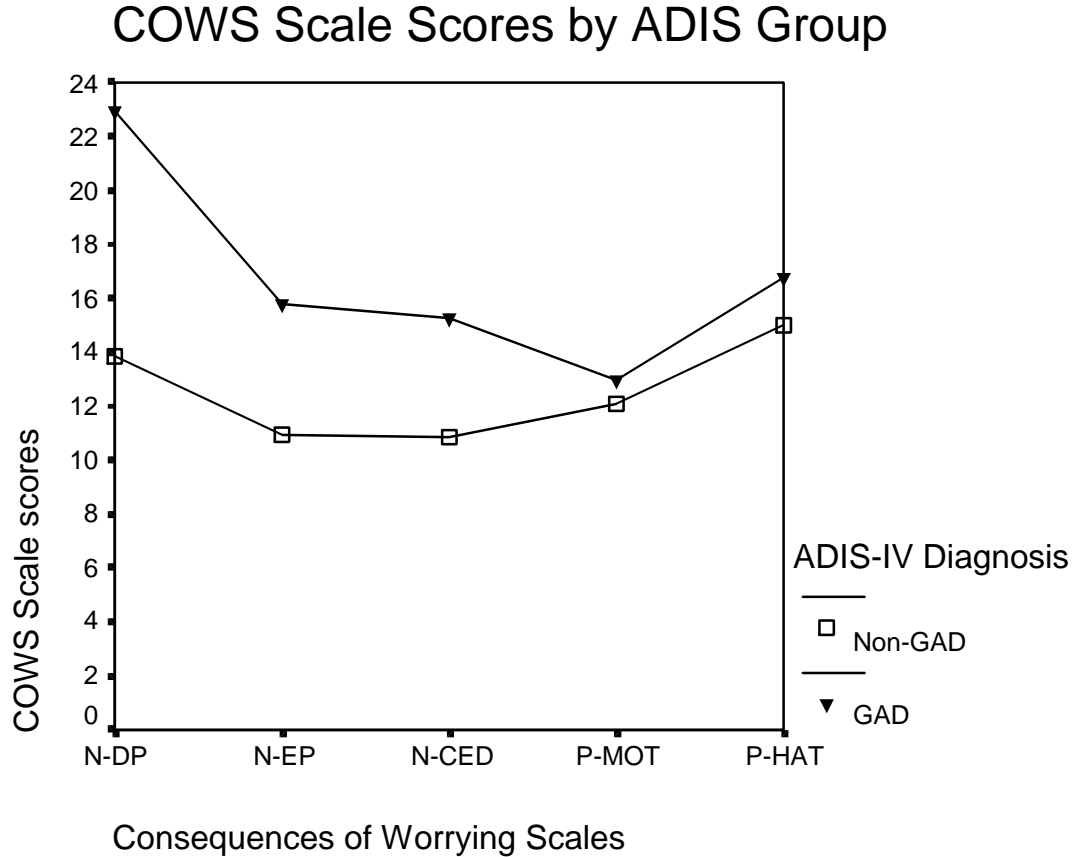


Figure 1. Average group scores for the five scales of the Consequences of Worrying Scale (COWS) for ADIS-IV groups. Negative consequences of worry scales: N-DP = Worrying disrupts effective performance, N-EP = Worrying exaggerates the problem, and N-CED = Worrying causes emotional distress. Positive consequences of worry scales: P-MOT = Worry motivates and P-HAT = Worry helps analytical thinking.

*COWS Scale Correlations in Part II – ADIS-IV Sample*

Bivariate correlations between the COWS scales were computed and are presented in Table 15. As shown in this table, the three negative COWS scales (disrupts



performance, exaggerates a problem, and causes emotional distress) were highly and significantly correlated with one another. The exaggerates a problem scale and the causes emotional distress were also significantly correlated with one of the positive COWS scales, the helps analytical thinking scale. The positive scales were significantly and strongly correlated with one another.

Table 15. Correlations Between the COWS Scale Scores in the ADIS-IV Subset

|                | <b>DP (N)</b> | <b>EP (N)</b> | <b>CED (N)</b> | <b>Mot (P)</b> | <b>HAT (P)</b> |
|----------------|---------------|---------------|----------------|----------------|----------------|
| <b>DP (N)</b>  | 1.00          | .814 **       | .780 **        | -.020          | .134           |
| <b>EP (N)</b>  |               | 1.00          | .903 **        | .169           | .322 *         |
| <b>CED (N)</b> |               |               | 1.00           | .220           | .445 **        |
| <b>Mot (P)</b> |               |               |                | 1.000          | .695 **        |
| <b>HAT (P)</b> |               |               |                |                | 1.00           |

Note. \*\* indicates the correlation was significant at the 0.01 level (2-tailed). \* indicates the correlation was significant at the 0.05 level (2-tailed). DP = Disrupts performance, EP = Exaggerates a problem, CED = Causes emotional distress, Mot = Motivates, and HAT = Helps analytical thinking.

*Regression of COWS Scales in ADIS-IV Defined Groups*

A direct logistic regression analysis was conducted with the five COWS scale scores as predictor variables and the ADIS-IV defined groups as the criterion variable. A test of the full model with all five predictors against a constant-only model resulted in a

high likelihood that the predictors significantly contributed,  $\chi^2 (5, N = 51) = 25.672, p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and non-GAD as defined via ADIS-IV administration. The overall classification success rate was 72.5%; 77.8% of non-GAD cases and 66.7% of GAD cases were classified correctly. Table 16 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Only one predictor, the scale for worry disrupting performance, reliably predicted ADIS-IV defined GAD status,  $z = 7.561, p < .01$ . The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 51) = 7.921, p = .441$ , indicating that the model reproduced the test correctly. The odds ratio of 1.344 indicated that the odds of an individual being diagnosed with GAD via ADIS-IV administration increased 34% with a one-unit increase in the COWS scale Worry disrupts performance.

Using only the significant COWS scale predictor (i.e., Worry disrupts performance), a direct logistic regression analysis was performed with ADIS-IV defined groups as the criterion. A test of this model against a constant-only model resulted in a high likelihood that the predictor significantly contributed,  $\chi^2 (1, N = 51) = 24.422, p < .001$ . This indicates that the COWS Worry disrupts performance scale reliably distinguished between GAD and non-GAD as defined via ADIS-IV administration. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 51) = 5.441, p = .710$ , indicating that the model reproduced the test correctly. The overall classification success rate was 76.5%; 85.2% of non-GAD cases and 66.7% of GAD cases were classified correctly. The predictor, the scale for worry disrupting performance, reliably predicted GAD versus Non-GAD as defined by the ADIS-IV,  $z = 13.165, p < .001$ . The constant

was  $-4.884$  and the beta coefficient for the predictor was  $.268$ . The odds ratio for the COWS scale Worry disrupts performance was  $1.307$ . Thus, the odds of an individual being diagnosed with GAD via the ADIS-IV increases  $31\%$  with a one-unit increase in the COWS scale Worry disrupts performance.

Table 16. Logistic Regression Analysis of Worry Beliefs as Predictors of GAD versus Non-GAD as Defined by the ADIS-IV

| Variables                 | B      | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|--------|---------------------|------------|
| Disrupts performance      | .296   | 7.561               | 1.344      |
| Exaggerates problem       | .072   | .129                | 1.075      |
| Causes emotional distress | -.146  | .427                | .864       |
| Motivates                 | -.005  | .002                | .995       |
| Helps analytical thinking | .116   | .705                | 1.123      |
| (Constant)                | -6.283 | 8.989               | --         |

*COWS Predictors: Non-GAD vs. GAD-only*

After removing the 7 GAD cases with comorbid MDD, a direct logistic regression was conducted with ADIS-IV groups (Non-GAD,  $n = 27$ ; GAD only,  $n = 17$ ) as the criterion variable and the five COWS scale scores as predictors. A test of the full model with all five predictors against a constant-only model resulted in a high likelihood that the predictors significantly contributed,  $\chi^2(5, N = 44) = 23.251, p < .001$ . This indicates that the predictors, as a set, reliably distinguished between GAD and Non-GAD as defined via

ADIS-IV administration. The overall classification success rate was 72.7%; 81.5% of Non-GAD cases and 58.8% of GAD cases were classified correctly. Table 17 shows regression coefficients, Wald statistics, and odds ratios for each of the five predictors. Only one predictor, the scale for worry disrupting performance, reliably predicted ADIS-IV defined GAD status,  $z = 7.032$ ,  $p < .01$ . The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2 (8, N = 44) = 8.722$ ,  $p = .366$ , indicating that the model reproduced the test correctly. The odds ratio of 1.407 indicated that the odds of an individual being diagnosed with GAD via ADIS-IV administration increased 41% with a one-unit increase in the COWS scale Worry disrupts performance.

Table 17. Logistic Regression Analysis of Worry Beliefs as Predictors of ADIS-IV Diagnostic Groups (Non-GAD & GAD without Comorbid MDD)

| Variables                 | B      | Wald Test (z-ratio) | Odds Ratio |
|---------------------------|--------|---------------------|------------|
| Disrupts performance      | .341   | 7.032               | 1.407      |
| Exaggerates problem       | .200   | .793                | 1.221      |
| Causes emotional distress | -.277  | 1.145               | .758       |
| Motivates                 | .341   | .358                | .931       |
| Helps analytical thinking | .341   | 2.093               | 1.286      |
| (Constant)                | -8.876 | 7.021               | --         |

Using only the significant COWS scale predictor (i.e., Worry disrupts performance), a direct logistic regression analysis was performed with ADIS-IV defined groups of Non-GAD versus GAD only as the criterion. A test of this model against a

constant-only model resulted in a high likelihood that the predictor significantly contributed,  $\chi^2(1, N = 44) = 20.314, p < .001$ . This indicates that the COWS Worry disrupts performance scale reliably distinguished between GAD only and non-GAD as defined via ADIS-IV administration. The Hosmer-Lemeshow goodness of fit test was not significant,  $\chi^2(8, N = 44) = 4.317, p = .827$ , indicating that the model reproduced the test correctly. The overall classification success rate was 79.5%; 88.9% of non-GAD cases and 64.7% of GAD only cases were classified correctly. The predictor, the COWS scale for worry disrupting performance, reliably predicted GAD only versus Non-GAD as defined by the ADIS-IV,  $z = 11.765, p < .01$ . The constant was  $-5.477$  and the beta coefficient for the predictor was  $.282$ . The odds ratio for the COWS scale Worry disrupts performance was  $1.326$ . Thus, the odds of an individual being diagnosed with GAD via the ADIS-IV increases 33% with a one-unit increase in the COWS scale Worry disrupts performance.

#### Summary of the Relationship Between Meta-Worry and GAD Assessment Methods

This final section provides a summary of the major results. Presented for ease of qualitative comparison, Table 18 provides a summary of the significant COWS scale predictors for each of the GAD assessment methods. Also, for the self-report methods the sensitivity, specificity, and overall predictive power in relation to the ADIS-IV are provided. Significant COWS scale predictors are presented in order of strength.

Table 18. Summary of Regression Analyses with Each of the Eight Instruments for Diagnosing GAD

| Outcome Variable              | Significant COWS Scale Predictor(s) | Sensitivity | Specificity | Overall Predictive Power |
|-------------------------------|-------------------------------------|-------------|-------------|--------------------------|
| GADQ Dichotomous              | DP                                  | 0.614       | 1.000       | 0.667                    |
| GADQ Continuous cutoff        | EP                                  | 0.800       | 0.731       | 0.765                    |
| GADQ Sum total cutoff         | EP & DP                             | 0.774       | 0.833       | 0.765                    |
| GADQ Continuous score         | EP & DP                             | 0.710       | 0.750       | 0.725                    |
| GADQ Sum total response score | EP & DP                             | 0.733       | 0.762       | 0.745                    |
| PSWQ Cutoff of 62             | EP & HAT                            | 0.625       | 0.818       | 0.667                    |
| PSWQ Continuous score         | EP & HAT                            | 0.731       | 0.680       | 0.706                    |
| ADIS-IV Interview             | DP                                  | --          | --          | --                       |

Note. DP = COWS Disrupts performance scale, EP = COWS Exaggerates a problem scale, CED = COWS Causes emotional distress scale, MOT = COWS Motivates scale, and HAT = COWS Helps analytical thinking scale.

#### IV. DISCUSSION

The Consequences of Worrying Scale (COWS; Davey et al., 1996) assesses five beliefs about worry: problem exaggeration, performance disruption, emotional distress, motivation, and assistance with analytical thinking. These five worry beliefs were examined as predictors of pathological worry using the GAD-Q-IV (Newman et al., 2002), as predictors of excessive worry using the PSWQ (Meyer et al., 1990), and as predictors of a diagnosis of GAD using a semi-structured interview, the ADIS-IV (Brown et al., 1994). Worry beliefs were shown to be differentially related to pathological worry, excessive worry, and GAD. Three of the five worry beliefs (i.e., worry exaggerates a problem, worry disrupts performance, and worry helps analytical thinking) predicted GAD pathology, though the results differed based on the instrument and scoring method that was used as the criterion. Two of the beliefs (i.e., worry causes emotional distress and worry motivates) did not predict GAD pathology, i.e., they were non-specific to pathological worry, excessive worry, or a diagnosis of GAD. Only the belief that worry disrupts performance predicted an ADIS-IV diagnosis of GAD. This result was concordant with the self-report measure that was most specific to a diagnosis of GAD, i.e., the GAD-Q-IV.

## Meta-Worry & Pathological Worry

### *Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV)*

The GAD-Q-IV (Newman et al., 2002), a self-report instrument based upon DSM-IV criteria for GAD, was used to assess pathological worry. Each of the five accepted scoring methods for the GAD-Q-IV was used as a criterion in predicting meta-worry. Positive beliefs that worry motivates and worry helps analytical thinking did not predict pathological worry as measured by any of the five means of scoring the GAD-Q-IV. The finding that those two positive COWS beliefs did not predict pathological worry was consistent with Wells' (2004) metacognitive theory of GAD, which posits that beliefs about the positive effects of worry are associated with normative task-oriented worry. Positive beliefs are theorized to be necessary, but insufficient, in the development and maintenance of GAD. In other words, beliefs about the benefits of worry are considered to be normative correlates of worry behavior.

One of the three negative beliefs, worry causes emotional distress, did not predict pathological worry versus non-pathological worry for any of the criteria used in this study. An explanation for the non-specific association between worry and the belief that worry causes emotional distress is that worry may cause emotional distress even in the absence of impairment or the pervasive use of worry as a coping strategy. As theorized by Borkovec and colleagues (see Borkovec et al., 2004; Borkovec & Roemer, 1995), worry may not cause functional impairment until an individual becomes overly reliant upon worry as an avoidant coping strategy. As such, non-pathological worriers likely have many other means of coping, whereas pathological worriers rely heavily upon



worry. Furthermore, Mennin and colleagues (2005) have shown that individuals with GAD lack emotion regulation skills. Possibly, the emotional distress that is caused by worry does not lead to functional impairment. Rather, avoidance of affective experience and associated functional disruption from the pervasive use of worry might lead to maladaptation and pathology.

Two of the three negative beliefs, performance disruption and problem exaggeration, predicted pathological worry as measured by the GAD-Q-IV. Recall that five methods of scoring the GAD-Q-IV were used as criterion variables. The three dichotomous methods were dichotomous scoring, continuous cutoff scoring, and sum total response cutoff scoring. The two continuous methods included sum total response scoring and continuous scoring. For three of the five scoring methods (i.e., sum total cutoff, continuous, and sum total continuous), the negative belief that worry exaggerates problems was the strongest predictor and the negative belief that worry disrupts performance was the second strongest predictor. Using dichotomous scoring and continuous cutoff scoring, only one of the beliefs was a significant predictor of pathological worry. The belief that worry exaggerates problems was the only significant predictor when continuous cutoff scoring of the GAD-Q-IV was used. With dichotomous scoring of the GAD-Q-IV, only the belief that worry disrupts performance significantly predicted pathological worry.

A review of the composition of the GAD-Q-IV and some of the scoring methods might elucidate reasons why predictive beliefs differed based on the scoring method. With the continuous cutoff scoring method, a continuous score above the cutoff of 5.7

could be achieved in the absence of physical symptoms, distress, or interference, provided that an individual listed multiple worry topics. For instance, an individual who listed six worry topics though responded negatively to all other items on the questionnaire would score above the cutoff. For another example, an individual who endorsed excessive and uncontrollable worry and four worry topics would score above the cutoff. Thus, a continuous GAD-Q-IV score above the cutoff could reflect the generation of multiple worry topics and/or reporting of excessive worry in the absence of other pathological indicators. With sum total cutoff scoring, a pathological worrier categorization based predominantly on the number of worry topics and endorsement of excessive worry is less likely to occur due to the number of worry topics being weighted. Specifically, the maximum number of points assigned to worry topics was two when using sum total response scoring, whereas the maximum was six with continuous scoring. Dichotomous GAD-Q-IV scoring was the most stringent means of categorizing pathological worry in that it required that the participant positively endorse all criteria for GAD. For example, an individual who is categorized as a pathological worrier via dichotomous GAD-Q-IV scoring would have endorsed excessive worry and uncontrollable worry during the past six months, listed three or more worry topics, endorsed three or more physical symptoms, and endorsed a moderate or higher degree of distress or interference. Thus, an individual categorized as a pathological worrier using the dichotomous GAD-Q-IV scoring as a criterion would have endorsed the full range of pathological indicators (i.e., diagnostic criteria) for GAD.

In summary, beliefs about problem exaggeration and performance disruption predicted pathological worry as measured by the GAD-Q-IV. Only the belief that worry disrupts performance predicted pathological worry based on the more rigidly-defined dichotomous GAD-Q-IV scoring, and only the belief that worry exaggerates a problem predicted pathological worry based on the less precisely defined GAD-Q-IV continuous cutoff scoring. The items in the problem exaggeration COWS scale are strongly tied to the concept of catastrophic thinking in GAD, where thought content is that of the worst-case scenario (see Brown et al., 2001). Items in the performance disruption COWS scale are tied to functional impairment in that the individual is less effective in performing daily tasks and in focusing on more important, immediate concerns. With these concepts in mind, the findings that beliefs about problem exaggeration and performance disruption predict pathological worry suggests that pathological worry differs from non-pathological worry to the extent that individuals view their worry as catastrophic and causing functional impairment. The current findings indicate that pathological worriers recognize problem exaggeration and performance disruption as negative consequences of their worry behavior, whereas non-pathological worriers either do not experience or do not recognize a significant degree of catastrophic thinking or functional interference as a result of their worry.

#### *Penn State Worry Questionnaire (PSWQ)*

The PSWQ (Meyer et al., 1990) assesses the intensity and excessiveness of worry, but does not directly assess other aspects of GAD as defined by the DSM-IV (APA, 2000). In further discussions of the PSWQ as a criterion, the term excessive worry will

be used to more accurately reflect this specificity and to differentiate it from pathological worry as measured by the GAD-Q-IV. Two methods were used in scoring the PSWQ. Continuous PSWQ scores were used as a criterion. Also, a recommended cutoff score of 62 (Behar et al., 2003) was applied to the continuous scores in order to categorize the participants as excessive worriers versus non-excessive worriers. Beliefs that worry exaggerates problems and helps analytical thinking predicted excessive worry. These two worry beliefs predicted excessive worry as measured by both continuous and dichotomous PSWQ scoring. Problem exaggeration was the strongest predictor and analytical assistance was the second strongest predictor.

The belief that worry exaggerates problems predicted both excessive worry (i.e., PSWQ criterion) and pathological worry (i.e., GAD-Q-IV criterion). As discussed earlier, many of the items in the problem exaggeration scale reflect the concept of catastrophic thinking, specifically that worry contributes to catastrophizing problems, or pessimistically thinking that the worst will happen (see Brown et al., 2001). The belief that worry helps analytical thinking predicted PSWQ-defined excessive worry, but not GAD-Q-IV-defined pathological worry. This suggests that the belief that worry helps one to analyze situations and consider alternatives might be specific to excessive worry and might even be a precursor to the development of GAD as theorized by Wells (2004). In his metacognitive theory of GAD, Wells posits that beliefs about the benefits of worry are normative and are associated with task-oriented worry. Worry becomes pathological as individuals worry about the negative consequences of their worry, which leads to negative self-evaluation and unsuccessful attempts to control their worry. Moreover,

Wells and Carter (2001) found that GAD is associated with beliefs that worry has catastrophic and dangerous consequences. The prediction of excessive worry by the belief that worry exaggerates problems was consistent with this theory and these research findings. The current finding that believing that worry exaggerates problems and helps analytical thinking predicted excessive worry suggest that excessive worriers recognize both benefits and consequences of their worry. This finding suggests that despite recognition that worry has negative consequences, excessive worriers rely upon worry as a coping strategy possibly because they lack available alternative coping mechanisms (Borkovec et al., 2004) or lack self-efficacy (Bandura, 1977) to utilize alternatives. Furthermore, worry is thought to be negatively reinforced by the absence of feared negative outcomes (Barlow, 2002; Borkovec et al., 2004; Borkovec & Roemer, 1995). Catastrophic thinking as measured by the COWS problem exaggeration scale might serve to maintain negative reinforcement by consideration of potential negative outcomes, the absence of which negatively reinforces worry.

#### Criterion-Related Diagnostic Validity of the Self-Report Methods

Criterion-related validity of the self-report methods in diagnosing GAD was examined using a clinician-administered semi-structured interview, the ADIS-IV (Brown et al., 1994). The five GAD-Q-IV scoring methods (i.e., dichotomous, continuous cutoff, sum total response cutoff, continuous, and sum total response) and the two PSWQ scoring methods (i.e., continuous and continuous cutoff) were used as predictors and ADIS-IV-defined diagnostic groups (i.e., GAD vs. Non-GAD) were used as the criterion. The highest overall predictive power (.765) was achieved with continuous cutoff and sum

total response cutoff scoring of the GAD-Q-IV, which involved applying a cutoff of 5.7 to the continuous and sum total response GAD-Q-IV scores. Of note, these two predictors were expected, in part, to yield the highest overall predictive power because selection for part two of this study was based on this cutoff, i.e., participants were invited if their continuous GAD-Q-IV scores were between 0 and 2 or were greater than or equal to six. Nonetheless, a similar methodology was used successfully by Newman and colleagues (2002) in examining the criterion-related validity of the GAD-Q-IV in relation to diagnosing GAD via the ADIS-IV interview.

With ADIS-IV diagnostic groups as the criterion, dichotomous scoring of the GAD-Q-IV resulted in the highest specificity, continuous cutoff scoring of the GAD-Q-IV resulted in the highest sensitivity, and sum total response scoring of the GAD-Q-IV resulted in the best balance between sensitivity and specificity. Dichotomous scoring of the GAD-Q-IV was most specific to a diagnosis of GAD (i.e., specificity of 1.00). There were no false positives with dichotomous scoring of the GAD-Q-IV, however there was a very high rate of false negatives (71%). The highest level of sensitivity (.800) was shown via continuous scoring of the GAD-Q-IV. Specificity with this method was 73%. Sum total cutoff scoring of the GAD-Q-IV showed the best overall predictive power (.765) and specificity of .833, which was second only to dichotomous scoring of the GAD-Q-IV. Of note, the recommended cutoff score of 5.7 used in sum total cutoff scoring of the GAD-Q-IV was originally determined via receiver operator curve analysis to achieve the best balance between specificity and sensitivity (Newman et al., 2002). Continuous cutoff scoring of the GAD-Q-IV showed the highest level of sensitivity (.800) and overall

predictive power of .765, which was equivalent to that achieved by sum total response cutoff scoring. The difference was that sum total cutoff scoring was more specific and continuous cutoff scoring of the GAD-Q-IV was more sensitive. The PSWQ was not as strong of a predictor in comparison to the GAD-Q-IV. The overall predictive power of the PSWQ was 70.6% with continuous scoring and 66.7% with continuous cutoff scoring.

In summary, if one's goal is to maximize confidence that individuals meet criteria for GAD, dichotomous scoring of the GAD-Q-IV is recommended, whereas continuous cutoff scoring of the GAD-Q-IV would achieve the lowest rate of false negatives. Provided a balance between specificity and sensitivity is desired, then continuous cutoff scoring or sum total cutoff scoring of the GAD-Q-IV are recommended. Sum total cutoff scoring provides greater specificity and continuous cutoff scoring provides greater sensitivity.

#### Meta-Worry & GAD

In phase two of this study, selected participants were administered a semi-structured interview, the ADIS-IV (Brown et al., 1994), and categorized as GAD or Non-GAD. With GAD and Non-GAD diagnostic groups as the criterion, only the belief that worry disrupts performance significantly predicted group-assignment. The odds ratio for the performance disruption scale was 34%. Results were similar when participants with comorbid major depressive disorder were removed from the GAD group. Comparing Non-GAD to GAD-only, i.e., removing participants with secondary MDD, the odds ratio for the disrupts performance scale was 41%. The odds ratio was slightly higher when

comparing Non-GAD to GAD-only than when the GAD group included individuals with secondary MDD.

In summary, the belief that worry disrupts performance predicted a diagnosis of GAD with or without comorbid MDD. Given that the belief that worry disrupts performance did not predict PSWQ scores, this finding suggests that the belief about performance disruption is not strictly a function of the excessiveness or intensity of worry. This suggests in turn that worry might not become disruptive until it is perceived as uncontrollable or as causing functional impairment. The current results support Ruscio and colleagues' (2002; 2005) findings that excessive worry does not have a direct relationship with distress and impairment in either college students or the general population. Many college students denied experiencing significant distress and impairment although they reported worrying excessively and uncontrollably (Ruscio, 2002). Moreover, data from the NCS-R study indicate that some individuals in the general population experience significant distress and impairment related to "non-excessive" worry (Ruscio et al., 2005). These individuals with "non-excessive" worry met all DSM-IV criteria for GAD except for excessiveness of worry.

#### Summary and Implications of Findings

Meta-worry beliefs predicted different aspects of GAD. Significant meta-worry predictors differed based on the features of GAD that were emphasized by the criterional assessment measures (i.e., the PSWQ, the GAD-Q-IV, and the ADIS-IV). Excessive worriers, as defined by the PSWQ, significantly differed from non-excessive worriers based on beliefs that worry exaggerates problems and helps them to think analytically.



Pathological worriers, as defined by the GAD-Q-IV, differed from non-pathological worriers based on beliefs that worry disrupts performance and exaggerates problems. Only the disrupts performance scale was a significant predictor when the GAD-Q-IV was scored to most strictly adhere to DSM-IV criteria, thereby encompassing the full range of GAD symptomatology. The belief about worry disrupting performance predicted a diagnosis of GAD via structured interview and via the GAD-Q-IV. The robust nature of this finding was also indicated by the performance disruption belief predicting a diagnosis of GAD whether or not it was comorbid with MDD.

Targeting the belief about performance disruption in cognitive behavioral therapy for GAD (see Brown et al., 2001; Leahy, 2004) might serve to increase motivation and serve as a guide to help in explicating more effective ways to enhance performance and cope with problems. Cognitive behavioral therapy has been shown to effectively treat GAD, though it is only successful in roughly 50% of cases, a rate lower than that with other anxiety disorders (Brown et al., 2001; Gould et al., 2004; Orsillo et al., 2003; Rygh & Sanderson, 2004). This suggests that relaxation and targeting of irrational thinking may be insufficient for many individuals with GAD. In order to improve the effectiveness of cognitive behavioral therapy for GAD, experiential (Borkovec et al., 2003; Orsillo et al., 2003), interpersonal skills training (Borkovec et al., 2003), emotional processing (Borkovec et al., 2003; Mennin et al., 2002), and mindfulness (Orsillo et al., 2003) components are being integrated with the standard relaxation, decatastrophizing, and probability estimation components (see also Newman, Castonguay, Borkovec, & Molnar, 2004; Rygh & Sanderson, 2004). Central to these new treatment components is

Borkovec and colleagues' conception of experiential avoidance in GAD (2004). Examples of experiential techniques designed to evoke emotions and increase emotional processing include the empty chair technique, narrative construction, and letter writing (Newman et al., 2004; Rygh & Sanderson, 2004). These techniques provide healthier, non-avoidant coping strategies and improve self-efficacy through approaching interpersonal conflict and other distressing situations gradually (i.e., in session and out of session). Mindfulness training provides individuals with skills to cope with distress, and specifically, to be in the present moment as opposed to being oriented toward futuristic, catastrophic thinking (Borkovec et al., 2004; Orsillo et al., 2003). In keeping with Prochaska and DiClemente's stages of change (1982, 2005), targeting an individual's belief that worry disrupts performance and educating him or her about these alternative coping strategies might serve to increase motivation to change and engage in these new treatment components.

The present results showed that beliefs about problem exaggeration and enhancement of analytical thinking did not predict excessiveness of worry. Notably, this is a questionable diagnostic criterion given that is not a requirement for diagnosis in the ICD-10 (World Health Organization; 1992) and some research suggests that many individuals experience significant worry-related functional impairment in the absence of "excessive" worry (Ruscio et al., 2005). With this caveat in mind, the finding that beliefs about problem exaggeration and enhancement of analytical thinking predicted excessive worry, but not a diagnosis of GAD, suggest there might be a subgroup of individuals with GAD who are "excessive worriers." Excessive worriers might experience tension in

holding discordant beliefs that worry leads to catastrophic thinking and enhances their ability to analyze potential solutions and consequences. Experiential therapeutic techniques (see Borkovec et al., 2003; Newman et al., 2004; Orsillo et al., 2003), such as using the empty chair technique to imaginably confront a family member or coworker within the session, might also be relevant to this subgroup given the discordant beliefs that worry helps analytical thinking, but also exaggerates problems. Furthermore, the cognitive nature of worry, and possibly meta-worry, serves to reinforce affect avoidance (Borkovec et al., 2004). Although worry content was not addressed in this study, the focus of worry in GAD is often interpersonal relationships, particularly issues of confrontation, competence, acceptance, and concern about others (Brietholtz et al., 1999). Experiential techniques might provide the individual with a means of testing their worry beliefs and might assist them in developing affect tolerance and improved self-efficacy in interpersonal situations within the safety of the therapy session and later directly outside of the session.

Nonspecific beliefs included worry motivates behavior and worry causes emotional distress, i.e., these beliefs did not predict excessive worry as measured by the PSWQ, pathological worry as measured by the GAD-Q-IV, or a diagnosis of GAD as assessed by the ADIS-IV. Not only was the belief that worry has a motivational effect not specific to pathological indicators, but also there were no significant differences between diagnostic groups with respect to the motivational effects of worry. These findings are consistent with Wells' (2004) conception of task-oriented worry as a normative behavior. The finding that both Non-GAD and GAD participants recognized

distress caused by worry indicates that distress that is directly related to worry might also be normative. The nonspecific nature of the belief about worry causing emotional distress also suggests that the low rate of mental health treatment-seeking of individuals with GAD (Roth & Eng, 2002) is not necessarily a function of a failure to recognize distress associated with worry.

### Limitations and Qualifiers

Several limitations are evident in this study: multicollinearity among measures, lack of uniformity in measurement, potentially weak external validity vis a vis clinic samples, and restricted range of possible beliefs. Multicollinearity affected the results of phase one and phase two of this study. In both the first and second phases, the three negative COWS scales were strongly and significantly correlated with each other and the two positive COWS scales were moderately and significantly correlated with each other. These correlations affected the amount of variance that each scale could explain when added to the others.

Another consideration is that the maximum scale-range for each of the COWS scales was not uniform. For instance, the causes emotional distress scale had only four items, whereas the disrupts performance scale had eight items. The other scales had five to six items providing a maximum range of 25 to 30. These scale range differences might have affected the results in that the variability between groups was lower for some of the scales. Of note, the strongest predictor, the belief that worry exaggerates problems, had the largest range.

The generalizability of these findings to community and clinical samples is limited due to this study being conducted with an undergraduate sample. However, it should be noted that the majority of individuals with GAD do not present to mental health professionals (Roth & Eng, 2002; Wang et al., 2005). Therefore this sample differs from the community in terms of age and education, not in clinical status, i.e., not seeking treatment. Individuals in this study who were diagnosed with GAD would be considered to have early onset GAD, which is predictive of greater symptom severity later in life (Campbell et al., 2003).

The meta-worry beliefs examined in this study were not exhaustive. For example, negative beliefs that worry is uncontrollable or is a dangerous process were not directly assessed in this study. These beliefs have been shown to be highly predictive of GAD versus non-GAD and other anxiety disorders (Wells, 2005; Wells & Carter, 2001). Additionally, the positive belief that worry distracts from more emotional topics was not assessed. While individuals with GAD have reported this belief, a scale has not been developed to directly measure it. Two questions follow from the belief that worry distracts from more emotional topics. One, what are the more distressing topics and two, why are they avoided? With respect to the content of the more emotional topics, researchers at Temple University are approaching this area of study with an emphasis on emotion regulation (Novick-Kline et al., 2005; Mennin et al., 2005; Turk et al., 2005). In effect, emotional skill deficits involved in GAD are being examined as a means of developing increasingly targeted treatment strategies. This line of research ties in with

Borkovec and colleagues' avoidance theory of worry (2004) and provides a guide for skill development and experiential work with these clients.

### Future Research

Meta-worry is present in most theories about the development and maintenance of worry (Barlow, 2002; Borkovec et al., 2004; Borkovec & Roemer, 1995; Dugas et al., 2005; Wells, 2004). Understandably, different groups of researchers have emphasized only some of the possible beliefs in developing assessment tools (Dugas et al., 1998; Freeston et al., 1994; Mennin et al., 2005; Roemer et al., 2005; Turk, Heimberg, & Mennin, 2004; Wells, 2005) and treatment approaches (Borkovec et al., 2003; Dugas et al., 2005; Mennin et al., 2002; Newman et al., 2004; Orsillo et al., 2003; Rygh & Sanderson, 2004). Future research in this area might include a more exhaustive study of the contents of meta-worry beliefs and study within community and clinical samples. Given that individuals diagnosed with GAD in this study were not seeking treatment, it is possible that treatment-seeking individuals may differ from non-treatment-seeking individuals with respect to their beliefs about the consequences of worry and these beliefs may have a role in treatment-seeking behavior.

Inquiry into relations between emotion regulation and meta-worry might also be informative regarding the maintenance and development of worry and assist in tying the major theories together – Borkovec and colleagues' avoidance theory (2004), Well's metacognitive model (2004), and Mennin and colleagues' emotion regulation theory (2002, 2004, 2005). Briefly stated, these theories might coalesce as follows: individuals lacking in emotion regulation skills are more susceptible to their worry being negatively

reinforced by the absence of feared outcomes and the absence of more intense negative affect. Normatively, worry is associated with positive beliefs about its effectiveness. These individuals might become overly reliant on this coping mechanism and become increasingly avoidant of emotion. They recognize the negative consequences of worry, but this recognition serves to increase catastrophizing and meta-worry, thereby further undermining their self-efficacy. The resultant low sense of self-efficacy might reduce their willingness to attempt alternative means of coping. Optimally, a longitudinal approach would be used to test this theoretical integration, but other research approaches could be fruitful. For instance, a research approach that presents worrisome situations, then compares approach/avoidance behaviors of individuals with and without GAD, and concurrently measures cognitive strategies, emotional regulation efforts, and meta-worry, might provide meaningful information regarding the behavioral and cognitive processes associated with pathological worry.

### Summary

The present study contributes to the literature in several ways. One, this sample was significantly larger than the original COWS validation sample, thereby increasing confidence in the extension of the present findings that worry beliefs are associated with pathological worry. Two, this was the first use of the COWS with a sample administered a clinical interview. Thus, provisional statements can be made not only about pathological worry, but also about GAD. Finally, this study showed that particular meta-worries, as assessed by the COWS, were differentially associated with pathological features of GAD. Beliefs that worry exaggerates problems and helps analytical thinking

were specific to individual's endorsements that their worry was intense and excessive. The belief that worry disrupts performance by negatively affecting concentration, by shifting focus to less important matters, and by contributing to irrational thoughts, predicted a diagnosis of GAD via self-report and clinician-administered diagnostic interviews. Motivational effects of worry were non-specific, i.e., associated with both normative and pathological worry. Beliefs about the distressing effects of worry also did not predict pathology, indicating that recognition of distress might not be a meaningful diagnostic criterion for GAD pathology.



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## APPENDICES



APPENDIX A  
INFORMED CONSENT DOCUMENTS

## INFORMED CONSENT

### EVALUATING PHYSIOLOGICAL RESPONDING DURING WORRY AND COGNITIVE RESTRUCTURING

You are invited to participate in a study of nervous system activity in generalized anxiety disorder (GAD) to be conducted by Jacey Hammel, psychology graduate student, under the supervision of Dr. F. Dudley McGlynn, professor of psychology. We hope to learn about the physical effects of worry. You were recruited as a possible participant because you expressed interest as an Auburn University undergraduate student.

If you decide to participate, first sign this informed consent and complete the medical questionnaire, and return the forms to the research assistant. Then complete three additional questionnaires that you will receive from the research assistant. Be sure to include your name and phone number or e-mail address on the information sheet so we can contact you if you qualify for the rest of the study. Please do not include your name on any other documents. Completion of this packet should take approximately 15-30 minutes. Depending on your responses on these questionnaires, you may or may not be asked to participate in an additional phase of the study. If you do not qualify, you will not be contacted. If you do qualify you will be contacted and invited to participate in the second phase of the study. Regardless of whether or not you qualify for the second phase of the study, you will receive an extra credit voucher for one hour of research participation upon turning in the completed questionnaires to the research assistant.

The second phase of the study, which will last approximately one hour, will include an interview with a psychology graduate student followed by worry exposure. During the interview, a psychology graduate student will ask you about anxiety, worry, and related experiences. Subsequently, you will be asked to focus on something you are worried about. Then you will be given instructions on how to challenge your worry. During the exposure, we will record your heart rate, breathing rate, and some minute electrical events on the surface of your skin. You will also be asked to return one week later and complete three of the previously administered questionnaires. You may also opt to complete these questionnaires over the phone, at which time a graduate student, who is part of the research team, will contact you and ask you to respond to fifty questions. These questionnaires will take approximately 5-10 minutes. Depending upon the assigned level of participation, total time involved in this study is between 15 minutes and 2 hours, including completion of the questionnaires in the screening and one week after the exposure.

Because you will be asked to discuss your anxiety and to think about and challenge your worries, you may experience some distress. If at any time you feel you need to take a break or discontinue participation you may. You will not be penalized for withdrawing from the study if you desire to do so, and you will receive extra credit for your participation. If you need immediate attention at any time during your participation in the study, Dr. Frank Weathers, a licensed clinical psychologist, will be contacted immediately. You will be provided a list of phone numbers of counselors and mental health agencies to call if you would like to talk to someone, at your own expense, about anything that might come up for you during the study.

Participant's Initials \_\_\_\_\_

Page 1 of 2

The direct benefit to you, the participant, is up to 3 hours of research participation, which earns extra credit in many psychology classes. You will receive one hour of extra credit for completing the screening packet. For participation in the second phase of the study, you will receive 2 hours of extra credit, though the time invested will be about 1 hour and 15 minutes. If you withdraw from the study during the second phase you will receive extra credit relative to your amount of participation, not to be less than one hour of extra credit. The course instructor will determine the amount of extra credit received per hour of research participation. Some participants who complete the study may experience some worry reduction as a result of this experience. We cannot promise that you will receive any or all of the benefits described. Your participation may benefit the public by contributing to knowledge of nervous system functioning during worry and the benefits of interventions.

Any information obtained in connection with this study that can be identified as belonging to you will remain strictly confidential. However, should you disclose information that you are dangerous to yourself or others, we are required to take appropriate action to ensure your safety and the safety of others. In the event of such a disclosure including an intention or a plan to harm yourself or others, Dr. Frank Weathers, a licensed clinical psychologist in Alabama, will be contacted immediately for assessment and appropriate actions taken to ensure your safety and the safety of others. If you decide to withdraw at some point in the study, you may withdraw any data that has been collected about you as long as it is identifiable. Your name and any other identifying information will not be associated with the data collected. Once you decide to participate you will be assigned a code number. All data collected will be associated with this code number. The master code list will be kept in a locked filing cabinet separate from the data. The master code list will be destroyed after data analysis is complete. This informed consent will be destroyed after three years.

Your decision whether or not to participate will not jeopardize your relationship with Auburn University or the Department of Psychology. If you have any questions, you may contact Ms. Hammel at (334) 844-4932 ([hammejc@auburn.edu](mailto:hammejc@auburn.edu)) or Dr. McGlynn at (334) 844-6472 ([mcglyfd@auburn.edu](mailto:mcglyfd@auburn.edu)) and we will be happy to answer them. You will be provided a copy of this form to keep.

For more information regarding your rights as a research participant you may contact the Office of Human Subjects Research by phone or email. The people to contact there are Mr. Chip Burson, Executive Director at (334) 844-5966 ([bursoen@auburn.edu](mailto:bursoen@auburn.edu)) or Dr. Peter Grandjean at (334) 844-6499 ([grandpw@auburn.edu](mailto:grandpw@auburn.edu)).

HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

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| Participant Signature | Date | Investigator Signature | Date |
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## PARENTAL INFORMED CONSENT -Daughter

### Evaluating Physiological Responding During Worry Exposure and Cognitive Restructuring

Your daughter is invited to participate in a study of nervous system activity in generalized anxiety disorder (GAD) to be conducted by Jacey Hammel, psychology graduate student, under the supervision of Dr. F. Dudley McGlynn, professor of psychology. We hope to learn about the physical effects of worry. Your daughter was recruited as a possible participant because she expressed interest as an Auburn University undergraduate student.

If you decide to allow your daughter to participate, first sign this informed consent, you must sign and return this informed consent in the envelope provided. Your daughter will then fill out the rest of this packet and return it to 226 Thach Hall. Your daughter will be asked include her name and phone number or e-mail address on the information sheet so we can contact her if she qualifies for the rest of the study. We request that she does not include her name on any other documents. Completion of the screening packet should take approximately 15-30 minutes. Depending on your daughter's responses on these questionnaires, she may or may not be asked to participate in an additional phase of the study. If she does not qualify, she will not be contacted. If she does qualify she will be contacted and invited to participate in the second phase of the study. Regardless of whether or not your daughter qualifies for the second phase of the study, she will receive an extra credit voucher for one hour of research participation upon turning in the completed questionnaires to the research assistant.

The second phase of the study, which will last approximately one hour, will include an interview with a psychology graduate student followed by worry exposure. During the interview, a psychology graduate student will ask your daughter about anxiety, worry, and related experiences. Subsequently, your daughter will be asked to focus on something she is worried about. Then she will be given instructions on how to challenge her worry. During the exposure, we will record your daughter's heart rate, breathing rate, and some minute electrical events on the surface of her skin. She will also be asked to return one week later and complete three of the previously administered questionnaires. Your daughter may also opt to complete these questionnaires over the phone, at which time a graduate student, who is part of the research team, will contact her and ask her to respond to fifty questions. These questionnaires will take approximately 5-10 minutes. Depending upon the assigned level of participation, total time involved in this study is between 15 minutes and 2 hours, including completion of the questionnaires in the screening and one week after the exposure.

Because your daughter will be asked to discuss your anxiety and to think about and challenge your worries, she may experience some distress. If at any time your daughter feels she needs to take a break or discontinue participation she may. Your daughter will not be penalized for withdrawing from the study if she desires to do so, and she will receive extra credit for her participation. If your daughter needs immediate attention at any time during her participation in the study, Dr. Frank Weathers, a licensed clinical psychologist, will be contacted immediately. Your daughter will be provided a list of phone numbers of counselors and mental health agencies to call if she would like to talk to someone, at her own expense, about anything that might come up for her during the study.

The direct benefit to your daughter, the participant, is up to 3 hours of research participation, which earns extra credit in many psychology classes. Your daughter will receive one hour of extra credit for completing the screening packet. For participation in the second phase of the study, your daughter will receive 2 hours of extra credit, though the time invested will be about 1 hour and 15 minutes. If your daughter withdraws from the study during the second phase she will receive extra credit relative to her amount of participation, not to be less than one hour of extra credit. The course instructor will determine the amount of extra credit received per hour of research participation. Some participants who complete the study may experience some worry reduction as a result of this experience. We cannot promise that your daughter will receive any or all of the benefits described. Your daughter's participation may benefit the public by contributing to knowledge of nervous system functioning during worry and the benefits of interventions.

Parent's Initials \_\_\_\_\_

Page 1 of 2

Any information obtained in connection with this study that can be identified as belonging to your daughter will remain strictly confidential. However, should your daughter disclose information that she is dangerous to herself or others, we are required to take appropriate action to ensure her safety and the safety of others. In the event of such a disclosure including an intention or a plan to harm herself or others, Dr. Frank Weathers, a licensed clinical psychologist in Alabama, will be contacted immediately for assessment and appropriate actions taken to ensure her safety and the safety of others. If your daughter decides to withdraw at some point in the study, she may withdraw any data that has been collected about her as long as it is identifiable. Your daughter's name and any other identifying information will not be associated with the data collected. Once your daughter decides to participate she will be assigned a code number. All data collected will be associated with this code number. The master code list will be kept in a locked filing cabinet separate from the data. The master code list will be destroyed after data analysis is complete. This informed consent will be destroyed after three years.

Your decision whether or not to allow your daughter to participate will not jeopardize her relationship with Auburn University or the Department of Psychology. If you or your daughter have any questions, please contact Ms. Hammel at (334) 844-4932 (hammejc@auburn.edu) or Dr. McGlynn at (334) 844-6472 (mcglyfd@auburn.edu) and we will be happy to answer them. Your daughter will be provided a copy of this form to keep.

For more information regarding your daughter's rights as a research participant you may contact the Office of Human Subjects Research by phone or email. The people to contact there are Mr. Chip Burson, Executive Director at (334) 844-5966 (bursoen@auburn.edu) or Dr. Peter Grandjean at (334) 844-1462 (grandpw@auburn.edu).  
HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO ALLOW YOUR DAUGHTER TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO ALLOW YOUR DAUGHTER TO PARTICIPATE.

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| Parent Signature | Date | Investigator Signature | Date |
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## PARENTAL INFORMED CONSENT – (Son)

### Evaluating Physiological Responding During Worry Exposure and Cognitive Restructuring

Your son is invited to participate in a study of nervous system activity in generalized anxiety disorder (GAD) to be conducted by Jacey Hammel, psychology graduate student, under the supervision of Dr. F. Dudley McGlynn, professor of psychology. We hope to learn about the physical effects of worry. Your son was recruited as a possible participant because he expressed interest as an Auburn University undergraduate student.

If you decide to allow your son to participate, first sign this informed consent, you must sign and return this informed consent in the envelope provided. Your son will then fill out the rest of this packet and return it to 226 Thach Hall. Your son will be asked include his name and phone number or e-mail address on the information sheet so we can contact him if he qualifies for the rest of the study. We request that he does not include his name on any other documents. Completion of the screening packet should take approximately 15-30 minutes. Depending on your son's responses on these questionnaires, he may or may not be asked to participate in an additional phase of the study. If he does not qualify, he will not be contacted. If he does qualify he will be contacted and invited to participate in the second phase of the study. Regardless of whether or not your son qualifies for the second phase of the study, he will receive an extra credit voucher for one hour of research participation upon turning in the completed questionnaires to the research assistant.

The second phase of the study, which will last approximately one hour, will include an interview with a psychology graduate student followed by worry exposure. During the interview, a psychology graduate student will ask your son about anxiety, worry, and related experiences. Subsequently, your son will be asked to focus on something he is worried about. Then he will be given instructions on how to challenge his worry. During the exposure, we will record your son's heart rate, breathing rate, and some minute electrical events on the surface of his skin. He will also be asked to return one week later and complete three of the previously administered questionnaires. Your son may also opt to complete these questionnaires over the phone, at which time a graduate student, who is part of the research team, will contact him and ask him to respond to fifty questions. These questionnaires will take approximately 5-10 minutes. Depending upon the assigned level of participation, total time involved in this study is between 15 minutes and 2 hours, including completion of the questionnaires in the screening and one week after the exposure.

Because your son will be asked to discuss your anxiety and to think about and challenge your worries, he may experience some distress. If at any time your son feels he needs to take a break or discontinue participation he may. Your son will not be penalized for withdrawing from the study if he desires to do so, and he will receive extra credit for his participation. If your son needs immediate attention at any time during his participation in the study, Dr. Frank Weathers, a licensed clinical psychologist, will be contacted immediately. Your son will be provided a list of phone numbers of counselors and mental health agencies to call if he would like to talk to someone, at his own expense, about anything that might come up for him during the study.

The direct benefit to your son, the participant, is up to 3 hours of research participation, which earns extra credit in many psychology classes. Your son will receive one hour of extra credit for completing the screening packet. For participation in the second phase of the study, your son will receive 2 hours of extra credit, though the time invested will be about 1 hour and 15 minutes. If your son withdraws from the study during the second phase he will receive extra credit relative to his amount of participation, not to be less than one hour of extra credit. The course instructor will determine the amount of extra credit received per hour of research participation. Some participants who complete the study may experience some worry reduction as a result of this experience. We cannot promise that your son will receive any or all of the benefits described. Your son's participation may benefit the public by contributing to knowledge of nervous system functioning during worry and the benefits of interventions.

Parent's Initials \_\_\_\_\_

Page 1 of 2

Any information obtained in connection with this study that can be identified as belonging to your son will remain strictly confidential. However, should your son disclose information that he is dangerous to himself or others, we are required to take appropriate action to ensure his safety and the safety of others. In the event of such a disclosure including an intention or a plan to harm herself or others, Dr. Frank Weathers, a licensed clinical psychologist in Alabama, will be contacted immediately for assessment and appropriate actions taken to ensure her safety and the safety of others. If your son decides to withdraw at some point in the study, he may withdraw any data that has been collected about him as long as it is identifiable. Your son's name and any other identifying information will not be associated with the data collected. Once your son decides to participate he will be assigned a code number. All data collected will be associated with this code number. The master code list will be kept in a locked filing cabinet separate from the data. The master code list will be destroyed after data analysis is complete. This informed consent will be destroyed after three years.

Your decision whether or not to allow your son to participate will not jeopardize his relationship with Auburn University or the Department of Psychology. If you or your son have any questions, please contact Ms. Hammel at (334) 844-4932 (hammejc@auburn.edu) or Dr. McGlynn at (334) 844-6472 (mcglyfd@auburn.edu) and we will be happy to answer them. Your son will be provided a copy of this form to keep.

For more information regarding your son's rights as a research participant you may contact the Office of Human Subjects Research by phone or email. The people to contact there are Mr. Chip Burson, Executive Director at (334) 844-5966 (bursoen@auburn.edu) or Dr. Peter Grandjean at (334) 844-1462 (grandpw@auburn.edu).  
HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO ALLOW YOUR SON TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO ALLOW YOUR SON TO PARTICIPATE.

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| Parent Signature | Date | Investigator Signature | Date |
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APPENDIX B  
QUESTIONNAIRES



## GAD-Q-IV

1. Do you experience excessive worry? Yes\_\_\_ No\_\_\_
2. Is your worry excessive in intensity, frequency, or amount of distress it causes? Yes\_\_\_ No\_\_\_
3. Do you find it difficult to control your worry (or stop worrying) once it starts? Yes\_\_\_ No\_\_\_
4. Do you worry excessively and uncontrollably about minor things such as being late for an appointment, minor repairs, homework, etc.?  
Yes\_\_\_ No\_\_\_

5. Please list the most frequent topics about which you worry excessively and uncontrollably:
- |          |          |
|----------|----------|
| a. _____ | d. _____ |
| b. _____ | e. _____ |
| c. _____ | f. _____ |

6. During the last six months, have you been bothered by excessive and uncontrollable worries more days than not? Yes\_\_\_ No\_\_\_

IF YES, CONTINUE. IF NO, SKIP REMAINING QUESTIONS.

7. During the past six months, have you often been bothered by any of the following symptoms? Place a check next to each symptom that you have had more days than not:

- |   |  |
|---|--|
| <input type="checkbox"/> Restlessness or feeling keyed up or on edge                      | <input type="checkbox"/> Irritability          |
| <input type="checkbox"/> Difficulty falling/staying asleep or restless/unsatisfying sleep | <input type="checkbox"/> Being easily fatigued |
| <input type="checkbox"/> Difficulty concentrating or mind going blank                     | <input type="checkbox"/> Muscle tension        |

8. How much do worry and physical symptoms interfere with your life, work, social activities, family, etc.?  
Circle one number:

|      |   |      |   |          |   |        |   |             |
|------|---|------|---|----------|---|--------|---|-------------|
| 0    | 1 | 2    | 3 | 4        | 5 | 6      | 7 | 8           |
| /    | / | /    | / | /        | / | /      | / | /           |
| None |   | Mild |   | Moderate |   | Severe |   | Very Severe |

9. How much are you bothered by worry and physical symptoms (how much distress does it cause you)?  
Circle one number:

|             |   |               |   |                   |   |                 |   |                      |
|-------------|---|---------------|---|-------------------|---|-----------------|---|----------------------|
| 0           | 1 | 2             | 3 | 4                 | 5 | 6               | 7 | 8                    |
| /           | / | /             | / | /                 | / | /               | / | /                    |
| No distress |   | Mild distress |   | Moderate distress |   | Severe distress |   | Very Severe Distress |

Reprinted in Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the Generalized Anxiety Disorder Questionnaire – IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*, 215-233.

## Penn State Worry Questionnaire (PSWQ)

Enter the number that best describes how typical or characteristic each item is of you, putting the number next to the item.

| 1                     | 2 | 3                   | 4 | 5               |
|-----------------------|---|---------------------|---|-----------------|
| Not at all<br>typical |   | Somewhat<br>typical |   | Very<br>typical |

- \_\_\_ 1. If I don't have enough time to do everything, I don't worry about it.
- \_\_\_ 2. My worries overwhelm me.
- \_\_\_ 3. I do not tend to worry about things.
- \_\_\_ 4. Many situations make me worry.
- \_\_\_ 5. I know I shouldn't worry about things, but I just cannot help it.
- \_\_\_ 6. When I am under pressure I worry a lot.
- \_\_\_ 7. I am always worrying about something.
- \_\_\_ 8. I find it easy to dismiss worrisome thoughts.
- \_\_\_ 9. As soon as I finish one task, I start to worry about everything else I have to do.
- \_\_\_ 10. I never worry about anything.
- \_\_\_ 11. When there is nothing more I can do about a concern, I don't worry about it anymore.
- \_\_\_ 12. I've been a worrier all my life.
- \_\_\_ 13. I notice that I have been worrying about things.
- \_\_\_ 14. Once I start worrying, I can't stop.
- \_\_\_ 15. I worry all the time.
- \_\_\_ 16. I worry about projects until they are done.

## Consequences of Worry (COWS)

Please indicate, by circling the appropriate number, how much you think each of the following statements describes YOU when you worry.

1 = Not at all

2 = A little

3 = Moderately

4 = Quite a bit

5 = A lot

1. Worrying distorts the problem I have and so I am unable to solve it.  
1      2      3      4      5
2. By worrying, I reorganize and plan my time better – if I stick to it, it makes me feel better.  
1      2      3      4      5
3. Worrying starts off a process of preparing me to meet new situations.  
1      2      3      4      5
4. Worrying makes me depressed and therefore makes it harder to concentrate and get on with things.  
1      2      3      4      5
5. When I worry, it stops me from taking decisive action.  
1      2      3      4      5
6. Worrying weakens me by affecting my levels of energy in response to those events that worry me.  
1      2      3      4      5
7. Worrying makes me tense and irritable.  
1      2      3      4      5
8. Worrying clarifies my thoughts and concentration.  
1      2      3      4      5
9. Worrying acts as a stimulant.  
1      2      3      4      5
10. Worrying causes me stress.  
1      2      3      4      5
11. Worrying stops me dealing with certain situations.  
1      2      3      4      5
12. Worrying makes me irrational.  
1      2      3      4      5
13. Worrying challenges and motivates me, without them I would not achieve much in life.  
1      2      3      4      5
14. Worrying gets me worked up.  
1      2      3      4      5
15. Deep down I know I do not need to worry that much, but I can't help it.  
1      2      3      4      5

- 1 = Not at all
- 2 = A little
- 3 = Moderately
- 4 = Quite a bit
- 5 = A lot

- 16. Worrying increases my anxiety and so decreases my performance.  
1      2      3      4      5
- 17. Worrying gives me the opportunity to analyze situations and work out the pros and cons.  
1      2      3      4      5
- 18. Problems are magnified when I dwell on them.  
1      2      3      4      5
- 19. Worrying increases my anxiety.  
1      2      3      4      5
- 20. Worrying stops me from thinking straight.  
1      2      3      4      5
- 21. Worrying allows me to work through the worst that can happen, so when it doesn't happen, things are better.  
1      2      3      4      5
- 22. Worrying makes me do things by increasing my adrenalin levels.  
1      2      3      4      5
- 23. Worry makes me focus on the wrong things.  
1      2      3      4      5
- 24. In order to get something done, I have to worry about it.  
1      2      3      4      5
- 25. Worrying makes me reflect on life by asking questions I might not usually ask when happy.  
1      2      3      4      5
- 26. I become paranoid when I worry.  
1      2      3      4      5
- 27. Worrying gives me a pessimistic and fatalistic outlook.  
1      2      3      4      5
- 28. Worrying adds concern to the problem and as such leads me to explore different possibilities.  
1      2      3      4      5
- 29. Worrying increase my awareness, thus increasing my performance.  
1      2      3      4      5

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## APPENDIX C

### DEMOGRAPHICS OF DICHOTOMOUS PSYCHOMETRIC GROUPS

Table C-1. Demographics of Non-GAD and GAD Groups Defined via Dichotomous Scoring of the GAD-Q-IV

|                                      | Non-GAD         | GAD             | Sig.   |
|--------------------------------------|-----------------|-----------------|--------|
| <i>GAD-Q-IV Dichotomous scoring:</i> |                 |                 |        |
| N                                    | 235             | 28              |        |
| Sex (% male)                         | 26.8%           | 21.4%           | ns     |
| Age (years), <i>M</i> (SD)           | 20.55 (2.75)    | 21.81 (3.29)    | < .001 |
| Marital status (% single)            | 96.6%           | 85.7%           | < .01  |
| Race/ethnicity                       |                 |                 | ns     |
| Caucasian                            | 87.2%           | 85.7%           |        |
| African American                     | 9.8%            | 14.3%           |        |
| Hispanic                             | 0.4%            | 0.0%            |        |
| Asian                                | 1.3%            | 0.0%            |        |
| Native American                      | 0.4%            | 0.0%            |        |
| Mixed Ethnicity                      | 0.9%            | 0.0%            |        |
| Class standing                       | 2.6 years (1.1) | 2.8 years (1.3) | ns     |
| Student status (% full time)         | 95.7%           | 100.0%          | ns     |
| Employment status (% unemployed)     | 68.1%           | 78.6%           | ns     |

For one participant in the GAD group and six in the non-GAD group, data regarding age was missing.

Table C-2. Demographics of Non-GAD and GAD Groups Defined via Continuous Cutoff Scoring of the GAD-Q-IV

|   | Non-GAD         | GAD             | Sig. |
|---|-----------------|-----------------|------|
| <i>GAD-Q-IV Continuous cutoff of 5.7:</i> |                 |                 |      |
| N   | 145             | 118             |      |
| Sex (% male)                              | 30.3%           | 21.2%           | ns   |
| Age (years), <i>M</i> ( <i>SD</i> )       | 20.62 (2.81)    | 20.77 (2.88)    | ns   |
| Marital status (% single)                 | 96.6%           | 94.1%           | ns   |
| Race/ethnicity                            |                 |                 | ns   |
| Caucasian                                 | 89.7%           | 83.9%           |      |
| African American                          | 6.9%            | 14.4%           |      |
| Hispanic                                  | 0.7%            | 0.0%            |      |
| Asian                                     | 2.1%            | 0.0%            |      |
| Native American                           | 0.7%            | 0.0%            |      |
| Mixed Ethnicity                           | 0.0%            | 1.7%            |      |
| Class standing                            | 2.6 years (1.1) | 2.6 years (1.1) | ns   |
| Student status (% full time)              | 97.2%           | 92.9%           | ns   |
| Employment status (% unemployed)          | 69.7%           | 68.6%           | ns   |

For 5 participants designated GAD and 2 designated non-GAD, data regarding age was missing.

Table C-3. Demographics of Non-GAD and GAD Groups Defined via Sum Total Response Cutoff Scoring of the GAD-Q-IV

|  | Non-GAD         | GAD             | Sig. |
|--|-----------------|-----------------|------|
| <i>GAD-Q-IV Sum total cutoff of 5.7:</i> |                 |                 |      |
| N  | 202             | 61              |      |
| Sex (% male)                             | 28.7%           | 18.0%           | ns   |
| Age (years), <i>M</i> ( <i>SD</i> )      | 20.59 (2.92)    | 20.98 (2.52)    | ns   |
| Marital status (% single)                | 96.0%           | 93.4%           | ns   |
| Race/ethnicity                           |                 |                 | ns   |
| Caucasian                                | 89.1%           | 80.3%           |      |
| African American                         | 7.9%            | 18.0%           |      |
| Hispanic                                 | 0.0%            | 0.0%            |      |
| Asian                                    | 1.5%            | 0.0%            |      |
| Native American                          | 0.5%            | 0.0%            |      |
| Mixed Ethnicity                          | 0.5%            | 1.6%            |      |
| Class standing                           | 2.5 years (1.1) | 2.8 years (1.1) | ns   |
| Student status (% full time)             | 96.0%           | 96.7%           | ns   |
| Employment status (% unemployed)         | 70.3%           | 65.6%           | ns   |

For 2 participants designated GAD and 5 non-GAD, data regarding age was missing.



Table C-4. Demographics of Non-GAD and GAD Groups Defined via Continuous Cutoff Scoring of the PSWQ

|                                     | Non-GAD         | GAD             | Sig.  |
|-------------------------------------|-----------------|-----------------|-------|
| <i>PSWQ cutoff of 62:</i>           |                 |                 |       |
| N                                   | 209             | 54              |       |
| Sex (% male)                        | 29.7%           | 13.0%           | < .05 |
| Age (years), <i>M</i> ( <i>SD</i> ) | 20.76 (3.09)    | 20.37 (1.44)    | ns    |
| Marital status (% single)           | 95.2%           | 96.3%           | ns    |
| Race/ethnicity                      |                 |                 | ns    |
| Caucasian                           | 86.1%           | 90.7%           |       |
| African American                    | 10.5%           | 9.3%            |       |
| Hispanic                            | 0.5%            | 0.0%            |       |
| Asian                               | 1.4%            | 0.0%            |       |
| Native American                     | 0.5%            | 0.0%            |       |
| Mixed Ethnicity                     | 1.0%            | 0.0%            |       |
| Class standing                      | 2.6 years (1.1) | 2.6 years (1.1) | ns    |
| Student status (% full time)        | 96.7%           | 94.4%           | ns    |
| Employment status (% unemployed)    | 70.3%           | 64.8%           | ns    |

For 2 participants designated GAD and 5 non-GAD, data regarding age was missing.