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Can distress tolerance predict chronic worry? Investigating the relationships among worry, distress tolerance, cognitive avoidance, psychological flexibility, difficulties in emotion regulation, and anxiety sensitivity

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Can Distress Tolerance Predict Chronic Worry?

Investigating the Relationships among Worry, Distress Tolerance, Cognitive Avoidance,

Psychological Flexibility, Difficulties in Emotion Regulation, and Anxiety Sensitivity

by

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Dedication

This thesis is dedicated to my family and boyfriend for your unconditional support throughout this process, but also for all the ways in which you ease my sometimes anxious heart. This work is also dedicated to all individuals who currently are or have been plagued by chronic worry.

Acknowledgements

Abstract

According to the *avoidance theory of worry* proposed by Borkovec, Alcaine, and Behar (2004), chronic worry functions as an avoidance mechanism, enabling an individual to diminish the physiological experience of anxiety by impeding emotional processing of the fear stimulus. Previous research has revealed significant correlations between chronic worry and difficulties in emotion regulation (Salters-Pedneault et al., 2006) as well as anxiety sensitivity (Floyd, Garfield, & LaSota, 2005). Distress tolerance which is significantly related to anxiety sensitivity (Bernstein, Zvolensky, Vujanovic, & Moos, 2009) is strongly associated with many maladaptive avoidance behaviors (Anestis et al., 2007; Linehan, 1993; Timpano et al., 2009; Vujanovic et al., 2011). The present study examined the relationships among these variables, as investigators hypothesized that distress tolerance would be a significant predictor of worry. Undergraduate and graduate Eastern Michigan University students ($n = 470$) completed several measures via an on-line survey system. Analyses of the data support correlational relationships between anxiety sensitivity, difficulties in emotion regulation, avoidance constructs and worry presented in previous research. Distress tolerance was also found to significantly negatively correlate with worry. Additionally, analyses revealed distress tolerance, psychological flexibility, and cognitive avoidance to be significant predictors of worry. These novel findings add to the literature on the development and maintenance of chronic worry. The discovery of this significant relationship sheds light on avenues for clinical improvement in treating worry. Finally, the present study provides theoretical support for acceptance-based behavioral therapies (ABBTs), which have been yielding promising results for chronic worriers.

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Literature Review

Worry

The more attention allocated to an illusory inner world, a life spent lost in one's thoughts, the less attention can be devoted to what is right in front of us in our present-moment experiences (Borkovec, Alcaine, & Behar, 2004). "A life spent lost in one's thoughts" accurately describes the everyday experience of individuals who chronically worry. Chronic worrying is the cardinal feature of Generalized Anxiety Disorder (GAD; Borkovec et al., 2004). However, worry is a typical feature of many anxiety disorders (Wells & Carter, 2001) as well as depression (Fresco et al., 2002; Molina, Borkovec, Peasley, & Person, 1998; Segerstrom, Tsao, Alden, & Craske, 2000; Starcevic, 1995) and is a behavior engaged in at least to some degree by all of the general population. "Worry is defined as a chain of thoughts and images, negatively affect-laden; [worry] represents an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes" (Borkovec, 1994, p. 7).

Although commonly misconceived as such by the lay population, the term *worry* is not synonymous with *anxiety*. Indeed, worry and anxiety are unique constructs possessing independent sources of variance. Researching the relationship between worry and trait anxiety, Davey, Hampton, Farrell, and Davidson (1992) discovered that a significant positive correlation between worry and problem-focused coping emerged only when trait anxiety was partialed out. This result revealed a significant relationship between problem-focused coping and worry, which

is seemingly disrupted by the inclusion of trait anxiety. Therefore, research speculates that the capacity to worry was evolutionarily acquired by humans to serve an adaptive problem-solving function, but is a cognitive process with the capacity to turn pathological and be maintained under certain conditions (Davey et al., 1992). Pathological worry is characterized as excessive, uncontrollable, and significantly distressing, and typically results in substantial impairments within multiple domains of life.

Physiological Response to Worry

Physiological reactions aimed to prepare an organism to approach or flee from feared stimuli have been termed the *fight or flight* response. These biological responses resulting in sympathetic activation needed to retaliate or avoid feared stimuli enabled our ancestors to survive physical threats in their environments. These physiological responses have served to be so adaptive that they have been evolutionarily maintained across millennia. However, research has determined the fight or flight response to be less adaptive when preparing individuals to cope with feared stimuli which may or may not be encountered in the future. As such, ways to fight against or flee from an anticipated event are only hypothetically considered using mental resources most often worry (Durand & Barlow, 2006). Research has revealed that individuals with GAD who engage in chronic worry typically exhibit physiological characteristics dissimilar from sympathetic activation of the fight or flight response. For example, individuals with GAD frequently report symptoms which are mediated by the central nervous system, such as restlessness or feeling *keyed up*, muscle tension, irritability, and difficulty concentrating, but rarely report symptoms involving the autonomic nervous system (Marten et al., 1993). In fact, GAD and worry have been positively correlated with suppression of the sympathetic fear response (Hoehn-Saric, McLeod, & Zimmerli, 1989) and reduced autonomic flexibility (Thayer,

Friedman, & Borkovec, 1996). Several research investigations have deduced that these physiological characteristics of GAD may be critically related to the topography of worry.

Structure Influences Physiology

Studies exploring the cognitive structure of worry have established its linguistic quality, meaning that worry takes the form of thoughts and verbalizations, as opposed to images (Borkovec & Inz, 1990; Freeston, Dugas, & Ladouceur, 1996). Borkovec et al. (2004) described the phenomenological experience of worry as "talking to ourselves in an anxious way" (p. 82). Borkovec and Inz (1990) compared self-reported descriptions of mentation of individuals meeting criteria for a primary diagnosis of GAD to those of a control group, during periods of relaxation and worry. During the relaxation period, individuals of the control group reported experiencing primarily imagery, while the individuals meeting criteria for GAD described engaging in about equal proportions of thought and imagery. During the worry period, those of the control group described a shift, determined to be significant, in mentation from both thoughts and images to predominantly thoughts. After completing a 12-session intervention aimed to reduce worry, those of the GAD group exhibited a trending change in cognitive quality, shifting from equal thoughts and imagery, to more imagery during the relaxation phase. This verbal-linguistic quality of worry is imperatively associated with the physiological implications of engaging in thought-dominated cognitive patterns and the function of worry.

Imagining a feared experience produces physiological responses of the same caliber as encountering the feared event in reality. This extreme responding to fearful imagery is the result of the close connection between imagery and efferent command. Alternatively, worry and other thought-dominated cognitive processes result in very little physiological responding (Sibrava & Borkovec, 2006). In fact, Hoehn-Saric and colleagues (1989) reported that while individuals

meeting diagnostic criteria for GAD and a non-anxious control group did not differ significantly in heart inter-beat interval ranges at resting baseline, they discovered a significant difference in heart inter-beat interval ranges between the GAD group and the non-anxious controls when all participants experienced laboratory-induced psychological stress. Specifically, the non-anxious control group presented a dramatic increase in heart inter-beat interval ranges from baseline to period of induced stress, indicating great variability in cardiovascular responding to induced psychological stress. Alternatively, the GAD group exhibited a small and insignificant change in heart inter-beat interval ranges between conditions, suggesting that on average individuals with GAD display a weaker autonomic response to stressful situations compared to non-anxious individuals.

Similarly, when Borkovec and Hu (1990) undertook an experiment involving individuals with public speaking anxiety, they discovered that those instructed to engage in relaxed thinking before imagining giving a public speech exhibited greater cardiovascular responding compared to those who engaged in worrisome thinking prior to exposure. Borkovec, Lyonfields, Wiser, and Diehl (1993) extended this study by obtaining information about the amount of imagery experienced by participants who engaged in relaxed versus worrisome thinking before imagining speaking. The results revealed that the amount of imagery experienced was positively correlated with relaxed thinking and negatively correlated with worrisome thinking. These correlations clarify worry specifically, as opposed to thinking in general, to be related to suppression of the sympathetic fear response.

Borkovec's Avoidance Theory of Worry

Based on findings about the topography of worry and the implications of worry on the sympathetic nervous system, Borkovec et al. (2004) developed the *avoidance theory of worry*.

Borkovec et al. (2004) postulated that when a potential threat is perceived, worry can transform the aversive mental image, capable of sympathetic activation, into a string of negative thoughts in linguistic form. Because thoughts of linguistic/verbal quality are associated with reduced somatic activation and restricted autonomic variability, engaging the worrying process allows an individual to escape the physiological discomfort or somatic element of the fear response. As suppressed somatic responding quickly relieves an individual of aversive sensations, the process of worrying becomes negatively reinforcing.

While using worry to limit sympathetic activation seems to serve a positive function in the short-term, avoidance of anxiety-provoking material actually inhibits emotional processing and functions to maintain pathological worry. The neurological maintenance of an image involves a retrieval mechanism, as well as a refresher mechanism (Kosslyn, 1983). While individuals with GAD as a whole are no less capable of maintaining a mental image through retrieval and refreshment, engaging in worry neurologically impedes the refresher mechanism from maintaining the image (Borkovec et al., 2004). This interference is problematic because according to Foa and Kozak (1986) only repeated exposure to the entire fear structure, including the threatening image and the physiological/affective response, will enable complete emotional processing, necessary for extinction of the conditioned fear. Therefore, inability to maintain the image in cognition and suppression of the normal sympathetic response to fear inhibits full emotional processing of the threat which ultimately, prevents extinction. By this process, anxious-meanings are never extinguished and ambiguous stimuli become conditioned stimuli for worry. The consequence is a vicious cycle characterized by frequent anxiety-provoking intrusive images and relentless worry (Borkovec, 1994; Borkovec et al., 2004).

Cognitive Avoidance

Cognitive avoidance refers to cognitive attempts to escape mental contact with and physiological reactivity to threatening images. In addition, cognitive avoidance inadvertently aborts emotional processing of fear (Williams, Watts, McLeod, & Matthews, 1988). As worry actively transforms threatening mental images into verbal thought resulting in suppression of the sympathetic fear response and prevents emotional processing of the feared stimuli, Borkovec postulated that worry constitutes a cognitive avoidance strategy (Borkovec & Inz, 1990). Indeed, individuals meeting diagnostic criteria for GAD exhibit significantly higher levels of cognitive avoidance than do non-anxious controls (Ladouceur et al., 1999). Research thus far is inconclusive as to whether cognitive avoidance is a causal or predisposing factor for GAD, or simply a maintaining factor which functions to sustain chronic worry once its established (Rassin, Merckelbach, & Muris, 2000).

Psychological Flexibility

Psychological flexibility refers to "the ability to fully contact the present moment and the thoughts and feelings it contains" (Hayes, Strosahl, & Wilson, 1999) while persisting in or changing behavior in order to act in accordance with one's goals and values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Alternatively, psychological inflexibility is exemplified by individuals who behave at the mercy of difficult thoughts, feelings, or physiological sensations, rather than engaging in goal-directed or value-congruent behavior. Experiential avoidance, which is an example of psychological inflexibility, is defined as "an attempt to alter the form, frequency, or situational sensitivity of difficult private events, even when doing so leads to actions that are inconsistent with one's goals and values" (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Many problematic behaviors have been associated with experiential avoidance,

including substance abuse and self-injurious behavior. These problematic behaviors are maintained despite other negative consequences, because of their ability to alleviate unwanted internal experiences (Hayes et al., 1996).

As Borkovec's *avoidance theory of worry* portrays worry as a cognitive process enabling escape from threatening images and suppression of physiological sensations akin to the fear response, worry is characterized by experiential avoidance. Indeed, research by Roemer, Salters, Raffa, and Orsillo (2005) discovered a significant association between worry and experiential avoidance in a non-clinical sample of female college students. Additionally, Roemer et al. (2005) described a significant difference in reported levels of experiential avoidance between individuals meeting diagnostic criteria for GAD and non-clinical controls. Their findings revealed that on average the individuals with GAD exhibited significantly greater levels of experiential avoidance than did the non-clinical sample.

Emotion Regulation

As worry enables an individual to avoid the emotional experience of fear (Borkovec et al., 2004), Mennin et al. (2005) postulated that individual differences in experience and regulation of emotions may predict tendencies to seek emotional avoidance, perhaps in the form of worry. Emotion regulation refers to "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions," (Gross, 1998, p. 275). According to Gratz and Roemer (2004) emotion regulation is conceptualized as consisting of four components, including awareness and understanding of emotions, acceptance of emotions, ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses

as desired in order to meet goals and situational demands. Appropriate regulation of emotions includes modulating the intensity and duration of a negative or positive emotional experience. Alternatively, attempting to fix, change, or eliminate an emotional experience is not characteristic of healthy emotion regulation (Gratz & Roemer, 2004; Gross, 1998).

Mennin et al. (2005) proposed an emotion dysregulation model of GAD, presenting three studies revealing significant relationships between those meeting criteria for GAD and all four components of emotion regulation described above. In subsequent studies comparing undergraduate students meeting diagnostic criteria for GAD and individuals seeking treatment for GAD with separate control samples, Mennin et al. (2005) discovered significant relationships between meeting criteria for GAD and reported heightened intensity of emotions, as well as reported poorer understanding of emotions compared to controls. Individuals in the GAD samples endorsed more intense moods and greater difficulty differentiating emotions and distinguishing adaptive value of emotions than did individuals of the control groups. Both studies reported significant relationships between meeting criteria for GAD and reported negative reactivity to negative emotions as well as lesser acceptance of emotional experiences in general. The undergraduates meeting criteria for GAD expressed fearing the negative consequences of emotional experiences and articulated a greater desire to control these experiences, than did those of the control group. Those individuals seeking-treatment for GAD reported difficulty accepting their experiences with negative emotions compared to controls. Results of both studies also supported significant correlations between GAD and difficulty managing emotional experiences (Mennin et al., 2005).

In a third study, Mennin et al. (2005) used music to induce sad, anxious, and neutral moods in individuals with a diagnosis of GAD and control participants. The study aimed to

spontaneously compare the self-reported emotional experiences of both groups. Results of this study indicated that the participants with GAD expressed greater levels of physiological anxiety symptoms to the negative mood inductions, along with more difficulty accepting their present negative emotional states compared to controls.

Incorporating Borkovec's *avoidance theory of worry* with his research findings, Mennin et al. (2005) suggested that individuals with GAD who are highly emotionally sensitive and display marked difficulty understanding and differentiating emotions may react to emotional experiences with aversion and anxiety. Mennin et al. (2005) further hypothesized that responding to emotions with anxious-arousal, intensified reactivity and a perceived need to regain control of emotions may predispose individuals to utilize maladaptive approaches to manage their emotions, such as worrying to dampen the emotional experience. This hypothesis is supported by correlational research conducted by Salters-Pedneault, Roemer, Tull, Rucker, and Mennin (2006), which replicated the findings of Mennin et al. (2005), and also identified correlations between difficulties in emotion regulation and chronic worry, specifically. Deficits in emotional acceptance, clarity of emotional experiences, impulse control, perceived access to emotion regulation strategies, and ability to engage in goal directed behavior when experiencing negative emotions significantly correlated with chronic worry, even when controlling for general negative affect (Salters-Pedneault et al., 2006). Conclusively, pre-existing skills deficits in emotion regulation may influence individuals to modulate their emotional experiences using maladaptive management strategies, such as chronic worry (Salters-Pedneault et al., 2006).

Anxiety Sensitivity

A predisposition to dread or be fearful of the sensations of anxiety, fear, or panic may similarly motivate individuals to strictly manage their emotional experiences, attempting to fix or

change their feelings or to avoid negative emotions all together. Anxiety sensitivity refers to fear of anxiety and anxiety-related symptoms. Individuals with high anxiety sensitivity believe the sensations associated with anxiety lead to potentially harmful consequences (McNally, 2002), such as a heart attack and death, insanity, or extreme social humiliation. Thus, individuals with elevated anxiety sensitivity fear their anxious responses to anxiety-provoking stimuli, as opposed to fearing the actual stimuli. While increased anxiety sensitivity is most strongly associated with panic disorder, mean scores of anxiety sensitivity were significantly greater for individuals meeting GAD symptomatology compared to normal controls (Taylor, Koch, & McNally, 1992).

Research by Floyd, Garfield, and LaSota (2005) revealed anxiety sensitivity to be significantly correlated with both non-pathological and pathological worry in college students. Additionally, anxiety sensitivity uniquely predicted a small portion of worry above and beyond the variance it shared with overall distress. Interestingly, anxiety sensitivity has been uniquely associated with the use of cognitive or behavioral strategies to escape negative affect (Zvolensky et al., 2004). In fact, research by Sexton and Dugas (2009) determined that anxiety sensitivity uniquely predicted cognitive avoidance, even after controlling for negative beliefs about worry. In accordance with Borkovec's *avoidance theory of worry* (2004), these findings indicate a potentially stronger relationship between anxiety sensitivity and worry functioning to avoid emotional experiences than conveyed by previous research.

Interactions among Variables

Considering the unique relationships which emotion regulation and anxiety sensitivity both have with worry, research by Kashdan, Zvolensky, and McLeish (2008) and Vujanovic, Zvolensky, and Bernstein (2008) explored whether these variables may function synergistically to predict greater variance in worry and other anxiety variables than alone. Kashden et al. (2008)

determined that anxiety sensitivity positively correlated with worry only when an individual expressed having the belief that they could do little to effectively deal with their emotional distress, or communicated an unwillingness to accept this *unwanted* emotional state. When individuals did not articulate these beliefs, anxiety sensitivity did not correlate with worry or other anxiety symptomology.

Research by Vujanovic et al. (2008) supports robust main effects of both anxiety sensitivity and emotion regulation on prediction of worry, anxious arousal, and catastrophic thinking. Their analyses additionally revealed a significant interaction effect between anxiety sensitivity and difficulties in emotion regulation in terms of predicting worry, albeit small, contributing only 1% unique variance. Endorsement of pervasive difficulties in emotion regulation and high anxiety sensitivity predicted the largest amount of variance in worry, followed by elevated difficulties in emotion regulation and low anxiety sensitivity. Individuals exhibiting few difficulties in emotion regulation and either high *or* low anxiety sensitivity did not significantly differ in variance shared with worry. The results of this study, along with the findings presented by Kashden et al. (2008) indicate that the degree to which increased anxiety sensitivity results in vulnerability to anxiety and the use of worry may be influenced or determined by the individual's ability to regulate their emotional experiences.

Distress Tolerance

Distress tolerance is the capacity to experience and withstand negative psychological states. The construct refers to an individual's experience of negative emotions, including their appraisal of the tolerability or acceptability of negative emotions, propensity to become completely absorbed by the emotional state, and ability to appropriately regulate the negative emotions (Simons & Gaher, 2005). Individuals with little distress tolerance perceive themselves

as unable to endure negative emotional states and often exert great efforts to avoid or quickly alleviate the experience of negative emotions. Low distress tolerance may motivate individuals to avoid or quickly relieve themselves of a negative emotional experience, particularly if they possess few adaptive affect regulatory skills (McHugh, Reynolds, Leyro, & Otto, 2012). Indeed, research by McHugh et al. (2012) determined that distress intolerance and deficits in emotion regulation strategies were incrementally associated with experiential avoidance. Significant correlations have been revealed between decreased distress tolerance and maladaptive avoidance behaviors, such as binging and purging in individuals with bulimia (Anestis, Selby, Fink, & Joiner, 2007), chronic marijuana use (Zvolensky et al., 2009), alcohol use (Vujanovic, Marshall-Berenz, & Zvolensky, 2011), compulsive hoarding (Timpano, Buckner, Richey, Murphy, & Schmidt, 2009), and gambling (Daughters et al., 2005). Additionally, minimal levels of distress tolerance are characteristic of individuals with Borderline Personality Disorder, who engage in self-injurious behavior attempting to relieve painful emotions (Linehan, 1993).

The perception held by those with decreased distress tolerance of negative emotions as excruciating and unbearable is similar in nature to the perception endorsed by those with increased anxiety sensitivity of anxious arousal as overwhelming, uncontrollable, and inevitably resulting in harmful consequences. Indeed, research by Timpano et al. (2009) indicated an interactive effect of distress tolerance with anxiety sensitivity in individuals engaging in compulsive hoarding behaviors. Zvolensky et al. (2009) also determined that anxiety sensitivity and distress tolerance shared variance in predicting marijuana use as a coping behavior. Considering the commonalities of these two constructs, modest research has been conducted further exploring their relationship. Bernstein et al. (2009) reported a significant negative correlation between distress tolerance and anxiety sensitivity. Extension of this research

revealed anxiety sensitivity and distress tolerance to be distinct constructs uniquely associated

with anxiety, but related (Bernstein et al., 2009; Keough, Riccardi, Timpano, Mitchell, &

Schmidt, 2010; Zvolensky et al., 2009). Further research determined anxiety sensitivity and

distress tolerance to be lower-order facets of a higher-order factor, known as affect sensitivity

and tolerance (Bernstein et al., 2009).

Controlling for Negative Affect and Depressive Symptoms

Reports from the National Comorbidity Survey found that 62.4% of individuals with

lifetime GAD also met criteria for lifetime major depression (Wittchen, Zhao, Kessler, & Eaton,

1994). Research by Kessler, Zhao, Blazer, and Swartz (1997) also determined that individuals

with GAD were at greater risk for developing depression than individuals with other anxiety

disorders, with an odds ratio of 12.87. In addition to this close link between GAD and

depression, worry in general has been significantly associated with depression (Fresco et al.,

2002; Molina, et al., 1998; Segerstrom, et al., 2000; Starcevic, 1995), general distress (Floyd et

al., 2006) and negative affect (Segerstrom et al., 2000). Considering these relationships, there is

a high probability that depressive symptoms and/or negative affect may account for some of the

variation in worry.

Further research indicates that individuals with and without a diagnosis of depression

differ not necessarily in their initial response to a negative event, but in their ability to recover

from the negative affect experienced as a result of the negative event (Teasdale, 1988). The

individual's aptitude for recovery is determined by their ability to adaptively regulate this

negative emotional experience. Depression has been positively associated with maladaptive

emotion regulation strategies, such as rumination, brooding, and expressive suppression and

negatively related to reappraisal, a more adaptive approach to emotion regulation. Therefore, as

depression is a disorder of impaired emotion regulation abilities (Joormann & Gotlib, 2010), it is a possibility that difficulties in emotion regulation may account for variance in worry that is shared with depressive symptoms and negative affect. Because this variance would otherwise appear to be unique, depressive symptoms and negative affect will be measured and controlled for to avoid confounding results.

Study Aims and Hypotheses

According to the *avoidance theory of worry* proposed by Borkovec et al. (2004), chronic worry functions to avoid emotional processing of anxiety. Research has revealed significant correlations between individuals meeting criteria for GAD and endorsing chronic worry with specific individual differences in emotion regulation abilities. Strong reactivity to emotional experiences, difficulty understanding and differentiating emotions, lack of emotional acceptance, and the perceived need to *control* emotions are qualities correlated with both GAD and worry (Mennin et al., 2005). Anxiety sensitivity, a predisposing factor for GAD, predicts unique variance in pathological and non-pathological worry (Floyd et al., 2005), and has been associated with utilization of maladaptive avoidance behaviors (Zvolensky et al., 2004). Finally, distress tolerance, a unique construct, sharing a higher-order factor with anxiety sensitivity, is associated with experiential avoidance, particularly in combination with deficits in emotion regulation (McHugh et al., 2012). Considering the previously detailed relationships, the purpose of the present study is to further investigate the association between emotion regulation, anxiety sensitivity, distress tolerance, and chronic worry when utilized as an avoidance mechanism. While several studies exist detailing the associations between distress tolerance and maladaptive avoidance behaviors, the present study is the first known study to investigate distress tolerance and the avoidance behavior of chronic worry.

The hypotheses of the present study are as follows:

1. Distress tolerance will negatively correlate with worry.

2. Distress tolerance will significantly predict worry.

3. Low distress tolerance will predict inclusion in the *worry* group.

Method

Participants

A total of 470 Eastern Michigan University students participated in the present study. Undergraduate and graduate students were recruited in several ways, as 71.3% identified discovering the study on Sona System and 22.1% reported hearing about the study via an announcement made by their Introduction to Psychology instructor. In addition, 8% reported becoming aware of the study through an email from their Introduction to Psychology instructor, 2.1% through an email from the study investigator, and 4% indicated viewing flyers advertising the study around campus. As is evident, the majority of the student participants were enrolled in an Introduction to Psychology course during the winter semester of 2013; this does not necessitate that these individuals were majoring in psychology.

Demographics

Participants initially completed a demographics questionnaire covering age, current standing in college, race or ethnicity, and marital or dating status. As the 470 participants were undergraduate or graduate students enrolled at Eastern Michigan University, the majority of the sample (84%) was between 18 and 25 years of age, however 15.5% of the participants were 25 years or older, with the oldest participant being 55 years old. Similarly, 96.5% or the vast majority of the total sample were undergraduate students, while 3.6% marked *other*, indicating enrollment in graduate studies or a second bachelor's degree program. Over 60% of the sample reported being white/Caucasian and 22.9% black/African American, with only small percentages of the sample identifying with other ethnicities or as multi-cultural. Finally, almost half of the sample reported being single, while over a third of the sample identified as in a relationship.

Measures

Penn State Worry Questionnaire (*PSWQ*; Meyer, Miller, Metzger, & Borkovec, 1990). The Penn State Worry Questionnaire (PSWQ) was developed by Meyer et al. (1990) to assess the characteristic of trait worry. The measure was structured to evaluate the individual's tendency to engage in pathological worry, the excessiveness and intensity of the worry, the propensity to worry about things in general, rather than worry about a couple specific topics, and the perceived uncontrollability of the worry (Molina & Borkovec, 1994; Startup & Erickson, 2006). The PSWQ is a self-report measure consisting of 16 items answered using a Likert scale ranging from 1 (*not at all typical*) of the individual to 5 (*very typical*) of the individual's relationship with worry. Summation of the scores, considering items 1, 3, 8, 10, and 11 are reversed scored, range from 16 – 80 with higher scores indicating greater degrees of pathological worry (Meyer et al., 1990).

Factor analyses determined the PSWQ to be best conceptualized as representing a single underlying factor (Startup & Erickson, 2006). Evaluations of the psychological soundness of the PSWQ have determined it to possess high internal consistency, with Cronbach's alpha coefficients ranging from 0.86 to 0.95 (Davey, 1993; Meyer et al., 1990, Brown, Antony, & Barlow, 1992). Using a sample of unselected college students, Molina and Borkovec (1994) and Meyer et al. (1990) determined the PSWQ to demonstrate good test-retest reliability over 2 to 10 weeks (*r* values ranging from 0.74 to 0.92). Additionally, the PSWQ exhibits favorable convergent and discriminant validity (Brown et al., 1992), sensitivity to treatment change after 6 – 12 weeks of therapeutic intervention for GAD (Borkovec & Costello, 1993), and is unrelated to social desirability (Meyer et al., 1990).

Table 1

Sample demographics

Characteristic	Participants (percent of sample) ($n = 470$)
Age	
18-20	259 (55.1%)
21-24	137 (29.1%)
25-29	36 (7.7%)
30-49	31 (6.7%)
50+	7 (1.5%)
University status	
Freshman	143 (30.4%)
Sophomore	109 (23.2%)
Junior	90 (19.1%)
Senior	111 (23.6%)
other	17 (3.6%)
Race/Ethnicity	
White/Caucasian	287 (61.1%)
Black/African American	107 (22.8%)
Hispanic/Latino	11 (2.3%)
Asian	11 (2.3%)
Middle Eastern	8 (1.7%)
other	6 (1.3%)
Multicultural	40 (8.5%)
Dating/Marital status	
Single	210 (44.7%)
In a relationship	170 (36.2%)
In a relationship/cohabitating	50 (10.6%)
Married	29 (6.2%)
Separated/divorced	6 (1.2%)
other	5 (1.1%)

While the current study is not specifically interested in individuals with a diagnosis of

GAD, we are interested in identifying individuals whose worry is clinically significant and is a

valid demonstration of chronic worry as Borkovec's theory portrays it. Therefore, due to the

lack of literature detailing severity bands for the PSWQ without reference to GAD and the fact

that chronic worry is the cardinal feature of GAD, these cutoff scores were derived based on

literature which utilized the PSWQ with analogue and/or clinical GAD samples. The previous

research reviewed included Meyer et al.'s (1990) initial investigation of the validity and

reliability of the PSWQ, as well as a variety of studies using Receiving Operating Characteristics

(Behar, Alcaine, Zuellig, & Borkovec, 2003; Dear et al., 2011; Fresco, Mennin, Heimberg, &

Turk, 2003).

Behar et al. (2003) reported that a PSWQ score of 62 successfully separated their

analogue GAD group, which consisted of college students who had obtained a diagnosis of GAD

according to the Generalized Anxiety Disorder-Questionnaire-IV (Newman et al., 2002), from

their control group with 86% specificity and 98% negative predictive power. Similarly, research

completed by Fresco et al. (2003) determined that a PSWQ score of 65 could differentiate

participants with a diagnosis of GAD from those with a diagnosis of Social Anxiety Disorder

(SAD) with optimal sensitivity and specificity. Dear et al. (2011) developed severity bands with

which to classify *worriers* using the PSWQ and found a significant difference in GAD-7 scores

between individuals who were classified as *severe worriers* (who scored 65-80 on the PSWQ)

and those grouped as *moderate worriers* (PSWQ score of 45-64) or *mild worriers* (PSWQ score

of 16-44). In a similar fashion, Meyer et al. (1990) separated their sample into three groups

based on the amount of DSM-III-R diagnostic criteria for GAD reported and discovered that

individuals who did not endorse any of the criteria yielded a mean PSWQ score of 40.1, while

individuals who reported experiencing all of the criteria for GAD exhibited a mean PSWQ score

of 64.1. These findings from the literature served as a model for the current study as a PSWQ

total score of 65 or above qualified individuals for the *worry* group and a PSWQ total score of 45

or below was required to obtain *non-worry* group membership. Individuals whose PSWQ total

score fell between 46 and 64 were therefore excluded from the following analysis.

Generalized Anxiety Disorder-7 (*GAD-7;* Spitzer, Kroenke, Williams, & Löwe, 2006).

The Generalized Anxiety Disorder-7 (GAD-7) is a 7-item self-report measure of GAD based on

the criteria for GAD set out by the DSM-IV. Individuals indicate the frequency with which they

have experienced the symptoms listed over the past two weeks, with responses ranging from (*0 =*

not at all) to (*3 = nearly every day*). The GAD-7 was validated and deemed reliable using

patient samples from 15 primary care facilities in 12 different states. According to Spitzer et al.

(2006), the GAD-7 possesses excellent internal consistency ($\alpha = 0.92$) and good test-retest

reliability ($r = 0.83$). Additionally, results determined good convergent validity of the GAD-7

when compared with the Beck Anxiety Inventory ($r = 0.72$) and the Symptom Checklist-90 ($r =$

0.74).

Spitzer et al. (2006) determined that using a cut-off score of 10 to designate clinically

significant levels of GAD resulted in sensitivity and specificity both exceeding 0.80, nearly

maximizing possible sensitivity. Indeed, 89% of patients who met diagnostic criteria for GAD

according to a psychiatric interview conducted by a mental health practitioner scored a 10 or

greater on the GAD-7, while 82% of individuals determined by mental health practitioners to not

meet criteria for GAD scored a 9 or below. Spitzer et al. (2006) proposed using the ranges of 0-

4, 5-9, 10-14, and 15-21 to denote minimal symptoms, mild, moderate, and severe symptoms of

GAD. Finally, Spitzer et al. (2006) determined good construct validity of the GAD-7 as analyses

revealed significant differences in levels of functioning, according to the SF-20 Health-Related

Quality of Life Scale, between successive severity levels of GAD. For example, individuals who

scored 10-14 on the GAD-7 functioned as a group significantly better in all domains than those who scored 15-21.

      Cognitive Avoidance Questionnaire (*CAQ*; Sexton & Dugas, 2008). Le questionnaire d'évitement cognitif (QEC) is a 25-item French self-report measure developed by Gosselin et al. (2002), which assesses an individual's tendency to employ cognitive avoidance strategies when coping with anxiety-provoking internal events (Sexton & Dugas, 2008). The QEC possesses excellent internal consistency of the overall scale and subscales, good test-retest reliability, and good criterion, convergent, and discriminant validity (Gosselin, 2002). In 2008, the QEC was translated into English and culturally adapted by Sexton and Dugas, who named the translated version the Cognitive Avoidance Questionnaire (CAQ). The CAQ maintained original qualities of the QEC, such as self-report format, length of measure, and response style. Respondents endorse how true each statement is of them, using a Likert scale ranging from 1 (*not at all typical)* to 5 (*completely typical*). Scores range from 25 to 125 with higher scores suggesting a greater propensity to engage in cognitive avoidance when confronted with threatening intrusive thoughts (Sexton & Dugas, 2008).

      Confirmatory factor analyses support successful replication of the five-factor structure of the original scale. Internal consistency of the CAQ total scale is excellent compared to the original French measure, achieving a Cronbach's alpha coefficient of 0.95. The CAQ total scale demonstrates optimal test-retest reliability after 4 - 6 weeks ($r = 0.85$). Additionally, as the CAQ positively correlates with worry (PSWQ, $r = .64$, $p < .001$; Catastrophic Worry, $r = .64$, $p < .001$), convergent and divergent validities were determined to be favorable. Finally, regression analyses revealed a significant, positive contribution of CAQ to the prediction of worry ($\beta = .33$, $p < .001$; Sexton & Dugas, 2008).

In congruence with the QEC, the five subscales assess thought suppression, substitution of distressing thoughts, distraction, avoidance of threatening stimuli, and transformation of mental images into verbal thoughts. The factor loadings of all items on their respective factor were determined to be statistically significant. Internal consistency of the subscales ranged from good (Thought Substitution $\alpha = 0.73$) to excellent (Distraction $\alpha = 0.89$). The Transformation subscale, which will be of particular importance to the present study exhibits excellent internal consistence, $\alpha = 0.87$. Indeed, the CAQ-total and Transformation subscale significantly positively correlate, $r = 0.82$, $p < .001$. The subscales exhibit good test-retest reliability (ranging from $r = 0.7$ to $r = 0.79$; Transformation subscale, $r = 0.7$; Sexton & Dugas, 2008).

Acceptance and Action Questionnaire-II (*AAQ-II*; Bond et al., 2011). The Acceptance and Action Questionnaire-II (AAQ-II) is a ten-item, self-report measure which assesses psychological flexibility, using a Likert scale ranging from 1 (*never true*) to 7 (*always true*). As psychological flexibility and experiential avoidance are inverse constructs, higher scores indicate greater psychology flexibility and lesser experiential avoidance of the participant, while lower scores represent lesser psychology flexibility and greater experiential avoidance. The AAQ-II is an adaptation of the Acceptance and Action Questionnaire developed by Hayes et al. (2004). The original AAQ has been used in multiple research studies examining worry as an avoidance mechanism. Indeed, utilizing a sample of individuals meeting criteria for a diagnosis of GAD, Roemer and Orsillo (2002) discovered significant correlations between experiential avoidance, as measured by the AAQ, and trait worry, as measured by the PSWQ ($r = .36$, $p < .001$), as well as between experiential avoidance and level of interference of GAD symptoms in daily life ($r = .50$, $p < .001$).

This original AAQ demonstrated problematic internal consistency due to unnecessary item complexity, or the overly-technical wording of the items. Development by Bond and colleagues determined that the AAQ-II exhibits improved internal consistency, with a mean alpha coefficient across the six samples of 0.84 (ranging from 0.78 to 0.88). The AAQ-II also possesses good test-retest reliability at three and 12-months ($r = 0.81$ and $r = 0.79$, respectively). Additionally, the AAQ-II retained excellent convergent validity, as higher scores on the AAQ-II significantly correlate with high anxiety according to measurements by both the Beck Anxiety Inventory ($r = .61$, $p < .001$) and the Depression Anxiety Stress Scale: Anxiety Scale ($r = 0.49$, $p < .001$), as well as thought suppression, as measured by the White Bear Suppression Inventory ($r = .63$, $p < .001$; Bond et al., 2011). Recent research conducted by Joos et al. (2012) determined significant correlations between the Penn State Worry Questionnaire – Past Day (PSWQ-PD) and the AAQ-II ($r = .46$, $p < .0000$). Finally, Bond et al. (2010) shared that their sample, which was composed of University students, yielded a mean AAQ-II score of 50.72. As a review of the literature revealed that the CAQ and AAQ-II are both popular and sound measures of psychological avoidance, each having been included in a substantial number of published studies, both were included as measures of cognitive and experiential avoidance in the present study.

Difficulties in Emotion Regulation Scale (*DERS*; Gratz & Roemer, 2004). The Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004) is a 40-item self-report scale, measuring clinically significant difficulties in emotion regulation. Respondents indicate how often they perceive each statement as applicable to their emotional experiences, using a Likert scale ranging from 1 (*almost never*) to 5 (*almost always*). Higher scores indicate greater difficulties with emotion regulation. The DERS is a six-factor structured scale, reflecting the

multidimensional conceptualization of emotion regulation on which the scale was based. The six factors include nonacceptance, goals (assessing difficulties accomplishing objectives when experiencing negative emotions), impulse (measuring difficulties remaining in control of one's behavior when experiencing negative emotions), awareness, strategies (looking at strategies which respondents use to regulate emotions when upset), and clarity (determining the extent to which the individual understands the emotions which they are experiencing). Each factor loading was determined to be 0.40 or greater (Gratz & Roemer, 2004).

Statistical analyses revealed high internal consistency of the total scale ($\alpha = 0.93$). All individual subscales achieved Cronbach's alpha coefficients greater than 0.80, resulting in adequate internal consistency of subscales. The DERS total scale obtained good test-retest reliability across 4-8 weeks ($r = 0.88$, $p < .01$). The DERS possesses optimal construct validity, as the measure positively correlated with the experiential avoidance subscale and negatively correlated with the emotional expressivity subscale of the Generalized Expectancy for Negative Mood Regulation Scale (NMR; Cantanzaro & Mearns, 1990), a scale which previously was widely used to assess emotion regulation. In fact, additional variance in experiential avoidance beyond that accounted for by the NMR was revealed by the DERS. Additionally, the subscales of awareness, clarity, goals, and strategies accounted for a significant amount of additional variance in emotional expressivity, when controlling for NMR. Finally, the DERS is correlated with behaviors related to difficulties in emotion regulation, namely deliberate self-harm and partner abuse, signifying clinical relevance as an assessment/screening tool.

Anxiety Sensitivity Index - 3 (*ASI-3*; Taylor et al., 2007). The Anxiety Sensitivity Index – 3 (*ASI-3,* Taylor et al., 2007) is based upon the Anxiety Sensitivity Index – Revised (Taylor & Cox, 1998), which was a revised version of the original Anxiety Sensitivity Index (ASI)

developed by Peterson and Reiss in 1992. While anxiety sensitivity was originally conceptualized as a unidimensional construct, factor analyses determined the ASI to possess an unstable factor structure, with solutions ranging from one to four factors. Although not intended in the original design, the most commonly obtained factor analysis of the ASI is comprised of three factors: Physical concerns, Cognitive concerns, and Social concerns (Taylor, 1999). However, because several items loaded onto multiple factors, the content validity of the subscales was very weak. Revision of the ASI into the ASI-R also resulted in a model with an unsound factor structure. Therefore, Taylor and colleagues (2007) developed the ASI-3, a three-factor model which achieves good fit according to four indices across seven different clinical and non-clinical samples originating from different countries [Comparative Fit Index = .986, Tucker-Lewis Index = .984, Standardized-root-mean-square-residual = .051, Root-mean-square-error-of-approximation = .058, (90th percentile CI = .055, .061), χ^2 (132, N = 2,361) = 1.163.62, p < .001]. In fact, this three-factor model is associated with better values for all four fit-indices when compared to factor analyses of the original ASI and ASI-R conducted by Zvolensky and colleagues (2003).

The ASI-3 is an 18-item self-report questionnaire measuring participant's fear of anxiety-related signs and symptoms on a scale from 0 (*very little*) to 4 (*very much*). Higher scores indicate greater anxiety sensitivity. Coefficient alphas calculated for each of three subscales with six diverse samples indicated internal consistency ranging from acceptable to good (α = .73 - .87). Indeed, coefficient alphas of the ASI-3 are significantly more impressive than those of the ASI when comparing cognitive (ASI-3: α = .81-.91 compared to ASI: α = .68- .84) and social subscales (ASI-3: α = .73-.86 compared to ASI: α = .41-.66). Analyses comparing subscales of the ASI-3 to those of the ASI revealed favorable convergent validity (Physical subscale: *r* > .92;

Cognitive subscale: $r > .83$; Social subscale: $r > .92$). Additionally, for all analyses except one, correlations between similar subscales from the ASI-3 and ASI were significantly larger than correlations between dissimilar subscales indicating suitable discriminant validity (z-scores ranging from 6.36 to 206.46, $p < .001$). Ultimately, while test-retest reliability remains to be studied, strong factor analyses, acceptable to good internal consistency, and satisfactory validity deem the ASI-3 as the most preferable measure in assessing anxiety sensitivity when compared to its predecessors (Taylor et al., 2007).

Distress Tolerance Scale (*DTS*; Simons & Gaher, 2005). The Distress Tolerance Scale is a 15-item self-report measure assessing an individual's perception of their ability to tolerate emotional distress, their subjective appraisal of distress, the amount of attention which is absorbed by distress, and their regulation efforts to alleviate their experience of distress. Respondents report their agreement with each item using a Likert scale, ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Higher scores represent greater distress tolerance. Based on the four aspects of distress tolerance, the DTS is composed of the single higher-order factor of distress tolerance and four first-order factors reflecting tolerance, appraisal, absorption, and regulation (Simons & Gaher, 2005).

The DTS correlated with expected measures, yet demonstrated good discriminant validity. For example, the DTS shared 26% of the variance with affect lability, 35% of the variance with negative affectivity, and 29% of the variance with negative mood regulation expectancies. These relationships reveal that while the construct of distress tolerance is certainly related to temperamental affective states, propensity to experience intense negative emotional states, and perceived ability to regulate negative affect, distress tolerance is a unique construct, not isomorphic with any of these related constructs. Distress tolerance positively correlated with

positive affectivity ($r = .26$), general mood acceptance ($r = .47$), and mood regulatory

expectancies ($r = .54$), providing supportive evidence for convergent validity. Confirmatory

factor analyses determined the internal consistency of the higher-order factor to be good ($\alpha =$

.82-.85), while that of the first-order factors to be adequate (Tolerance: .72-.73, Appraisal: .82-

.84, Absorption: .78-.77, Regulation: .70-.74). Finally, the DTS appears to be a stable measure

over time, achieving good test-retest reliability ($r = 0.61$) at 6 months (Simons & Gaher, 2005).

Positive and Negative Affect Schedule (*PANAS;* Watson, Clark, & Tellegen, 1988). The

Positive and Negative Affect Schedule (PANAS) is a 20-item self-report assessment, composed

of two subscales (10-items each) measuring the orthogonal dimensions of affect. A Likert scale

ranging from 1 (*very slightly or not at all*) to 5 (*extremely*) is utilized; higher scores indicating

greater positive or negative affect. Watson, Clark, and Tellegen (1988) defined positive affect as

the extent to which an individual experiences pleasurable engagement with the environment.

While high positive affect is characterized by enthusiasm and alertness, low positive affect is

described by sadness and lethargy. Alternatively, high negative affect is characterized by a

distressed disposition, encompassing a variety of negative mood states, such as shame, guilt,

fear, upset, and hostility. Low negative affect is characterized by serenity and calm. Median

varimax loadings determined positive and negative affect to be highly distinctive variables.

Previous research by Tellegen (1985) has suggested that low positive affect and high negative

affect are distinguishing characteristics of depression and anxiety.

Items were selected which possessed significant loadings on one of 20 factors,

determined to be fundamentally characteristic of positive or negative affect, and near-zero

secondary loadings on all other factors. The internal consistency of both subscales of the

PANAS is acceptably high (positive affect α ranging from .86 to .90, negative affect α ranging

from .84 to .87) and a correlation indicates quasi-independence of subscales (r ranging from -.12 to -.23). In order to assess convergent and discriminant reliability, Watson et al. (1988) randomly embedded the 20 PANAS items within 60 other affect items, which consisted of three terms from each of the twenty content categories from which each PANAS item originated. Analyses revealed PANAS items to highly correlate with their corresponding regression-based factor (r ranging from .89 to .95). However, correlations of discriminant items are quite small (r ranging from -.02 to -.18).

Reports of perceived affect characterizing a specific time-frame (within the past year, today, in general, past few weeks, etc.) completed at seven-week intervals produced correlations indicating adequate test-retest reliability (positive affect r ranging from .47 to .68, negative affect r ranging from .39 to .71). While test-retest reliability tended to improve as rated time-frame lengthened (affect in general, positive affect $r = .68$, negative affect $r = .71$; within the past year, positive affect $r = .63$, negative affect $r = .60$), the reliability of reported affect describing more recent time-periods (affect today, positive affect $r = .47$, negative affect $r = .39$) maintained stability across time. Finally, additional analyses revealed significant correlations between PANAS subscales and the Hopkins Symptom Checklist (negative affect $r = .74$, positive affect $r = -.19$), the Beck Depression Inventory (negative affect $r = .56$, positive affect $r = -.35$), and the State-Trait Anxiety Inventory - State Anxiety Scale (negative affect $r = .51$, positive affect $r = -.35$) indicating good external validity of the PANAS. The PANAS controlled for negative affect in the analyses.

Patient Health Questionnaire-9 (*PHQ-9;* Kroenke, Spitzer, & Williams, 2001). The Primary Care Evaluation of Mental Disorders (PRIME-MD; Spitzer et al., 1994) was the first instrument designed to assess for the presence of mental disorders according to DSM-IV criteria

in primary health care settings. While valid and reliable, the average administration time of 8.4 minutes proved unfeasible for primary care physicians. Thus, Spitzer, Kroenke, and Williams (1999) reduced the PRIME-MD to a three-page self-report measure titled the Patient Health Questionnaire. Validity and reliability of the PHQ were examined in two separate studies utilizing a sample of patients from eight family and general internal medicine practices and a sample of 3,000 obstetric-gynecologic patients. Review of diagnoses by PHQ cut-off scores in comparison to diagnoses determined by interviews with mental health practitioners (completed within 48 hours of each other) revealed excellent agreement ($r = 0.84$), indicating good criterion validity. Additionally, the PHQ appeared to yield greater sensitivity for diagnosing Major Depressive Disorder (MDD; 73%) compared to the PRIME-MD (57%). Finally, when participants were categorized into four groups based on intervals of PHQ scores a significant difference in functional status, health care utilization, and number of disability days taken in the last three months was revealed between groups ($p < .001$), signifying good construct validity of the PHQ (Spitzer et al., 1999; Spitzer, et al., 2000).

The PHQ-9 (Kroenke et al., 2001) is a module taken from the PHQ which specifically assesses depression using nine self-report questions based on the nine criteria set forth by the DSM-IV. Questions are answered in reference to frequency within the past two weeks by endorsing from 0 (*not at all*) to 3 (*nearly every day*), with greater scores indicating greater depressive symptomatology. This response style enables physicians to determine depressive symptom severity, enriching the clinical utility of the PHQ-9. MDD is diagnosed if the participant answers *more than half the days* to five or more of the nine items, one of which must be depressed mood or anhedonia. A diagnosis of other depression is given if the participant

responds with *more than half the days* on two, three, or four items of the nine items, including

depressed mood or anhedonia.

Statistical analyses conducted utilizing participants from primary health care settings

determined superb internal reliability. Likelihood ratios revealed that endorsing a score of 0-4

on the PHQ-9 is only 0.04 times as likely in a patient with major depression as in a patient

without, while scoring a 20-27 on the PHQ-9 is 36.8 times as likely in a patient with major

depression as in a patient without. These ratios confirm a strong positive correlation between

PHQ-9 scores and increasing likelihood of depression, which is further supported by robust

construct validity as evidenced by a substantial association between PHQ-9 severity and the self-

reported number of clinic visits and disability days taken within the past three months (most

pairwise comparisons are significant at $p < .05$). Despite its brevity, ROC analyses substantiate

the excellent discriminatory capabilities of the PHQ-9 (area under the curve = 0.95).

Further research using a sample of the general population revealed that when subjects

were categorized into four groups according to degree of criteria fulfilled on the PHQ-9, a

significant difference in Beck Depression Inventory (BDI; Beck, Steer, & Carbin, 1988) scores

emerged between those of the 'major depression group' ($M = 15.92$, $SD = 3.07$) and those of the

'other depressive disorders group' ($M = 9.62$, $SD = 2.19$) with those of the non-depressed group

($M = 2.63$, $SD = 2.87$). In addition, depression severity determined by the PHQ-9 was found to

significantly, strongly correlate with scores of the BDI ($r = .73$, $p < .0001$), revealing excellent

convergent validity (Martin, Rief, Klaiberg, & Braehler, 2006). Conclusively, as the PHQ-9

exhibits excellent construct and convergent validity when assessing both the general population

and medical samples, the PHQ-9 is an efficient, validated, and reliable depression screener

(Martin et al., 2006; Kroenke, et al., 2001). The PHQ-9 controlled for depressive symptomology in the analyses.

Procedure

Institutional Review Board approval was obtained prior to commencing recruitment (see Appendix A). Participants were recruited from Eastern Michigan University college classes (undergraduate and graduate) using classroom solicitations, flyers, and the campus email system. Additionally, Sona System was used to recruit participants from psychology classes which had a research participation requirement or which offered extra-credit for participation in research studies. An electronic informed consent process informing participants of the research purpose, their participant rights including confidentiality, the potential risks and discomforts of participation, prospective research benefits, and incentives for participating was completed by every participant.

Upon offering electronic consent, each participant had the opportunity to respond to a demographic questionnaire, the PSWQ (Meyer et al., 1990), DTS (Simons & Gaher, 2005), and CAQ (Sexton & Dugas, 2008), in that order. The remaining questionnaires, which include the GAD-7 (Spitzer et al., 2006), DERS (Gratz & Roemer, 2004), ASI-3 (Taylor et al., 2007), PANAS (Watson et al., 1988), PHQ-9 (Kroenke et al., 2001), and AAQ-II (Bond et al., 2011), were presented in a random order to avoid order effects. All questionnaires were completed via SurveyMonkey. At completion, participants received extra-credit in their specific course, if applicable. In addition, all participants were eligible to partake in a raffle for a monetary prize.

Results

Descriptive Statistics of Total Sample

Viewing the data set in its entirety, participant total scores of worry, distress tolerance, difficulties in emotion regulation, anxiety sensitivity, negative affect, depressive symptoms, cognitive avoidance, and psychological flexibility generally spanned the full range of possibilities (see Table 2). While the distributions of distress tolerance, difficulties in emotion regulation, negative affect, cognitive avoidance, and psychological flexibility are normal, those of anxiety sensitivity and depressive symptoms appear to be slightly positively skewed. The Kolmogorov-Smirnov test produced significant results for the dependent variable of worry, $D(470) = 0.051$, $p < .01$, suggesting that the data set is significantly non-normal. However, Field (2009) reported that with large data sets, significant K-S scores should be regarded cautiously as small deviations from normality easily yield significance with large sample sizes. Therefore, considering the large sample size ($n = 470$) and the produced box-plot and Q-Q Plot which suggests that the distribution of worry scores is normal, it is unlikely that the small deviation from normality detected by the K-S test will bias the statistical analyses.

All data sets were also examined for outliers and influential cases. Only 4% and 0.2% of the cases exhibited standardized residuals with an absolute value greater than 1.96 and 2.58 respectively, which is an acceptable amount according to Field (2009). One participant response (standardized residual = -3.77) elicited concern, as Field suggests that a standardized residual with an absolute value greater than 3.29 may be indicative of an influential case. However, further examination of the Cook's distance (Cook's distance = 0.082) confirmed that this case is not exerting undue influence on the regression model as a whole. Complete surveillance of the Cook's distances for all cases determined that no cases have disproportionate influence on the model. Finally, seven cases exhibited Mahalanobis distances greater than 21, with the largest

being 30.06, suggesting that these cases may be biasing the parameters of the regression model (Barnett & Lewis, 1978). However, examination of the standardized DFBetas and DFFits for every case at each variable found insignificant differences in the model when these cases were excluded versus included. Therefore, the data set does not contain any outliers or influential cases. Conclusively, parametric tests completed using these data sets should yield accurate results.

Table 2

Means and standard deviations of Worry, Distress Tolerance, Anxiety Sensitivity, Difficulties in Emotion Regulation, Depressive Symptoms, Negative Affect, Cognitive Avoidance, and Psychological Flexibility for the total sample

	n Valid (Missing)	Range	*M (SD)*
Worry (PSWQ)	470 (0)	16-80	54.11 (13.37)
Distress Tolerance (DTS)	469 (1)	1.17-5.00	3.04 (0.82)
Anxiety Sensitivity (ASI)	461 (9)	0-72	21.36 (15.57)
Difficulties in Emotion Regulation (DERS)	463 (7)	42-166	97.83 (26.72)
Depressive Symptoms (PHQ-9)	462 (8)	0-27	8.15 (6.19)
Negative Affect (PANAS-N)	461 (9)	10-50	23.87 (8.04)
Cognitive Avoidance (CAQ)	470 (0)	25-121	69.84 (20.58)
Psychological Flexibility (AAQ-II)	462 (7)	10-70	46.91 (11.98)

Replication of Previous Research

In addition to meeting the assumptions of parametric data, the results should replicate the relationships between variables established by previous research. For example, as the hypothetical relationship between worry and distress tolerance is based upon Borkovec's avoidance theory of worry and the literature evidencing a strong relationship between distress tolerance and cognitive avoidance, it is imperative that the data replicates these significant

relationships. A bivariate correlation matrix revealed that the present study did indeed replicate the relationships between worry, cognitive avoidance, psychological flexibility (experiential avoidance), difficulties in emotion regulation, and anxiety sensitivity previously established. All correlations were in the expected directions and were significant at the $p < .001$ level (see Table 3).

Hypothesis 1: Distress tolerance will negatively correlate with worry.

A bivariate correlation revealed a significant negative correlation between worry and distress tolerance, $r = -.422$, $p < .001$ (see Table 4), such that as distress tolerance decreases, worry increases. According to this correlation, distress tolerance accounts for 17.8% of the variability in worry. A partial correlation was conducted to determine if this relationship between worry and distress tolerance remained significant when controlling for other variables as well as to assess how much unique variance in worry can be accounted for by distress tolerance alone. Distress tolerance and worry remained significantly negatively correlated, $r = -.218$, $p < .001$. Ultimately, out of the 17.8% variability, distress tolerance uniquely accounts for 4.8% of this variance in worry when controlling for cognitive avoidance, psychological flexibility, anxiety sensitivity, and difficulties in emotion regulation, as well as depressive symptomology and negative affect (see Table 4).

Table 3

Summary of Bivariate Correlations of Worry with Cognitive Avoidance, Psychological Flexibility, Anxiety Sensitivity, Difficulties in Emotion Regulation, and Distress Tolerance

Measure	1	2	3	4	5	6	7	8
1. Worry	--	.37**	-.47**	.34**	.33**	-.42**	.39**	.42**
2. Cognitive Avoidance		--	-.47**	.45**	.35**	-.42**	.36**	.43**
3. Psychological Flexibility			--	-.62**	-.78**	.53**	-.68**	-.67**
4. Anxiety Sensitivity				--	.61**	-.44**	.51**	.62**
5. Difficulties in Emotion Regulation					--	-.55**	.63**	.64**
6. Distress Tolerance						--	-.46**	-.44**
7. Depressive Symptoms							--	.63**
8. Negative Affect								--

** $p < .001$

Table 4

Summary of Partial Correlations of Worry with Anxiety Sensitivity, Difficulties in Emotion Regulation, and Distress Tolerance when controlling for Cognitive Avoidance, Psychological Flexibility, Depressive Symptoms, and Negative Affect, along with Percentages of Unique Variance in Worry accounted for by each.

Measure	*r*	% unique variance accounted for in worry
Anxiety Sensitivity	-.012	0%
Difficulties in Emotion Regulation	-.142*	2%
Distress Tolerance	-.218**	4.8%

*p < .01, **p < .001.

Hypothesis 2: Distress tolerance will significantly predict worry.

A multiple linear regression was computed to determine whether the variable of distress tolerance could significantly predict worry. Empirical evidence supports the correlational relationships of anxiety sensitivity (Mennin et al., 2005; Salters-Pedneault et al., 2006) and emotion regulation (Floyd et al., 2005) with significantly elevated levels of worry, as well as offers support for anxiety sensitivity and difficulties in emotion regulation as predictors of worry (Floyd et al., 2005; Kashden et al., 2008; Vujanovic et al., 2008). Therefore, anxiety sensitivity and difficulties in emotion regulation were entered into the hierarchical multiple regression first. While a substantial amount of research exists ascribing an avoidance function to worry (Borkovec, 1994; Borkovec et al., 2004), research is inconclusive as to whether avoidance constructs may be predictors of worry as well (Rassin, Merckelbach, & Muris, 2000). Therefore, the more exploratory factors of cognitive avoidance, psychological flexibility, and distress tolerance were entered into the hierarchical regression via Steps 4-6. Depressive symptoms and negative affect were also controlled for in the regression.

In order to ensure that the regression model is accurate and generalizable, the assumption of multicollinearity was examined and the standardized residuals of worry were assessed for homoscedasticity, normality, and linearity. Following the guidelines set by Menard (1995) suggesting tolerance values less than 0.1 indicate multicollinearity issues and Myers (1990) who specifies a VIF score greater than 10 as cause for concern, these values indicate that there are no issues with multicollinearity (tolerance values ranging from .428 to .804; VIF values ranging from 1.245 to 2.338). Further, collinearity diagnostics do not suggest dependency between variables. A histogram and normal P-Plot of the standardized residuals of worry support the normality assumed in the data set. Additionally, plots of the standardized residuals plotted against the standardized predicted values for worry indicate that the assumptions of homoscedasticity and linearity have been met. Satisfied that the data meet the necessary assumptions, the results of the linear regression can be interpreted as valid and reliable.

Results of the multiple linear regression reveal that distress tolerance ($t(448) = -4.72$, $p < .001$), psychological flexibility ($t(448) = -4.09$, $p < .001$) and cognitive avoidance ($t(448) = 2.35$, $p < .05$) are significant predictors of worry, in addition to negative affect ($t(448) = 2.83$, $p < .01$), and difficulties in emotion regulation ($t(448) = -3.03$, $p < .01$). Anxiety sensitivity ($t(448) = -0.25$, $p = .806$, ns) and depressive symptoms ($t(448) = 1.13$, $p = .260$, ns) do not significantly improve the model's ability to predict worry. The significant ($p < .05$) changes in R^2 occurring at Steps 1, 4, 5, and 6 of the hierarchical regression suggest that the model is significantly improved by the addition of psychological flexibility, cognitive avoidance, difficulties in emotion regulation, and distress tolerance as predictors of worry. Further, analyses confirm that the probability in which such improvement could have resulted by chance is less than 0.1% (see Table 5).

Analyses reveal that as distress tolerance decreases by one standard deviation (0.82 units) worry increases by .24 standard deviations (β = -.24), indicating that for every 0.82 unit decrease in distress tolerance, worry increases by 3.2 units. This interpretation is only valid when the effects of all other predictors are held constant. As psychological flexibility decreases by one standard deviation (11.98 units) worry increases by .3 standard deviations (β = -.3), suggesting that for every 11.98 unit decrease in psychological flexibility, worry increases by 4 units. Similarly, as cognitive avoidance increases by one standard deviation (20.58 units) worry increases by 0.1 standard deviations (β = .11). Therefore, when the effects of all other variables are held constant, worry increases by 1.4 units with every 20.58 unit increase in cognitive avoidance. As difficulties in emotion regulation decreases by one standard deviation (26.72 units) worry increases by .21 standard deviations (β = -.21), revealing that for every 26.72 unit decrease in difficulties in emotion regulation, worry increases by 2.81 units. Finally, as negative affect increases by one standard deviation (8.04 units), worry increases by .17 standard deviations (β = .17). Therefore, for every 8.04 unit increase in negative affect, worry increases by 2.3 units. These relationships only remain true when holding the effects of all other predictors constant.

Hypothesis 3: Low distress tolerance will predict inclusion in the *worry* group.

Descriptive statistics of *worry* and *non-worry* groups and significant differences between groups. The *worry* group was composed of 116 participants, while 118 individuals qualified for the *non-worry* group. While the data was coded and grouped for the purpose of calculating a logistic regression, a series of Independent samples t-tests were also computed to examine potential differences between *worriers* and *non-worriers* for each variable of interest.

Analyses revealed significant differences between groups for all variables of interest with significance reaching the $p < .001$ level (see Table 6).

Findings of the logistic regression. As distress tolerance was found to be a significant predictor of worry, a logistic regression was computed to determine if distress tolerance could in fact predict group membership in either the *worry* or *non-worry* group. In order to ensure that the results of the logistic regression are accurate and generalizable the assumption of linearity of the logit was examined by computing a logistic regression including the predictors of distress tolerance, anxiety sensitivity, difficulties in emotion regulation, depressive symptoms, and negative affect, as well as the interaction between these variables and their respective natural logs. Analyses revealed that the interactions between each predictor and its natural log yielded significance values greater than .05 indicating that the assumption of linearity of the logit has been met for all variables.

The significant model chi-square statistic, (97.93, $p < .001$) indicates that the overall regression model with additional variables included predicts whether a participant meets criteria for the *worry* group significantly better than did the model with only the constant included. More specifically, the Wald statistic reports that the coefficients in the model for the variables of distress tolerance (Wald(1) = 14.58, $p < .001$), depressive symptoms (Wald(1) = 5.02, $p < .05$), and negative affect (Wald(1) = 9.11, $p < .01$) are significantly different from zero, which allows us to conclude that these predictors make a significant contribution to predicting the outcome. The Wald statistics for anxiety sensitivity (Wald(1) = .085, $p = .771$, *ns)* and difficulties in emotion regulation (Wald(1) = 1.93, $p = .165$, *ns)* are not significant, suggesting that these predictors do not contribute to the model. More specifically, analyses reveal that the way in which an individual appraises their distress (Wald(1) = 6.73, $p < .01$), as well as an individual's

tendency to allow the distress to absorb their attention and disrupt their general functioning (Wald(1) = 4.04, *p* < .05) significantly predicted whether or not the individual reported engaging in clinically significant levels of worry.

Odds ratios allow conclusions about changes in the odds in which an individual will exhibit clinically significant levels of worry that result from a unit change in each significant predictor. Specifically, as distress tolerance increases by one unit (e.g. DTS score from two to three) the odds of meeting criteria for the *worry* group decrease by 58 units (β = 0.42). As depressive symptoms increases by one unit, the odds of the participant exhibiting clinically significant levels of worry increase by 9 units (β = 1.09). Finally, as negative affect increases by one unit, the odds of qualifying for the *worry* group increase by 11 units (β = 1.11; see Table 7).

Table 5

Hierarchical Linear Regression Model

	R^2	B	SE	β	t	p
Step 1	.205					
Constant		38.59	1.8			
Depressive Symptoms		0.43	0.12	0.20	3.69	.000
Negative Affect		0.50	0.09	0.30	5.51	.000
Step 2	.206					
Constant		37.60	2.39			
Depressive Symptoms		0.40	0.13	0.19	3.18	.002
Negative Affect		0.47	0.10	0.28	4.81	.000
Difficulties in Emotion Regulation	0.02	0.03	0.04	0.64	.524
Step 3	.209					
Constant		38.73	2.51			
Depressive Symptoms		0.39	0.13	0.18	3.06	.002
Negative Affect		0.42	0.10	0.25	4.06	.000
Difficulties in Emotion Regulation	0.01	0.03	0.01	0.16	.877
Anxiety Sensitivity		0.07	0.05	0.08	1.46	.144
Step 4	.251					
Constant		71.21	6.92			
Depressive Symptoms		0.20	0.13	0.09	1.52	.128
Negative Affect		0.33	0.10	0.20	3.19	.002
Difficulties in Emotion Regulation	-0.08	0.03	-0.16	-2.30	.022
Anxiety Sensitivity		0.03	0.05	0.04	0.62	.534
Psychological Flexibility		-0.42	0.08	-0.37	-5.02	.000
Step 5	.271					
Constant		61.35	7.39			
Depressive Symptoms		0.19	0.13	0.09	1.50	.135
Negative Affect		0.28	0.10	0.17	2.75	.006
Difficulties in Emotion Regulation	-0.07	0.03	-0.13	-1.94	.053
Anxiety Sensitivity		-0.001	0.05	-0.001	-0.02	.987
Psychological Flexibility		-0.36	0.08	-0.32	-4.25	.000
Cognitive Avoidance		0.11	0.03	0.17	3.50	.001
Step 6	.306					
Constant		78.96	8.13			
Depressive Symptoms		0.14	0.13	0.07	1.13	.260
Negative Affect		0.28	0.10	0.17	2.83	.005
Difficulties in Emotion Regulation	-0.10	0.03	-0.21	-3.03	.003
Anxiety Sensitivity		-0.01	0.05	-0.01	-0.25	.806
Psychological Flexibility		-0.36	0.08	-0.30	-4.09	.000
Cognitive Avoidance		0.07	0.03	0.11	2.35	.019
Distress Tolerance		-3.89	0.82	-0.24	-4.72	.000

Table 6

Means and standard deviations of Worry, Distress Tolerance, Anxiety Sensitivity, Difficulties in Emotion Regulation, Depressive Symptoms, Negative Affect, Cognitive Avoidance, and Psychological Flexibility and differences between worry and non-worry groups

	Worry group ($n = 116$) M (SD)	Non-worry group ($n = 118$) M (SD)	t	r (effect size)
Worry	70.68 (4.21)	36.41 (7.11)	44.97**	.96
Distress Tolerance	2.58 (0.82)	3.48 (0.85)	-8.34**	.48
Anxiety Sensitivity	29.50 (16.80)	15.30 (13.56)	7.07**	.43
Difficulties in Emotion Regulation	111.43 (27.56)	86.83 (26.33)	6.92**	.42
Depressive Symptoms	11.44 (6.30)	5.04 (5.28)	8.33**	.49
Negative Affect	29.09 (8.22)	19.53 (6.95)	9.50 **	.54
Cognitive Avoidance	78.97 (20.33)	59.30 (19.71)	7.52**	.44
Psychological Flexibility	38.96 (12.38)	53.78 (10.86)	-9.64**	.54

** $p < .001$

Table 7

Summary of Logistic Regression Outcomes and Odds Ratios

	B(SE)	Wald	p	95% CI for Odds Ratio		
				Lower	Exp(β)	Higher
Distress Tolerance	-.87 (0.23)	14.58	.000***	0.27	0.42	0.65
Negative Affect	.10 (0.04)	9.11	.003**	1.04	1.11	1.19
Depressive Symptoms	.09 (0.04)	5.02	.025*	1.01	1.09	1.18
Difficulties in Emotion Regulation	-.01 (0.01)	1.93	.165	0.97	0.99	1.01
Anxiety Sensitivity	.004 (0.02)	0.09	.771	0.98	1.00	1.04

Note: R^2 = .31 (Hosmer & Lemeshow), .35 (Cox & Snell), .47 (Nagelkerke). Model $\chi^2(5)$ = 97.93, $p < .001$, ***$p < .001$, **$p < .01$, *$p < .05$.

Because the total score on the DTS is the mean of the four subscale scores, the scale is much smaller (0-4) than that of the PHQ-9 (0-27) or PANAS (10-50), making the odds ratios more difficult to interpret. Therefore, the predicted probability of an individual being classified in the *non-worry* or *worry* group was calculated using the equation produced by the logistic regression, imputing specific scores of each significant predictor (individually) while holding scores of all other variables in the equation constant (i.e. at their means). The specific scores chosen to be imputed into the regression model to calculate the predicted probability of group membership were the minimum total score, median of the lowest 25% of scores, median of the lower half of the interquartile range, median of the full range of scores, median of the upper half of the interquartile range, median of the highest 25% of scores, and the maximum total score.

Therefore, the predicted probability of obtaining *worry* or *non-worry* group membership was calculated at various scores of each significant predictor (see Table 8 and Figure 1).

Table 8

Predicted Probability of Group Membership with varying Total Scores on DTS

Distress Tolerance Scale		Predicted Probability of Group Membership	
Total score	Xβ	Non-worry group	Worry group
1	-1.70862	15.3%	84.7%
1.5	-1.27312	21.9%	78.1%
2.5	-0.40212	40.1%	59.9%
3	0.03338	50.8%	49.2%
3.5	0.46888	61.5%	38.5%
4.5	1.33988	79.2%	20.8%
5	1.77538	85.5%	14.5%
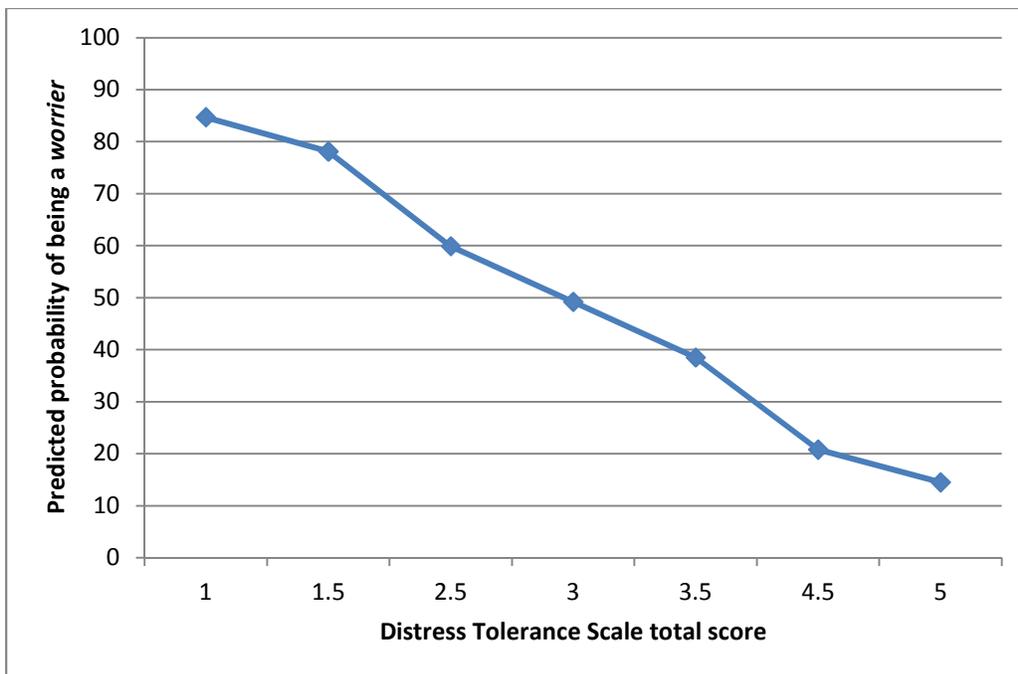
Figure 1. Predicted probability of being a *worrier* given specific total scores on the DTS, while holding scores of all other variables constant (at their means).

Additional Analyses

Interaction effect – Distress tolerance and difficulties in emotion regulation.

Analyses revealed a significant interaction effect between distress tolerance and difficulties in emotion regulation, Wald(1) = 5.18, $p < .05$. Odds ratios indicate that if an individual exhibits a DERS total score that is 1.5 standard deviations below the mean (depicted in Figure 2 as 'low' DERS), their odds of being a worrier decrease 81 times when their DTS total score increases by one unit. If this individual endorsed the mean total score on the DERS (referred to in Figure 2 as 'med' DERS) their odds of being a worrier decrease 65 times with each unit increase in DTS total score. Finally, if this participant endorsed a DERS total score that is 1.5 standard deviations above the mean (displayed in Figure 3 as 'high' DERS), their odds of being a worrier only decrease 33 times when their DTS total score increases by one unit.
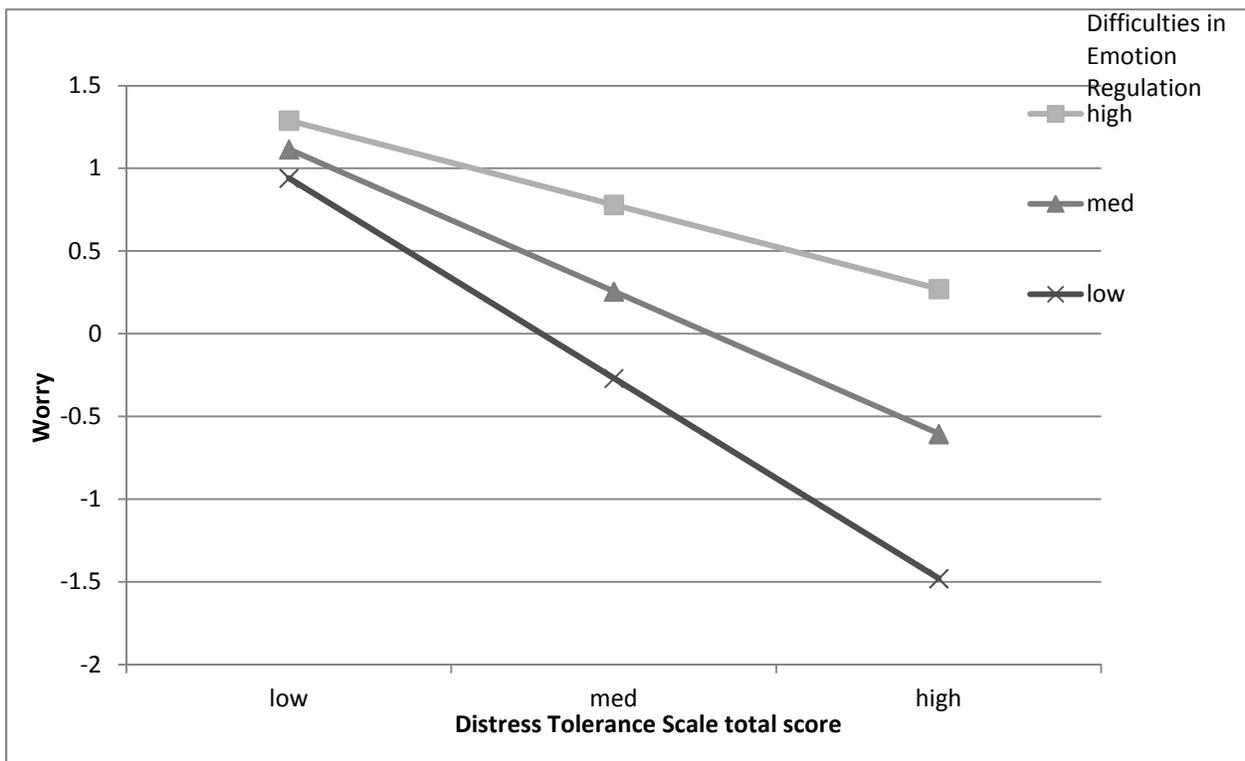
Figure 2. Degree of difficulties in emotion regulation interacts with improvements in distress tolerance to determine worry.

Discussion

The present study successfully replicated the significant correlational relationships which worry has with avoidance constructs, difficulties in emotion regulation, and anxiety sensitivity previously established in the literature (Borkovec et al., 2004; Floyd et al., 2005; Salters-Pedneault et al., 2006). Specifically, worry was found to significantly positively correlate with cognitive avoidance. In addition, worry significantly negatively correlates with psychological flexibility, meaning that as worry increases, psychological flexibility decreases or experiential avoidance increases. These findings provide continued support for Borkovec's *avoidance theory of worry.* Additionally, analyses revealed a significant positive correlation between worry and anxiety sensitivity, replicating the findings of Floyd et al. (2005), as well as between worry and difficulties in emotion regulation, providing support for research by Salters-Pedneault et al. (2006). Beyond these bivariate correlations, analyses from the current study indicate that cognitive avoidance, experiential avoidance, and difficulties in emotion regulation, account for unique variance, albeit small amounts (1.3%, 3.4%, and 2% respectively), in worry.

Significant correlational relationships between distress tolerance and anxiety sensitivity, difficulties in emotion regulation, and avoidance constructs discovered by previous researchers were replicated. Specifically, distress tolerance significantly negatively correlates with cognitive avoidance, anxiety sensitivity, and difficulties in emotion regulation. Meanwhile, a significant positive association was found between distress tolerance and psychological flexibility. Analyses further revealed that distress tolerance shares 5.8% unique variance with cognitive avoidance, supporting several previous studies which have presented a robust relationship between distress tolerance and maladaptive avoidance behaviors, such as binging and purging (Anestis et al., 2007), alcohol and marijuana use (Vujanovic et al., 2011; Zvolensky et al., 2009),

compulsive hoarding (Timpano et al., 2009), and self-injurious behaviors (Linehan, 1993).

Replication of these correlational relationships provides further empirical support for the theory

upon which the current study hypotheses were based. Analyses computed by linear and logistic

regression however revealed some variations between the present study and previous research in

terms of which variables significantly predict worry.

Hypothesis 1: Distress tolerance will negatively correlate with worry.

While supporting previous research by confirming the robust relationships worry has

with cognitive avoidance, psychological flexibility, difficulties in emotion regulation, and

anxiety sensitivity, analyses of the present study also reveal a novel association between worry

and distress tolerance. Analyses indicate a linear relationship between distress tolerance and

worry, in which worry increases as distress tolerance decreases. While cognitive avoidance,

psychological flexibility, and difficulties in emotion regulation also account for unique variance

in worry when other variables are partialed out, distress tolerance actually maintains the

strongest relationship with worry when controlling for all other variables, including depressive

symptomology and negative affect. Indeed, distress tolerance accounts for 4.8% unique variance

in worry.

Hypothesis 2: Distress tolerance will significantly predict worry.

The linear regression determined that negative affect, psychological flexibility, cognitive

avoidance, difficulties in emotion regulation, and distress tolerance are significant predictors of

worry. The linear regression reports that depressive symptoms and anxiety sensitivity do not

significantly predict worry, a finding that is contrary to research by Vujanovic et al. (2008) and

Floyd et al. (2005). Analyses suggest that psychological flexibility shares all of the variance

which depressive symptoms accounts for in worry, as depressive symptoms no longer makes a

significant contribution to the model after psychological flexibility is added in Step 3 of the hierarchical regression. Additionally, while difficulties in emotion regulation does not significantly improve the model's ability to predict worry when initially added in Steps 2 or 3, it does significantly contribute to the model when psychological flexibility is added in Step 4 and continues to significantly predict worry in Steps 5 and 6.

Vujanovic et al. (2008) reported significant main effects of anxiety sensitivity and difficulties in emotion regulation as predictors of worry. While our results corroborate their finding that difficulties in emotion regulation significantly improves the model's ability to predict worry, our results indicate that anxiety sensitivity is not a significant predictor of worry. Vujanovic et al. (2008) did control for negative affect in their hierarchical linear regression, however they did not control for depressive symptoms. As diagnostic reports reveal that the regression did not violate the assumption of multicollinearity, it is plausible that anxiety sensitivity primarily predicts variance in worry which happens to also be accounted for by other variables. Presumably, much of the variance in worry accounted for by anxiety sensitivity is shared with depressive symptoms.

Similarly, research by Floyd et al. (2005) reported that anxiety sensitivity accounts for unique variance with worry after controlling for general distress. However, analyses of the current study revealed that while anxiety sensitivity shares 11.8% of its variability with worry, anxiety sensitivity does not account for any unique variance in worry when controlling for depressive symptoms and negative affect. These findings also suggest that much of the variance in worry accounted for by anxiety sensitivity is shared with depressive symptoms and negative affect. Therefore, while general distress, negative affect, and depressive symptoms seem like very similar constructs, they account for distinct portions of variance in worry. It is important

for future research on worry to control for all three of these constructs, as controlling for one or

the other may produce misleading results. Conclusively, results of the present study indicate that

the relationship which anxiety sensitivity has with worry is potentially weaker than conveyed by

previous research.

Despite Borkovec's long-standing *avoidance theory of worry* and the plethora of research

establishing the association between distress tolerance and other maladaptive avoidance

behaviors, this is the first study to date which details a significant relationship between distress

tolerance and worry. In addition, the present study supports psychological flexibility and

cognitive avoidance as significant predictors of worry. These findings not only offer substantial

support for Borkovec's *avoidance theory of worry*, they actually augment his theory by

suggesting that the general tendency to utilize cognitive and/or behavioral strategies to escape

cognitions and alleviate emotional experiences predicts the later development of chronic worry.

As research thus far is inconclusive as to whether cognitive/experiential avoidance is a

causal/predisposing factor for worry in addition to the function which worry serves (Rassin et al.,

2000), these findings empirically support cognitive/experiential avoidance as predictive factors

for chronic worry as well as factors which sustain worry once developed. Further research using

a longitudinal study design is necessary to confirm that experiential/cognitive avoidance

chronologically predates worry as well as exists in tandem with it. Nonetheless, these novel

findings supporting distress tolerance, psychological flexibility, and cognitive avoidance as

significant predictors of worry add to the literature on chronic worry and will aid psychologists

in further understanding the development and maintenance of chronic worry.

Hypothesis 3: Low distress tolerance will predict inclusion in the *worry* group.

Results of the logistic regression reveal that when participants are classified as *worriers* or *non-worriers*, distress tolerance is a significant predictor of group membership. Specifically, the predicted probability in which a participant will score a 65 or greater on the PSWQ and qualify for the *worry* group can be calculated by imputing the participant's total score on the DTS into the equation produced by the logistic regression, while holding the total scores of all other variables constant at their means. For example, analyses revealed that an individual with a total score of one on the DTS, indicating minimal distress tolerance, has an 84.7% chance of being in the *worry* group. If their distress tolerance total score increases to three, the probability that this individual will exhibit clinically significant worry decreases to 49.2%. Finally, the model predicts that a DTS total score of five, suggesting maximum tolerance of distressing emotions, indicates a 14.5% chance of obtaining *worry* group membership, when scores of all other variables are held constant at their means (see Table 8 and Figure 1).

Clinical Implications

The novel finding that distress tolerance is a significant predictor of chronic worry yields clinical implications in terms of prevention and treatment. As a large proportion of individuals who receive traditional cognitive-behavioral therapies (CBTs) for GAD fail to meet criteria for high end-state functioning post-treatment (Waters & Craske, 2005) GAD continues to be the most difficult of all the anxiety disorders to treat (Mennin et al., 2005). As CBTs for GAD deemed by research to be efficacious and specific (Butler, Fennell, Robson, & Gelder, 1991; Dugas et al., 2010; van der Heiden, Muris, & van der Molen, 2012) do not explicitly address distress tolerance, adding treatments aimed at increasing patients' tolerance of distressing emotions may be an avenue for clinical improvement. Additionally, low distress tolerance could

be considered a predisposing factor for chronic worry and potentially GAD. As such, screeners

for distress tolerance could be introduced in clinical settings as early detection of and

intervention for low distress tolerance could prevent individuals from becoming chronic

worriers, saving them from intense suffering. As the literature continues to associate the

inability to tolerate distressing emotions with the development of many maladaptive avoidance

behaviors, now including chronic worry, bolstering society's distress tolerance in a preventative

fashion may thwart the development of all sorts of psychopathology, including maladaptive

eating behaviors associated with bulimia (Anestis et al., 2007), excessive alcohol and marijuana

use (Vujanovic et al., 2011; Zvolensky et al., 2009), compulsive hoarding (Timpano et al., 2009),

self-injurious behaviors (Linehan, 1993), and chronic worry.

Traditional CBTs have not been as successful in terms of yielding clinically significant

and sustainable improvements in psychological functioning for individuals with GAD compared

to other anxiety disorders (Waters & Craske, 2005). However, recent randomized controlled

trials using acceptance-based behavioral therapies (ABBT) with individuals meeting diagnostic

criteria for GAD have yielded promising results. Indeed, research by Roemer, Orsillo, and

Salters-Pedneault (2008) revealed that 76.92% of the individuals who received ABBT no longer

met diagnostic criteria for GAD post-treatment compared to only 16.67% of wait-list controls.

These individuals maintained their treatment gains, continuing to meet criteria for high end-state

functioning at three and nine month follow-up evaluations. In addition, individuals who received

ABBT for GAD exhibited significant reductions in experiential avoidance from pre to post-

treatment. As the present investigation reveals powerful associations between

experiential/cognitive avoidance and worry, the findings of the current study provide theoretical

support for the efficacy of these acceptance-based interventions. Particularly, the current study's

support for experiential avoidance as a predictor of worry offers continued provision for ABBTs which have been found to improve worry by increasing acceptance and decreasing experiential avoidance.

Interaction Effects

Results reveal a significant interaction between distress tolerance and difficulties in emotion regulation. The interaction effect is such that an individual's odds of being a worrier decrease as distress tolerance increases by differing amounts depending on the individual's degree of difficulties in emotion regulation. Specifically, with each unit increase in distress tolerance, the odds that an individual will be a worrier decrease two and a half times as much for individuals who exhibit few difficulties in emotion regulation than for those who endorsed having many difficulties in emotion regulation. Similarly, with each unit increase in distress tolerance, the odds of being a worrier decrease 25% more for individuals with few difficulties in emotion regulation compared to those exhibiting an average amount of difficulties in emotion regulation (for this sample). Finally, with each unit increase in distress tolerance, the odds that an individual will exhibit clinically significant levels of worry decrease twice as much for individuals who reported an average amount of difficulties in emotion regulation than for those experiencing ubiquitous trouble regulating their emotions. While an individual's odds of being a worrier consistently decrease with each unit increase in distress tolerance, the magnitude of this reduction in odds is influenced by the degree of difficulties that individual exhibits in regulating their emotions. Therefore, equivalent increases in distress tolerance lead to greater improvements in worry for those with few difficulties in emotion regulation compared to those with pervasive difficulty regulating emotion.

Conclusively, greater difficulties in emotion regulation appear to restrict the impact which improved distress tolerance has on worry. These findings suggest that treatment of difficulties in emotion regulation in addition to improving distress tolerance will be necessary to substantially reduce chronic worry in these individuals. Further research should investigate whether this treatment could be done simultaneously, or if difficulties in emotion regulation must be addressed before distress tolerance, or vice versa. These findings reinforce the importance of individualized treatments based on careful assessment, as treatment focusing on increasing distress tolerance may yield significant reductions in worry for some individuals, while more intensive interventions will be necessary to achieve the same results with individuals exhibiting worry co-morbid with pervasive difficulties in emotion regulation.

Limitations

Despite the novel and significant relationships discovered throughout this present investigation, several limitations should be considered. First, the generalizability of the results may be limited due to aspects of the study sample. While analyses of demographics reveal that the sample was somewhat diverse in terms of ethnicity with 40% belonging to a minority group, the sample was very restricted in terms of age, as 84% of participants were between 18 and 25 years old. Therefore as the sample was comprised of primarily young adults and entirely college students, perceptions held by this sample may not generalize well to people of differing ages, maturity levels, and educational backgrounds. However, because Eastern Michigan University has a large student body of 23,000 students and is primarily a non-residential university, the college experience seems to vary dramatically from student to student, which may result in a more generalizable student sample than could be recruited at other colleges or universities. In addition, the vast majority of participants (71.3%) reported discovering the study via their

Introduction to Psychology course. While enrollment in this course does not necessitate that these individuals were majoring in psychology, as it is often taken to fulfill general education requirements, it is possible that this sample has had more exposure to psychological concepts and may be more psychologically-minded than the general population. This may additionally limit the generalizability of the current study's findings. Future research should examine the relationship between distress tolerance and worry utilizing a variety of more diverse samples.

A second potential limitation to the present study is the reliance on self-report instruments as the primary assessment strategy. While research determined adequate validity and reliability of each instrument utilized, social desirability is always a limitation of self-report data. In addition, self-report measures, particularly those answered on-line without supervision of a study investigator, provide the opportunity for participants to randomly respond or skip large portions of each survey. Unfortunately, without any methods of testing for malingering or random-responding, these flaws inherent in self-report measures may have confounded the results. Therefore, future research utilizing multi-method approaches including clinical interviews is necessary to corroborate the findings of the present study. Finally, although our results reveal that distress tolerance, depressive symptoms, and negative affect significantly predict worry, the cross-sectional nature of the current study limits causal conclusions. Therefore, future research should utilize a longitudinal design to examine the relationship between distress tolerance and chronic worry across time.

Despite these limitations, the novel relationship discovered between distress tolerance and worry adds to the literature on the development and maintenance of chronic worry. By relating chronic worry to distress tolerance, a construct which has been repeatedly associated with maladaptive avoidance behaviors, the present investigation provides continued support for

Borkovec's *avoidance theory of worry*. In addition, this novel relationship may positively

inform the treatment of chronic worriers, as incorporating interventions which target distress

tolerance may improve treatment outcomes. The revelation of psychological flexibility and

cognitive avoidance as significant predictors of worry corroborates as well as augments

Borkovec's theory. Finally, this specific discovery provides theoretical support for and

continued provision of the use of acceptance-based behavioral therapies to treat chronic worry.

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APPENDICES

Appendix A: Eastern Michigan University's Human Subjects Review Committee Aprroval

EASTERN MICHIGAN UNIVERSITY

Education First

February 24, 2013

Bethany Sabourin
Department of Psychology

Dear Bethany:

The College of Arts and Sciences Human Subjects Review Committee (CAS HSRC) of
Eastern Michigan University has reviewed and approved your proposal (#1157) titled,
"Can Distress Tolerance Predict Chronic Worry? Investigating the Relationships among
Worry, Cognitive Avoidance, Anxiety Sensitivity, Emotion Regulation, and Distress
Tolerance." The CAS HSRC has determined that the rights and welfare of the individual
subjects involved in this research are carefully guarded. Additionally, the methods used
to obtain informed consent are appropriate, and the individuals participating in your study
are not at risk.

You are reminded of your obligation to advise the HSRC of any change in the protocol
that might alter your research in any manner that differs from that upon which this
approval is based. Approval of this project applies for one year from the date of this
letter. If your data collection continues beyond the one-year period, you must apply for a
renewal. Please specify in your consent form that approval is from 2/24/2013 to
2/23/2014.

On behalf of the Human Subjects Committee, I wish you success in conducting your
research.

Sincerely,

Alissa Huth-Bocks

Alissa Huth-Bocks, Ph.D.
CAS Human Subjects Review Committee Chair

Note: If project continues beyond the length of **one** year, please submit a continuation
request form by 2/23/2014.

cc: Ellen Koch, Ph.D.

University Human Subjects Review Committee · Eastern Michigan University · 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu

Appendix B: Informed Consent Agreement

Can Distress Tolerance Predict Chronic Worry?
The Relationships among Worry, Cognitive Avoidance, Emotion Regulation, Anxiety
Sensitivity, and Distress Tolerance

Primary Investigator: Bethany Sabourin, B.A.

Thesis Committee Chair/Faculty Advisor: Ellen Koch, Ph.D.

Thesis Committee: Ellen Koch, Ph.D., Flora Hoodin, Ph.D., Tamara Loverich, Ph.D.

Purpose: The purpose of this research study is to gain a better understanding of worrying – why do some people uncontrollably worry? What might make someone more likely to worry excessively? We aim to investigate variables which are related to and may predict the use of worry, such as tolerating and regulating distressing emotions.

Procedure: This study involves answering five demographic questions and completing nine brief questionnaires, which should take about 50 minutes total of your time. The questionnaire will ask about the degree to which you worry. In addition, the questionnaires aim to gauge how you typically regulate your emotions, particularly distressing emotions, and measure personal sensitivity to the symptoms of anxiety. The questionnaires inquire about depression and Generalized Anxiety Disorder (GAD), as well. You will be asked to fill out these questionnaires online using the Survey Monkey software. The completed questionnaires will only be reviewed by the investigators.

Risks: The potential risks of participating in this study are minimal. However, some individuals may feel uncomfortable sharing personal information and some questions may be more sensitive than others. If you become uncomfortable, you may discontinue your participation at any time. You may also contact Snow Counseling and Psychological Services at (734) 487-1118 should you become overly distressed by participating in this study. Services are free for currently enrolled students.

Benefits: There may be no personal benefit to you. However, you may learn more about whether or not you typically worry and about how you regulate and/or experience your emotions. Additionally, your participation in this study is also expected to benefit the research community by increasing our knowledge about worry and factors that contribute to its development.

Compensation: At the end of the study, you will be directed to another survey where you can enter your contact information (name and email address) for a raffle drawing. Your identifying information will not be connected to your survey responses at any point. For the raffle drawing, you have a chance to receive an electronic gift card from your preference of Amazon, Target, or Walmart. One $30 and two $15 gift cards will be available once the study is completed.

Additionally, if permitted by your instructor, you could receive compensation of extra credit in your psychology course. Your instructor will determine if and how much extra credit is available for research participation.

Confidentiality: All information obtained from you will remain confidential. The questionnaires will be completed using a secure website. Once data is collected, it will be stored in a password protected computer file in a locked office. Additionally, your identity or contact information will not be disclosed to any unauthorized individuals. If you provide identifying information, this will also be kept separate from your responses at all times.

Withdrawal without penalty: Participation in this research study is voluntary. You will not be penalized for refusing to participate in the study. Further, you are free to withdraw consent and discontinue your involvement in the study at any time without penalty.

Public use of the data: Information from these surveys may be presented in oral or poster presentations at conferences or submitted for publication in academic journals. Your identity and individual responses will not be disclosed and all information will be presented as group data.

Information regarding what to do if you have questions:

If you have any questions about your participation in this study, please feel free to contact Bethany Sabourin (primary investigator): (248)-953-8144 or bsabouri@emich.edu or Dr. Ellen Koch (faculty advisor): (734) 487-0189 or ellen.koch@emich.edu.

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from 2/24/13 to 2/23/14. If you have questions about the approval process, please contact the Director of the Graduate School (734.487.0042, human.subjects@emich.edu).

By checking the "I accept" box below and entering this survey, I acknowledge that I have read, understood, and accepted the terms outlined above. Additionally, I acknowledge that I am at least 18 years old and freely able to consent to participating in this study.