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PROPOSED SPECIFIC FACTORS FOR GENERALIZED ANXIETY DISORDER WITHIN THE INTEGRATIVE HIERARCHICAL MODEL OF ANXIETY AND DEPRESSION

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Abstract

Since its first appearance in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III, 1980), generalized anxiety disorder (GAD) has provided challenges to the discriminative validity of the mood and anxiety disorders. Although the removal of autonomic symptoms from the diagnostic criteria for GAD in DSM-IV helped to increase the diagnostic reliability from a range of .27 (Mannuzza et al., 1989) to .56 (Williams et al., 1992) based on DSM-III-R criteria and .67 based on DSM-IV criteria (Brown, Di Nardo, Lehman, & Campbell, 2001), some researchers have expressed concern that this distinction further confuses the boundary between GAD and mood disorders (Clark & Watson, 1991; Brown et al., 1995). It has been argued that though the removal of these symptoms from the diagnostic criteria improved the overall reliability of GAD, as well as the discriminative validity of GAD in relation to the other anxiety disorders, the overlap with depressive disorders and the discriminative difficulties therein still remain. Research based on DSM-IV criteria has shown that GAD shares a closer relationship to the mood disorders than it does to other anxiety disorders (Mineka, Watson, & Clark, 1998; Brown, Chorpita, & Barlow, 1998; Watson, 2005). Clark and Watson (1991) developed the tripartite model, in which depression and anxiety share a common factor of negative affectivity, depression is indicated by low positive affectivity (PA) and anxiety by high autonomic arousal (AA). Mineka, Watson, and Clark expanded on this model with the integrative hierarchical model, within which each anxiety disorder is indicated by an idiosyncratic predictor. Watson (2005) has made the argument that this model can and should be extended to new taxonomic systems, including the approaching DSM-V. However, a specific factor remains to be determined for GAD within this model.

The present study sought to determine possible specific factors for GAD within the integrative hierarchical model. Research participants (n = 423) completed a packet of questionnaires

related to the constructs of interest. Participants were mostly female (69%) and Caucasian (85%), with an average age of 20 years. Latent path relationships were examined using structural equation modeling (SEM) in LISREL (Joreskog & Sorbom, 2006). The initial model replicating the tripartite structure of NA, GAD, and depression fit the data extremely well. Three competing models with possible specific latent factors for GAD were then examined: worry, perfectionism, as represented by a dimensional measurement of obsessive-compulsive personality disorder (OCPD), and positive beliefs about worry. The latter latent factor consisted of scales related to perceptions of worry as preparatory and motivating. All models fit the data exceptionally well. Both perfectionism and positive beliefs about worry strongly related to GAD and failed to demonstrate a statistically significant relationship with depression. Worry, despite demonstrating a large and significant relationship with GAD ($\beta = .88$), also significantly, albeit negatively, related to depression as well ($\beta = -.09$). Due to concerns regarding the instrumental relationship of worry to current GAD diagnostic criteria and possible resultant tautological statistical findings, models were tested to determine if positive beliefs about worry and perfectionism remained significant predictors of GAD while controlling for the latent factor for worry. These models fit the data exceptionally well. Perfectionism and positive beliefs about worry were retained as specific factors for GAD.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

Taxonomic disagreements are not new to the classification of mental disorders. There have been over the years large-scale reorganizations of the most widely used nosological system, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; American Psychiatric Association, 1952, 1968, 1974, 1980, 1987, 1994, 2000). These reorganizations have variously been based on social or political criteria, such as the removal of homosexuality as a disorder from DSM-II (APA, 1974); changing theoretical climates within the discipline, such as the shift from psychodynamically-based to more atheoretically-based classifications between the DSM-II and the DSM-III (APA, 1980); or statistical data, such as reliability findings from large-scale studies (Di Nardo, Moras, Barlow, Rapee, & Brown, 1993; Mannuzza et al., 1989; Williams et al., 1992).

Studies such as those listed above contributed to the reorganization of diagnostic criteria for several mood and anxiety disorders within the DSM. Within the diagnostic criteria for generalized anxiety disorder (GAD), such reorganizations included the addition of a requirement that worry be perceived as uncontrollable and the removal of autonomic arousal symptoms. Although these changes were based on empirical evidence that, in the case of the former, the parameter of uncontrollability distinguishes pathological worry from normal worry (Abel & Borkovec, 1995; Borkovec, 1994) and, in the case of the latter, that autonomic symptoms fail to effectively distinguish GAD from other anxiety disorders (Brown, Marten, & Barlow, 1995), some controversy remains regarding both revisions.

Although the removal of autonomic symptoms from the diagnostic criteria for GAD helped to increase the diagnostic reliability from a range of .27 (Mannuzza et al., 1989) to .56 (Williams et al., 1992) based on DSM-III-R criteria and .67 based on DSM-IV criteria (Brown, Di Nardo, Lehman, & Campbell, 2001), some researchers have expressed concern that this distinction further

confuses the boundary between GAD and mood disorders such as major depressive disorder (MDD; Clark & Watson, 1991; Brown et al., 1995). For example, Brown et al., (1995) showed that of the three symptom clusters for GAD delineated in DSM-III-R, Motor Tension (MT), Vigilance and Scanning (VS), and Autonomic Hyperactivity (AH), only AH differentiated GAD from the mood disorders. However, analyses intended to discriminate GAD from other *anxiety* disorders demonstrated that MT, VS, and DSM-IV cluster scores yielded the largest effects (Brown et al., 1995), suggesting that what discriminates GAD from mood disorders is not synonymous with what discriminates GAD from other anxiety disorders.

Therefore, though the removal of AH from diagnostic criteria improved the overall reliability of GAD as well as the discriminative validity of GAD in relation to the other anxiety disorders, the overlap with depressive disorders and the discriminative difficulties therein still remain. Research based on DSM-IV criteria has shown that GAD shares a closer relationship to the mood disorders than it does to other anxiety disorders (Mineka, Watson, & Clark, 1998; Brown, Chorpita, & Barlow, 1998; Watson, 2005). Furthermore, it has been shown that GAD and MDD may share a common genetic diathesis, though environmental effects play a crucial role in their differential manifestations (Roy et al. 1995). Ideally a nosology might be developed that discriminates GAD from mood disorders equally as well as from other anxiety disorders.

Negative Affect as a Common Factor

For more than thirty years the question of what connects and what differentiates anxiety and depression, and moreover, what differentiates anxiety disorders from each other has been debated. The DSM-I and DSM-II distinction of neurosis, an umbrella term that encapsulated most of today's mood and anxiety disorders, goes back to the days of Freud (1929) and his early psychoanalytic contemporaries. While defining anxious, depressive, and obsessional *types* of neuroses, this term

assumed a common underlying etiological factor (American Psychiatric Association, 1952, 1968). One dilemma that serves to obfuscate discriminative solutions is this: what elements of shared characteristics between disorders can be attributed to shared etiological factors and what elements should instead be attributed to overlapping diagnostic or measurement artifacts?

Regarding the diffuse categories of anxiety and depression, researchers have established a long and consistent history of demonstrating high correlations between self-report measures of these constructs (Mendels, Weinstein, & Cochrane, 1972; Costello, 1976; Gotlib, 1984; Watson & Clark, 1984; Dobson, 1985a; Dobson, 1985b; Watson, Clark, & Carey, 1988; Clark & Watson, 1991; Clark, Watson, & Mineka, 1994; Mineka, et al., 1998; Brown, et al., 1998; Watson, 2005). Dobson (1985a) found that the average correlation between various scales measuring anxiety was .66, the average for depression scales was .69, and the average correlation between anxiety and depression scales was .61.

Some researchers have taken the intercorrelations between various mood and anxiety measures to indicate the presence of an underlying or unifying construct of general distress (Gotlib, 1984; Watson & Clark, 1984; Dobson, 1985c; Watson, et al., 1988; Clark & Watson, 1991; Clark, et al., 1994; Mineka, et al., 1998; Brown, et al., 1998; Watson, 2005). This proposed underlying construct has been demonstrated by factor analyses of scales purported to discriminatively measure anxiety and depression. Such analyses have revealed a two factor structure in which the first factor has accounted for 50% (Gotlib, 1984) to 74.4% (85% for females only; Dobson, 1985c) of the total variance. In both studies, all of the scales loaded heavily on the first factor. This factor, which Gotlib (1984) and Dobson (1985c) have labeled "psychological distress," has been termed Negative Affectivity (NA) by Tellegen (1982) and Watson and Clark (1984). NA is closely related to the construct of Neuroticism (Eysenck & Eysenck, 1968). In fact, several studies have used 'negative

affectivity' and 'neuroticism' synonymously (Watson & Clark, 1984; Muris, Roelofs, Rassin, Franken, & Mayer, 2005; Gamez, Watson, & Doebbeling, 2006; Weinstock & Whisman, 2006).

NA is conceptualized as the tendency to experience distress, dysphoria, and irritability, have a negative view of self, and expect negative outcomes from the external environment. Individuals low on NA tend to exhibit a positive view of self and often display contentedness and satisfaction. NA and its related constructs (e.g. neuroticism, negative emotionality, psychological distress) have been shown to be heritable (Tellegen et al., 1988; Kendler et al., 1992) and stable across time (Watson & Clark, 1984). In addition, NA, as proposed by Watson and Clark (1988), is uncorrelated with Positive Affectivity (PA), a measure of positive or pleasurable activation, enthusiasm, approach, and engagement with the environment.

The Tripartite Model

In attempting to isolate the root or cause of the considerable diagnostic overlap between anxiety and depression, one possible source of error may be the categorical nature of the nosological system in use. By limiting research and clinical classifications to what are ultimately binary case or no-case distinctions, we may be missing more subtle differentiations of disorders that lay along a continuum. A nosology that incorporates a more dimensional approach may therefore allow for more discriminative power.

In light of the apparent common variance shared by both mood and anxiety disorders and the need in both research and clinical settings to differentiate the two groups of disorders, Clark and Watson (1991) sought to utilize a dimensional model that contained a common factor that is shared by anxiety and depression as well as specific factors that identify each individually. Citing evidence that both mood and anxiety disorders relate to NA but that only mood disorders relate to PA (Hall, 1977; Tellegen, 1985; Watson and Tellegen, 1985, Watson, et al., 1988), Clark and Watson (1991)

proposed the tripartite model of anxiety and depression. In this model depression and anxiety share a common factor of NA, depression is distinguished by a specific factor of low PA, and anxiety by a specific factor of high autonomic arousal (AA; Clark & Watson, 1991).

Although strong support has been found for the tripartite model (e.g. Joiner, Catanzaro, & Laurent, 1996; Watson, et al., 1995), weaknesses have been proposed within certain aspects of the model (Mineka, et al., 1998; Brown et al., 1998) and the model as a whole (Burns & Eidelson, 1998). The most apparent inconsistency has been the finding that AA is a specific factor for panic disorder (PD) but not for anxiety in general or other anxiety disorders specifically (Mineka, et al., 1998; Brown, et al., 1998). It has also been shown that low PA is a characteristic of social phobia as well as depression (Brown et al., 1998; Chorpita et al., 2000, Watson, et al., 1988; Hughes et al., 2006). Therefore, more work is required in order to better delineate specific factors for both anxiety and depression.

The Integrative Hierarchical Model of Anxiety and Depression

In light of evidence that the tripartite model accurately reflects a shared component of anxiety and depression and a unique specifier for depression but fails to adequately differentiate anxiety, Mineka et al. (1998) created the integrative hierarchical model of anxiety and depression. In this model depression and anxiety share a common, higher-order factor of NA and each disorder is differentiated by its own specific factor. As previously demonstrated, the specific factor for depression within this model is low PA (Clark & Watson, 1991) and the specific factor for PD is high AA (Brown et al., 1998). Taken at face value, these specifications do not appear to represent a drastic departure from those of the tripartite model. However, the assertion that each individual diagnosis can be defined by a unique specifier provides a framework within which mood and anxiety disorders may more clearly be delineated. Mineka, et al. (1998) maintain that further research is

required to identify the specific factors for other disorders such as GAD, obsessive compulsive disorder (OCD), post-traumatic stress disorder (PTSD), dysthymia, and specific phobias.

As mentioned above, Brown et al. (1998) found that low PA was related to social phobia as well as MDD, though to a lesser degree by both correlational and structural measurement. Hughes et al. (2006) demonstrated that although low PA was a specific factor for social phobia, when the diagnosis was divided into generalized and specific social phobia, represented as social interaction anxiety and performance anxiety respectively, only social interaction anxiety was closely related to low PA, whereas performance anxiety was better differentiated by high AA. These equivocal results demonstrate that further work needs to be done in defining specific factors within the integrative hierarchical model. Though the present study will not examine possible specific factors for social phobia, it will seek to replicate prior findings relating MDD to low PA and to examine the possible role of low PA in GAD.

Possible Specific Factors for GAD

Given the stated need to identify specific factors for disorders other than MDD, panic disorder, and social phobia (Mineka, et al., 1998; Brown, et al., 1998), the aim of the present study was to identify a specific factor for GAD within the integrative hierarchical model. The current study used structural equation modeling (SEM) to evaluate the specificity of three constructs to GAD. The constructs of interest were worry, positive beliefs about worry, and perfectionism, as represented by a dimensional measurement of obsessive-compulsive personality disorder (OCPD).

Worry

Worry is the central feature of the diagnostic criteria for GAD in the DSM-IV-TR (American Psychiatric Association, 2000). Worry that is pathological (and therefore indicative of GAD) is chronic and disruptive (Borkovec, Ray, & Stober, 1998). However, worry has been shown to play a

role in multiple axis I disorders, including depression (Ruscio, et al., 2005; Andrews & Borkovec, 1988). Furthermore, worry has often been conflated with the construct of rumination. It is believed that the process of unproductive repetitive thought is manifested in both worry and depressive rumination (Segerstrom, Stanton, Alden, & Shortridge, 2003). Though an examination of rumination was outside of the scope of the current study, some discussion of the differences and similarities between worry and rumination is warranted. If worry is to differentiate GAD from depression within the integrative hierarchical model, worry and rumination would necessarily need to be differentiable.

Though other, more elaborated descriptions (to be discussed below) exist, many authors have found that worry and rumination can be differentiated by their temporal orientation (Papageorgiou & Wells, 1999; Muris, Roelefs, Meesters, & Bommsma, 2004; Watkins, Moulds, & Mackintosh, 2005; Hong, 2007). That is, worry is a process of maladaptive or unproductive thought focused on future events, whereas rumination is a similar process, focused on past events. This distinction is possibly a crucial one as research has demonstrated the presence of worry in depression (Starcevic, 1995) and rumination in GAD (Blagden & Craske, 1996).

Rumination has been defined as "behaviors and thoughts that passively focus one's attention on one's depressive thoughts and on the implications of these thoughts" (Nolen-Hoeksema, 1998, p. 239). Nolen-Hoeksema (1987, 1991, 1998) couches rumination within a bifurcated repetitive thought system in which individuals respond to depressive symptoms by either engaging in repetitive thinking about the causes and consequences of the symptoms (rumination), or by engaging in repetitive thinking about pleasant activities (distraction). Distraction, in this context, is seen as an adaptive and protective response, whereas rumination is a maladaptive response that can exacerbate a depressive disorder. Interestingly, Segerstrom, et al. (2000) astutely point out that the definition of

rumination provided by Nolen-Hoeksema includes the "implications" of depressive thoughts. Likewise, Papageorgiou and Wells (2001) identify the "implication" of thought content in their explanation of depressive rumination. Implication, used in this way, references potential future outcomes of past behavior or events, which implies that the ruminative process is to some degree oriented to future events and outcomes.

Worry has been characterized by Borkovec, Robinson, Pruzinsky, and DePree (1983) as "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable; it 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" (p.10). More recently this definition has been modified to accommodate the discovery that worry often involves a preponderance of verbal thought activity that works to the exclusion of imagery and image-based thoughts (Borkovec, et al., 1998).

It is important to take a moment to examine the evidence that indicates worry and rumination may not be different constructs, in order to possibly substantiate why they are. Some researchers have failed to find evidence indicating that worry is exclusively related to anxiety and rumination to depression (Starcevic, 1995; Muris et al., 2004; Muris et al., 2005). Utilizing the corresponding self-report measures for worry and rumination, Segerstrom, Tsao, Alden, and Craske (2000) were unable to demonstrate idiosyncratic relationships between worry and anxiety or depression and depressive rumination. They did, however, demonstrate significant relationships between negative repetitive thought and both anxiety and depression. Muris et al. (2005) argue that despite research demonstrating that worry and rumination account for unique portions of the variance in psychopathology, such findings may be the result of the theoretical bases upon which self-report measures of the constructs were designed and not on inherent differences in the latent constructs themselves.

In direct contrast to this assertion, Muris et al., (2004) were able to show that when controlling for rumination, worry remained a significant predictor of anxiety, whereas, when controlling for worry, rumination failed to remain a significant predictor of depression. Hong (2007) found that although worry uniquely predicted anxiety, and rumination uniquely predicted depression, "worry was the dominant construct that accounted for increases in anxious and depressive symptoms over time" (p. 285). If it is the case that worry and rumination are in fact derived from a single, undifferentiated construct as Muris et al. (2005) assert, then findings relating to the dominance or relevance of one as compared to the other are merely statistical or methodological artifacts. However, if the two latent constructs are truly separate and measurable, then the findings of Muris et al. (2004) and Hong (2007) suggest the primacy of worry.

Given that this evidence seems to suggest that worry correlates with both anxiety and depression, whereas rumination relates only to depression (Muris et al., 2004; Hong, 2007), it would seem that worry represents the more robust and predictive of the two constructs. What remains to be determined is whether it is truly exclusive to GAD within the framework of the tripartite and integrative hierarchical models. While the primacy of worry proposed by Hong (2007) and Muris (2004) would imply more robust predictive power on the part of worry versus rumination, the implication is likewise that worry is a robust predictor for both GAD and depression. A specific factor would necessarily relate to one construct and not the other.

A final hurdle exists in attempting to define worry as a specific factor for GAD insofar as worry is a key part of the diagnostic criteria for GAD. Symptom overlap is a common feature of the DSM-IV-TR. For instance sleep disturbance and restlessness are diagnostic criteria for both GAD and MDD. It may therefore be quite reasonable methodologically to use an embedded diagnostic criterion as a defining specific factor for a given disorder. That it can be shown that such a

diagnostic criterion is uniquely predictive of one diagnosis over another, that this criterion provides discriminant predictive power, would seem to fulfill the criteria for a specific factor. However, it is imperative that such a defining criterion be distinguishable and differentiable from the disorder itself, otherwise a tautological quandary exists wherein a construct is ultimately defining itself. It is possible that such would be the case with worry and GAD.

Positive beliefs about worry

Although prior research has shown that the parameter of uncontrollability separates the pathological worry of GAD from normal states of worry (Abel & Borkovec, 1995; Borkovec, 1994), it has also been shown that worriers often believe that their worry can either prepare them for negative outcomes or help to avoid them altogether (Borkovec & Roemer, 1995; Borkovec, 1999). This agentic view of worry has been hypothesized to be maintained by negative reinforcement. Because much of what is worried about does not occur, the worry is identified as the causative preventative element. Negative reinforcement has also been hypothesized to play a role in the emotional avoidant function of worry (Borkovec, Alcaine, & Behar 2004). In an examination of the perceived function of worry by Borkovec and Roemer (1995), GAD analogues were significantly discriminated from controls on only one of six items: "Worrying…is a way to distract myself from...even more emotional things that I don't want to think about."

Wells (1995, 1997) has proposed a metacognitive model of worry and GAD in which worry is conceptualized as a normative function of cognitive coping and processing. Wells maintains that positive beliefs about worry serve to facilitate these functional properties and that it is only with the manifestation of negative metacognitive beliefs, "worry about worry," that GAD develops (Cartwright-Hatton & Wells, 1997). In examining the role of positive beliefs about worry in relation to trait anxiety, worry proneness, and normal personality, Cartwright-Hatton and Wells (1997) found

that positive beliefs about worry were both predictive of trait anxiety and worry proneness, as well as strongly related to "pleasant and normal personality." Similarly, proneness to worry, a dimensional GAD trait, was significantly related to the belief that worry is productive and desirable. Within the metacognitive framework then, positive beliefs about worry correlate with all degrees of worry behavior, from adaptive and beneficial to pathological and debilitating. However, while the emotionally avoidant aspects of worry may be circumscribed within pathological worry behavior, positive beliefs about worry are nevertheless fundamentally built upon a system of negative reinforcement. When positive beliefs about worry are adaptively utilized as a coping mechanism, Wells says, "the person becomes more anxious as negative outcomes are processed, and less anxious as the goal of generating coping options is reached" (Wells, 2006).

Evidence that a positive belief system exists within depression has been equivocal. Though several authors have found evidence for positive metacognitive beliefs about rumination in MDD (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001; Papageorgiou & Wells, 1999, 2001; Watkins & Moulds, 2005), the character and content of such beliefs are not synonymous or congruent with those being investigated in the current study. Positive beliefs have included gaining insight and understanding of depression and emotion (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001; Papageorgiou & Wells, 1999), improving problem-solving (Papageorgiou & Wells, 1999), and increasing self-awareness (Watkins & Baracaia, 2001). Although Watkins et al. (2005) hypothesize that rumination may function as an emotional avoidance mechanism similar to what has been outlined by Borkovec et al. (1998) in worry, no evidence to date has been found for such a mechanism, nor have positive beliefs about the emotionally avoidant nature of rumination been endorsed by depressed individuals in any of the studies listed above.

Given the potential tautological dilemma described above in using worry as a specific factor for GAD, it is vital to avoid similar complications and contamination in the examination of positive beliefs about worry. Ideally, a derived latent factor would consist of content related to positive beliefs *about* worry, and be wholly separable from worry itself and therefore from the diagnostic criteria for GAD. It would follow then that item content used to assess positive beliefs about worry should pertain to beliefs about worry as productive or beneficial, and avoid conceptualizations of worry as a vehicle for emotional avoidance, as the latter has been implicated in the pathological role of worry in GAD (Borkovec, Hazlett-Stevens, & Diaz, 1999).

Perfectionism

In one of the first comprehensive studies examining the prevalence of personality disorders among individuals with anxiety disorders, Sanderson, Wetzler, Beck, and Betz (1994) found that individuals with social phobia and GAD were most likely to have a comorbid personality disorder (61% and 49% respectively). Within the GAD subgroup, the most common personality disorder was obsessive-compulsive personality disorder (OCPD). In regard to this relationship, the authors offered, "Insofar as GAD is a kind of 'worrying' personality disorder, it may be associated with the detail-minded, rigid, and indecisive traits found in obsessive-compulsive personalities" (page 172). Aside from their characterization of GAD as a *personality* disorder, there has been support for Sanderson et al.'s conceptualization of the detail-minded and indecisive nature of worry in GAD. Metzger, Miller, Cohen, Sofka, and Borkovec (1990) showed that in a categorization task, high-worriers were slower to make decisions. Tallis, Eysenck, and Mathews (1991) offered that this effect was due to "elevated evidence requirements," or the need for greater amounts of confirmatory information. In a later study, Pratt, Tallis, and Eysenck (1997) were able to demonstrate that these elevated evidence requirements in high-worriers were in turn related to a measure of perfectionism.

Stober and Joorman (2001) replicated this finding, adding that it was the *amount* of worry, and not the frequency or intensity that predicted levels of perfectionism. Terry-Short, Owens, Slade, and Dewey (1995) demonstrated that while perfectionism overall was positively correlated with task accuracy on a visual search task, dissatisfied perfectionism, a measure of distress related to perfectionist tendencies, correlated *negatively* with performance speed. These authors stated that the closest approximation of perfectionism within the DSM-IV is, in fact, OCPD (Slade & Owens, 1998). This view is shared by Shafran and Mansell (2001) who offered that "it could be argued that the essence of OCPD is perfectionism centered on performance."

In a recent review of research relating personality to psychopathology, Krueger and Tackett (2003) report that "there is a growing consensus that abnormal personality should be conceptualized dimensionally, as opposed to the categorical approach found in the DSM" (page 116). Despite this claim, there is a paucity of research taking this approach to the examination of the relationship between OCPD and GAD or between perfectionism and GAD. If it is the case that it is the perfectionist element of OCPD, and not the comprehensive and categorical disorder itself, that relates most strongly to GAD, then examinations of the disorders at the categorical level will likely fail to articulate the true strength of relationship between the constructs. Nestadt et al. (1992), in an examination of the comorbidity between GAD, alcohol abuse, and simple phobia, and compulsive and antisocial personality disorders in an epidemiological sample, utilized both categorical diagnoses and dimensional ratings. The former were determined by board-certified psychiatrists using structured interviews, whereas the latter were derived from 5 questions, rated 0 to 3, summed to a 0 – 15 dimensional compulsivity scale. Correlations between categorical diagnoses of compulsive personality disorder and individual items ranged from .33 to .68. Nestadt et al. found that, when age, sex, and race were controlled for, the odds of having GAD increased by 50% for every unit increase

in dimensional scores for compulsive personality. The authors did not report whether this relationship was driven by perfectionist diagnostic criteria. It was the expectation of the current study that item-level analyses of the OCPD criteria would reveal that perfectionist items were most strongly related to GAD.

The goal of the present study was to identify a specific factor for GAD within the integrative hierarchical model of anxiety and depression (Mineka, et al., 1998). Three specific factors were proposed: worry, positive beliefs about worry, and perfectionism as represented by a dimensional measurement of OCPD. The strength of relationship between the latter factor and GAD was believed to be derived from perfectionist qualities encapsulated within the measurement of OCPD. It was hypothesized that all three proposed specific factors would relate idiosyncratically to GAD compared to depression. Goodness-of-fit for each specific factor within the integrative hierarchical model was tested with SEM.

Method

Participants and Procedure

Participants were 423 undergraduate students enrolled in introductory psychology courses at Penn State University. Participation in the current study was reimbursed with credit towards research requirements in these courses. Participants were mostly female (69%, n = 294) and Caucasian (85%, n = 359), with an average age of 20 years. Study materials were made available to participants through PsychData, an online data collection service. Participants completed self-report instruments (described below) related to the constructs of interest. There were no inclusion or exclusion criteria.

Model Indicators

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a 20 item measure thought to capture two theoretically orthogonal dimensions of mood: Positive Affect and Negative Affect. Each dimension is represented by 10 items. Items are rated on a 5-point, 1 (very slightly or not at all) to 5 (extremely), Likert scale. Scores on each dimension range from 10 to 50. The PANAS can be administered as a state or trait measure, depending on the temporal orientation of the instructions (e.g. in general, this month, this week, right now). The present study utilized a trait approach to positive and negative affect. Participants were instructed to rate how they feel "in general." The PANAS NA scale was used as an indicator for the latent construct 'NA' in all models. The PANAS PA scale was used as an indicator for the latent construct 'PA' in all models. In all models, the latent constructs NA and PA were modeled with a single indicator. In such a scenario two possibilities exist: to random split-half the indicating scale, creating two observed variables for adequate identification, or to constrain the theta-epsilon matrix to a predetermined value, allowing only the lamda-*Y* parameter to be freely estimated. In the latter approach, an estimate of error variance is derived by calculating the internal consistency of the scale (Cronbach's α) and setting the error variance to 1 – α. Given that Cronbach's α represents an average of all possible random split-halves, and the relatively small size of the PANAS scales (each scale contains 10 items, halves would then contain only 5 items each), it was decided to use this approach for the estimation of NA and PA.

Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS is a 42-item instrument measuring current (over the past week) symptoms of depression, anxiety, and stress. The three psychometrically distinct scales consist of 14 items each, which are rated on a 4-point, 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time), Likert scale. The range of scores for each scale is 0-42. The DASS-Depression scale consists of items emphasizing

dysphoria, hopelessness, self-deprecation, and lack of interest and involvement. Large-sample studies of clinical and non-clinical populations have provided strong support for the psychometric properties of the DASS (T.A. Brown, Chorpita, Korotitsch, & Barlow, 1997; Lovibond & Lovibond, 1995). The DASS has also been normed as separate 21-item instruments with independent 7-item scales for depression, anxiety and stress within each. In order to allow for a greater number of indicators for the latent construct Depression, the two DASS depression scales were treated separately.

Beck Depression Inventory (BDI; Beck & Steer, 1990). The BDI is a widely used measure of current depression. The scale consists of 21 items. Items are rated on a 4-point, 0-3, Likert scale. Total scores range from 0 to 63. Given results of a factor analysis conducted by Brown et al. (1996) that indicated a two-factor solution to the BDI (Cognitive-Affective and Nonspecific Somatic), the BDI was scored using only the 10 items (1-9 and 13) that loaded on the Cognitive-Affective factor in Brown et al. (1996). The intention, as in the case of Brown, et al., was to eliminate unnecessary covariation with general distress or NA. The 10-item BDI score was used as an indicator for the latent construct Depression in all models.

Generalized Anxiety Disorder Questionnaire-IV (GADQ-IV; Newman, Zuellig, et al., 2002). The GADQ-IV is a 9 -item self-report measure designed to diagnose GAD based on DSM-IV criteria. Using Receiver Operating Characteristic analyses, the GAD-Q-IV showed 89% specificity and 83% sensitivity when compared to structured interview diagnoses of individuals with GAD, social phobia, panic disorder, and nonanxious controls. The GAD-Q-IV also demonstrated test-retest reliability, convergent and discriminant validity, and kappa agreement of .67 with a structured interview. Students diagnosed with GAD by the GAD-Q-IV were not significantly different on two measures than a GAD community sample, but both groups had significantly higher scores than

students identified as not meeting criteria for GAD, demonstrating clinical validity of the GAD-Q-IV. The GADQ-IV was used as an indicator for the latent construct GAD in all models.

Generalized Anxiety Disorder-Dimensional Questionnaire (GAD-DQ; Newman, in preparation). Given the binary nature of much of the original GADQ-IV, the GAD-DQ was developed to provide a more complete dimensional estimation of GAD. The instrument contains 15 items related to frequency, intensity, and controllability of worry, irritability, restlessness, fatigue, sleeping difficulties, concentration, and muscle tension. Each item is rated on a 9-point, 0 to 8 Likert scale. The Pearson's correlation between total scores on the GADQ-IV and the GAD-DQ in the current sample was .90, $p < .001$. The GAD-DQ was used as an indicator for the latent construct GAD in all models.

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16 item self-report measure of the frequency and intensity of worry. Factor analysis indicated that the PSWQ assesses a unidimensional construct with an internal consistency coefficient of .91 (Meyer et al., 1990). High test-retest reliability was also demonstrated (Meyer et al., 1990). The validity of the PSWQ was supported by an analysis indicating that the measure distinguished individuals with GAD from each of the other anxiety disorder groups, including those with obsessive-compulsive disorder (Brown, Antony, & Barlow, 1992). Correlations between the PSWQ and measures of anxiety, depression, and emotional control supported the convergent and discriminant validity of the measure (Brown, et al., 1992). In addition, this measure discriminated samples that (1) met all, some, or no DSM-III--R (American Psychiatric Association, 1987) diagnostic criteria for GAD and (2) met criteria for GAD versus posttraumatic stress disorder (PTSD) (Meyer et al., 1990). The PSWQ has also demonstrated sensitivity to change in response to psychotherapy (Meyer et al., 1990). The PSWQ was used as the sole indicator for the latent

construct Worry. Contrary to the approach taken with PA and NA, the PSWQ was random split-halved, allowing Worry to be estimated by two independent indicators.

Why Worry Scale (WW-II; Freeston, et al., 1994). The WW-II is a 25 item self-report questionnaire that assesses the reasons that individuals engage in worry. Each item is followed by a 5-point, 1 (not at all) to 5 (absolutely), Likert scale. The scale contains 5 subscales: "worry aids in problem-solving," "worry helps to motivate," "worrying protects the individual from negative emotions in the event of a negative outcome," "the act of worrying itself prevents negative outcomes," and "worry is a positive personality trait." The first, second, and final of these of these subscales were used to indicate the latent construct Positive Beliefs about Worry, from here on referred to as PosWorry. The subscales "worrying protects the individual from negative emotions in the event of a negative outcome" and "the act of worrying itself prevents negative outcomes" although consistent with material presented above describing the negative reinforcement of worry through emotional avoidance, were deemed to be less pure indices of PosWorry. Although emotional avoidance is a theoretically robust underlying hypothesis for the existence of PosWorry, the interest in the current study was not to examine an emotional avoidance specific factor, but instead to attempt to isolate positive beliefs about worry as an independent construct. Moreover, Wells (1995, 1997) has proposed that positive beliefs about worry function to promote the utilization of worry as a cognitive coping and processing strategy and that it is only when negative metacognitive beliefs about worry arise that GAD pathology develops. To this end, using the two cognitive avoidance scales may contaminate PosWorry with core aspects of GAD pathology, creating a possible tautological dilemma. As noted in the Introduction, it is important to remember that while the emotionally avoidant functions of PosWorry may be partialed out, the construct and practice of PosWorry is nevertheless maintained through negative reinforcement.

Personality Diagnostic Questionnaire-4 (PDQ-4; Johnson & Bernstein, 1992). The PDQ-4 is a forced choice, self-report, 99-item questionnaire designed to measure the DSM-IV personality disorders. The PDQ-4 items are listed in random order within the questionnaire. Like its previous version (Hyler et al., 1990, 1992; Zimmerman and Coryell, 1989), the PDQ- 4 shows only moderate agreement with Axis-II diagnoses based on structured interviews because of its tendency to overdiagnose personality disorders (Fossati et al., 1998). Nevertheless, the PDQ-4 was used to dimensionally measure the perfectionist traits inherent in the OCPD scale. To bolster the dimensional properties of the instrument, the true/false answer options were modified such that participants were allowed to indicate whether a given item was 1: never true, 2: rarely true, 4: Mostly true or 5: Always true. Given the relatively small size of the OCPD scale (8 items), the latent construct Perfectionism was estimated with a single indicator utilizing the error variance estimation method described above for NA and PA.

Approach to Structural Modeling

The variance-covariance matrix of the above-mentioned indicators was analyzed using a linear structural relationships program and a maximum-likelihood solution (LISREL 8.80; Joreskog & Sorbom, 2006). The *X* system of the LISREL program was not utilized so that endogenous and exogenous variables were not differentiated. Molenaar (personal communication, 2008) has demonstrated the equivalence of confirmatory and structural models utilizing both *X* and *Y* systems, and the *Y* system exclusively. Therefore, the ksi, theta-delta, phi, and gamma matrices were not utilized during model evaluation in the current study. Goodness-of-fit was evaluated using the following fit indices: the non-normed fit index (NNFI; Tucker & Lewis, 1973), the comparative-fit index (CFI; Bentler, 1990), the root mean square error of approximation (RMSEA; Steiger, 1990), the standardized root mean square residual (SRMR), Akaike information criteria (AIC; Akaike,

1990), and the Satorra-Bentler scaled chi-square test (Satorra & Bentler, 2001). The Satorra-Bentler scaled chi-square test statistic is a scaled or mean-adjusted chi-square, where the usual normal-theory chi-square statistic is divided by a scaling correction to better approximate chi-square under non-normality.

Multiple fit indices serve to provide a more conservative and comprehensive evaluation of model fit. In the case of nested model comparison, Satorra-Bentler scaled chi-square difference tests were utilized to examine comparative fit. Absolute fit can be assessed independently by each of the aforementioned indices. Both normal theory chi-square and Satorra-Bentler scaled chi-square values were estimated. In both cases, the chi-square value is derived by the equation (n-1)L, where L = the model likelihood function (the observed covariance matrix – the fitted covariance matrix). Here then it can be seen that as sample size increases, chi-square fit proportionally decreases, regardless of model fit. It is for this reason that fit indices independent of sample size, such as the NNFI, CFI, RMSEA and SRMR, have been developed. Hu and Bentler (1999) have provided the following guidelines for goodness-of-fit estimation with these indices: NNFI > .96, CFI > .96, RMSEA < .06, and SRMR < .08. Finally, the AIC provides an estimation of model parsimony. The AIC is derived by the equation $2k - 2\ln(L)$, where k = the number of parameters and L = the likelihood function (Akaike, 1974). Here the number of parameters is the number of paths in a given model. Therefore the AIC returns smaller values both for better probabilistic fit (likelihood function) and fewer estimated parameters.

Results

Table 1 provides the 13 x 12 correlation matrix for the observed measures used in all confirmatory and structural models to follow. Table 2 provides the Cronbach's α reliability coefficients for each scale.

Table 1: Zero-order correlations between observed measures in confirmatory and structural models

	NA	*PA*	*GADQ-IV*	*GAD-DQ*	*BDI*	*DASS D1*	*DASS D2*	*PSWQ1*	*PSWQ2*	*WWII Aids*	*WWII Motiv*	*WWII Pos*
NA												
PA	.26**											
GADQ-IV	.45**	-.10*										
GAD-DQ	.42**	-.14**	.90**									
BDI	.54**	-.12*	.60**	.59**								
DASS D1	.48**	-.09	.59**	.60**	.72**							
DASS D2	.48**	-.05	.56**	.56**	.70**	.90**						
PSWQ1	.31**	-.14**	.72**	.76**	.44**	.42**	.37**					
PSWQ2	.33**	-.15**	.72**	.76**	.46**	.43**	.38**	.90**				
WWII Aids	.27**	.00	.41**	.43**	.23**	.30**	.29**	.43**	.49**			
WWII Motiv	.22**	-.02	.38**	.41**	.22**	.30**	.31**	.40**	.46**	.83**		
WWII Pos	.23**	-.03	.37**	.38**	.27**	.31**	.31**	.40**	.44**	.77**	.76**	
PDQ-4 OCPD	.31**	-.02	.44**	.46**	.39**	.36**	.34**	.43**	.45**	.38**	.38**	.39**

** Correlation is significant at $p < .01$
* Correlation is significant at $p < .05$

Table 2: Sample-based Cronbach's α for observed measures

Measure	*Cronbach's α*
PA	.92
NA	.88
BDI	.85
DASS D1	.89
DASS D2	.92
GADQ-IV	.92
GAD-DQ	.96
PSWQ1	.88
PSWQ2	.90
WWII Aids	.90
WWII Motiv	.91
WWII Pos	.84
PDQ-4 OCPD	.61

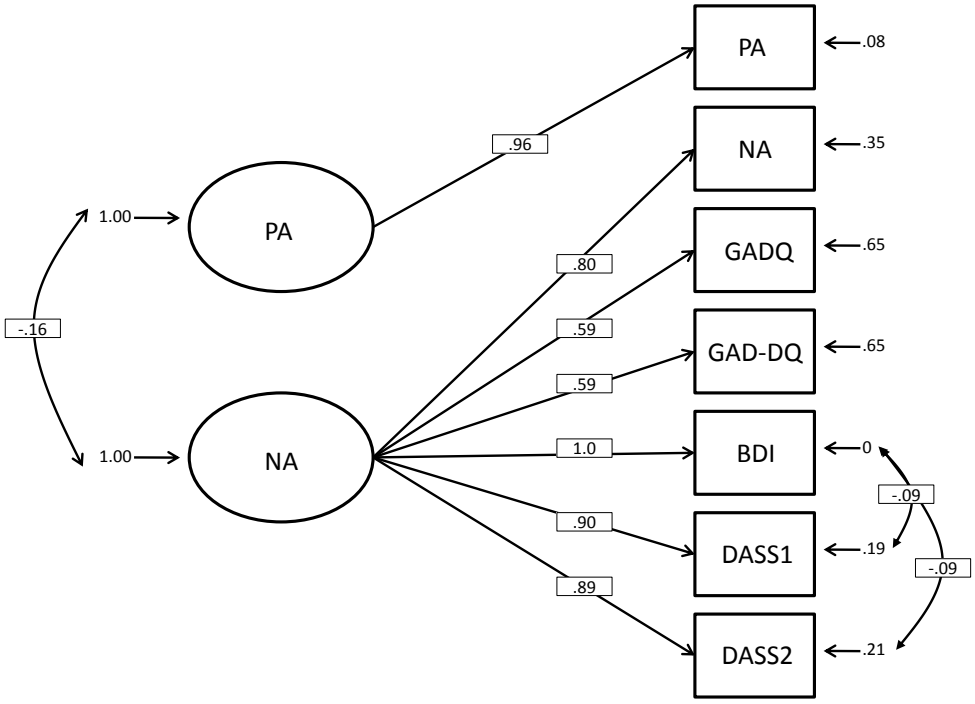
Measurement Models

Confirmatory factor analysis was conducted to test the appropriateness of a four factor solution to the observed measures of GAD, Depression, PA, and NA. In order to rule out the possibility that comorbidity of anxiety and depression is due to the nature of both constructs as underlying indicators of NA, a two-factor solution of NA and PA was also examined, wherein NA was indicated by the NA scale of the PANAS, GADQ-IV, GADDQ, BDI, DASS-D1, and DASS-D2, and PA was indicated by the PA scale of the PANAS. In all models, the theta-epsilon matrix was programmed to allow correlated error between the BDI and each of the DASS-D scales. It was found that a small (-.09) but significant negative correlation existed between the error variance estimates for the DASS and BDI, and that allowing this correlation greatly improved model fit. No other error variance estimates were allowed to correlate.

First, the two-factor model was fitted to the data. Fit indices indicated that this model provided a poor fit to the data, χ^2 (14), (N = 419) = 819.14, $p < .001$, RMSEA = .371, SRMR = .420, NNFI = .67, CFI = .67, AIC = 847.14 (N = 419 for all χ^2 analyses). Figure 1 depicts the two-factor

confirmatory model. Of note, in figure 1 and all model figures to follow, rectangles represent observed variables, ovals represent latent constructs, straight lines represent loadings or regression relationships, and curved lines represent correlations.

Figure 1: Two Factor Confirmatory Factor Model



Next, the four-factor model was fitted to the data. Fit indices indicated that this model provided an excellent fit to the data, χ^2 (9) = 13.82, p = .13, RMSEA = .036, SRMR = .015, NNFI = 1.00, CFI = 1.00, AIC = 51.82. Figure 2 depicts the four-factor confirmatory model. Table 3 provides the correlations between the latent factors in the four-factor confirmatory model. Two correlations bare mentioning. The largest correlation between any two higher-order factors is found between GAD and Depression (ψ = .63). This replicates prior work cited above demonstrating a significant overlap between these two diagnostic dimensions. Secondly, there is a small but significant positive relationship between PA and NA (ψ = .28). Past research investigating these

constructs has found either a null relationship or a small *negative* relationship (Watson & Clark, 1984; Brown et al., 1998).

Figure 2: Four Factor Confirmatory Factor Model

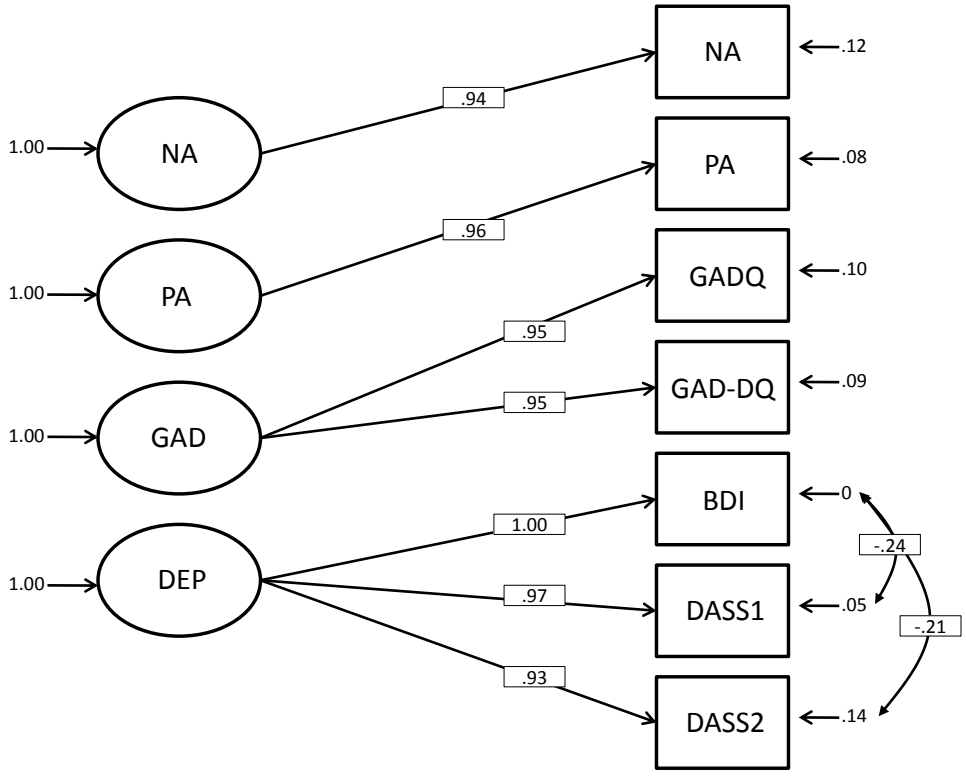


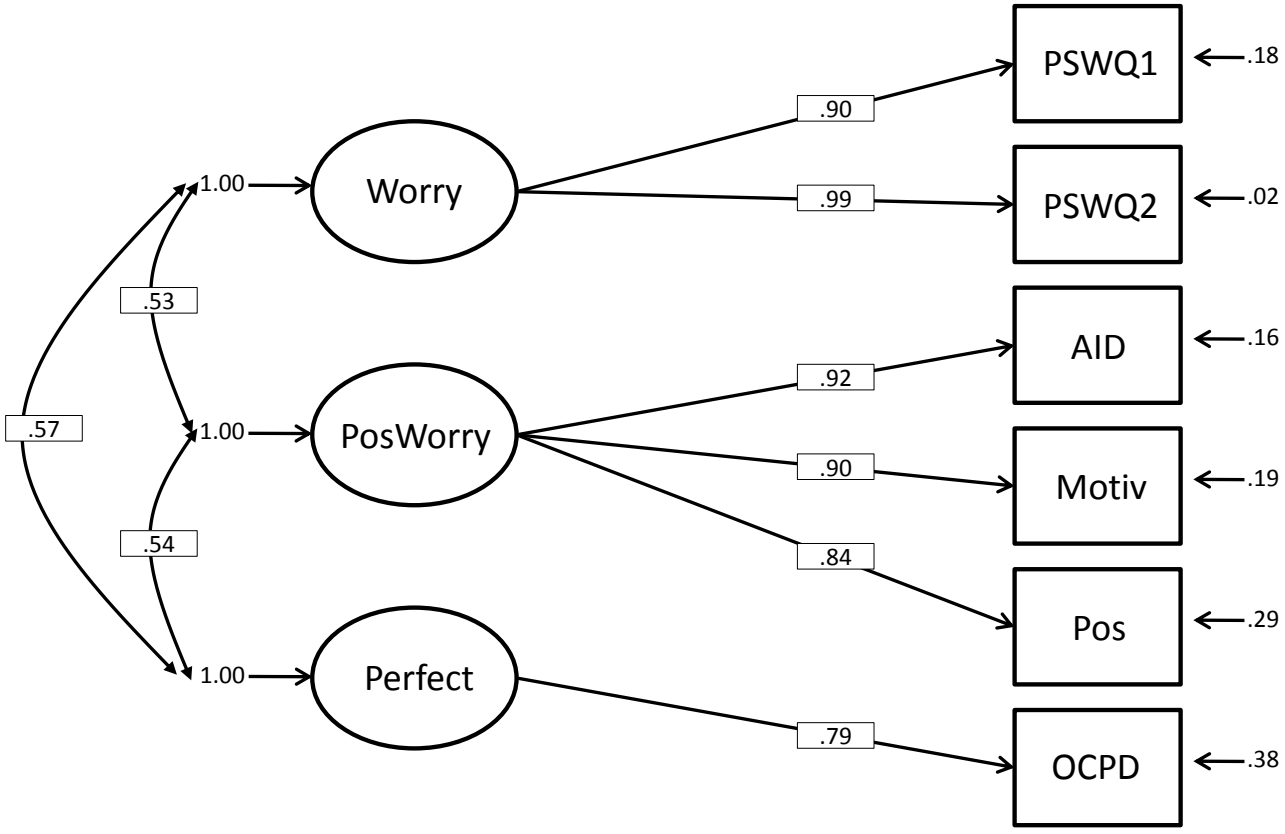
Table 3: Correlations between Latent Factors in Four-Factor CFA

	NA	*PA*	*GAD*	*Depression*
NA	1.00			
PA	.28	1.00		
GAD	.49	-.14	1.00	
Depression	.56	-.11	.63	1.00

NA = negative affectivity, PA = positive affectivity, GAD = generalized anxiety disorder

Finally, a measurement model testing the appropriate identification of the lower-order constructs, the proposed specific factors, was assessed. The WW-II subscales "worry aids in problem-solving," "worry helps to motivate," and "worry is a positive personality trait," indicated the latent factor PosWorry, the two random split-halves of the PSWQ indicated the latent factor Worry, and the OCPD scale of the PDQ-4 indicated the latent construct Perfectionism. Fit indices indicated that this model provided an excellent fit to the data χ^2 (7) = 7.30, p = .40, RMSEA = .010, SRMR = .012, NNFI = 1.00, CFI = 1.00, AIC = 35.30. Figure 3 depicts the lower-order confirmatory model. Interestingly, the three proposed specific correlated equally with each other (ψ's = .53, .54, and .57).

Figure 3: Lower-Order Confirmatory Factor Model



Factor loadings (completely standardized estimates from the lambda-*Y* matrix) for the four higher-order factors and three lower-order factors are presented in table 4.

Table 4: Completely Standardized Factor Loadings for the 7 Latent Factors

Latent Factor and Measures	*Factor Loading*
NA	
PANAS NA	.94
PA	
PANAS PA	.96
GAD	
GADQ-IV	.95
GAD-DQ	.95
Worry	
PSWQ1	.90
PSWQ2	.99
PosWorry	
Aids	.92
Motivates	.90
Positive Trait	.84
Perfectionism	
PDQ-4 OCPD	.79

PANAS = the positive and negative affect schedule, NA = negative affectivity, PA = positive affectivity, GAD = generalized anxiety disorder, GADQ-IV = the generalized anxiety disorder questionnaire, GAD-DQ = the generalized anxiety disorder dimensional questionnaire-IV, PSWQ = the Penn State worry questionnaire, PosWorry = positive beliefs about worry, OCPD = obsessive-compulsive personality disorder, PDQ-4 = personality diagnostic questionnaire-4

Structural Models

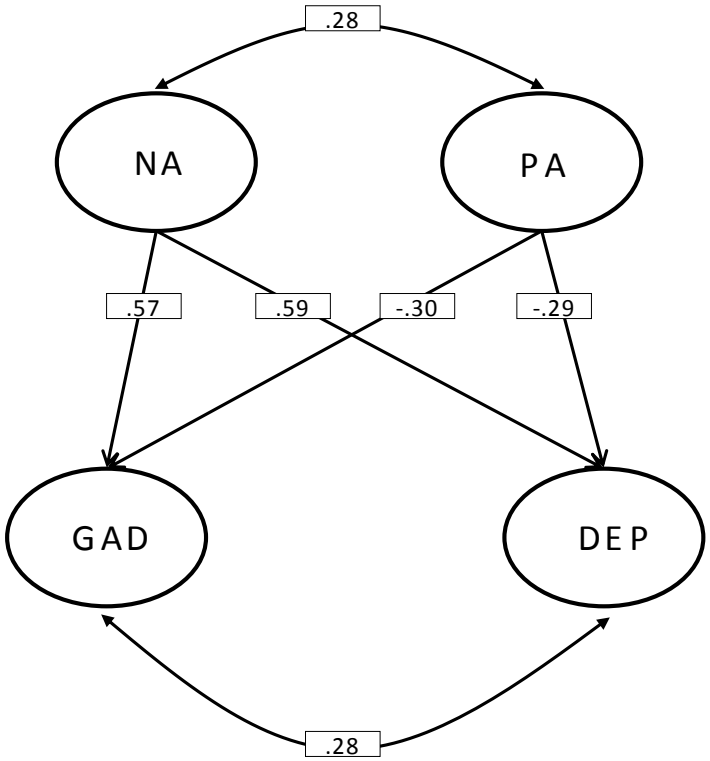
Once appropriate relationships between observed indicators and latent factors were established with confirmatory factor analysis, structural relationships between the latent factors were examined. The tripartite model as proposed by Clark and Watson (1991) includes a higher-order factor of NA to account for the relationship between anxiety and depression and a negative relationship between PA and Depression. Brown et al. (1998) confirmed this structure, demonstrating standardized loadings of .67 and .74 on NA for Depression and GAD respectively, no significant relationship between PA and GAD and a loading of -.29 of Depression on PA.

The initial structural model was created to replicate the basic structure of the tripartite model produced by Brown et al. (1998). Given the established nature of the model in question, the statistical and methodological approach taken to the current research endeavor, to identify a specific factor for GAD, was an additive and not comparative one. That is, the intention was not to create models that might compete with the tripartite model, but instead to add elements to the previously demonstrated structure. Therefore, after examining the goodness-of-fit of the original tripartite model, proposed specific factors were added and successive models were tested with Satorra-Bentler nested χ^2 difference tests.

Figure 4 depicts model 1, the tripartite model. Fit indices indicated that this model provided an excellent fit to the data χ^2 (9) = 13.82, p = .13, RMSEA = .036, SRMR = .015, NNFI = 1.00, CFI = 1.00, AIC = 51.82. Consistent with findings by Brown et al. (1998), loadings on NA for GAD and Depression are .57 and .59 respectively. Allowing for the higher-order relationship with NA reduced the correlation between GAD and Depression from .63 to .28. Also consistent with, in fact identical to, Brown et al.'s model is the -.29 loading of Depression on PA. However, there are two striking differences between the model demonstrated by Brown et al. and the current model. First, as mentioned above, there is a significant *positive* correlation of .28 between NA and PA. This is similarly inconsistent with Watson and Clark's (1984) original conception of the relationship between these two constructs. It was originally theorized that NA and PA were orthogonal to each other and should therefore demonstrate zero correlation. However, researchers have consistently shown that the two constructs are often significantly, albeit negatively correlated (Watson & Clark, 1984, 1988; Brown et al., 1998). The second inconsistency between both prior theorizing and the model demonstrated by Brown et al. is the loading of -.30 for GAD on PA. Low PA has been implicated in social phobia (Mineka et al., 1998, Brown et al., 1998) but not GAD. It should be

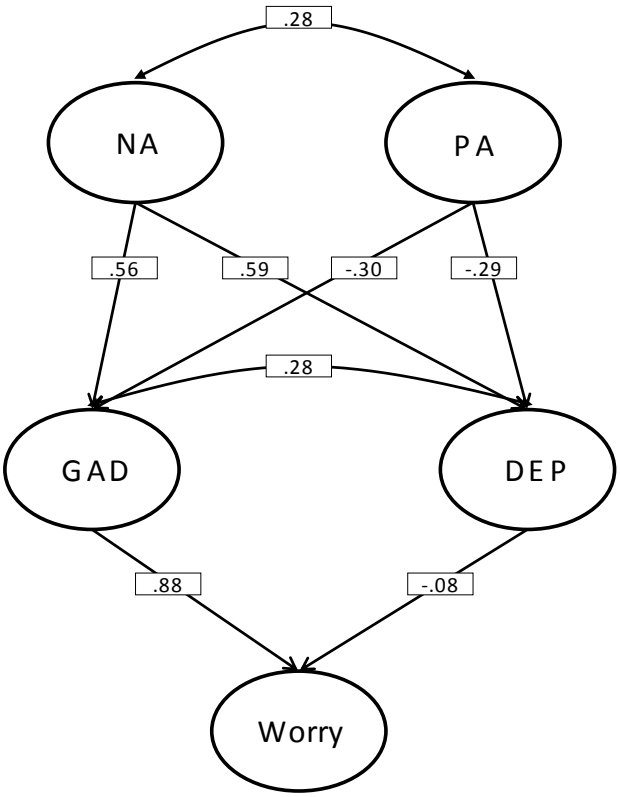
noted that the observed measures in the current model are dimensional representations of the targeted constructs, covering in all cases the full spectrum of scoring permutations. Instruments measuring social phobia were not included in the present study. It is therefore possible that some or even many of the individuals endorsing high scores on the GADQ-IV and GAD-DQ may actually experience psychopathology more closely related to social phobia than GAD and that inclusion of social phobia measures, and by extension, a latent factor for social phobia would have better accounted for the covariation with PA and left little to no relationship between GAD and PA. Such assumptions are substantiated by findings in epidemiological (Kessler, Chiu, Demler, &Walters, 2005) and treatment (Newman, Przeworski, Fisher, & Borkovec, 2007) studies indicating that social phobia is the anxiety disorder with which GAD is most highly comorbid.

Figure 4: Initial Structural Model (model 1)



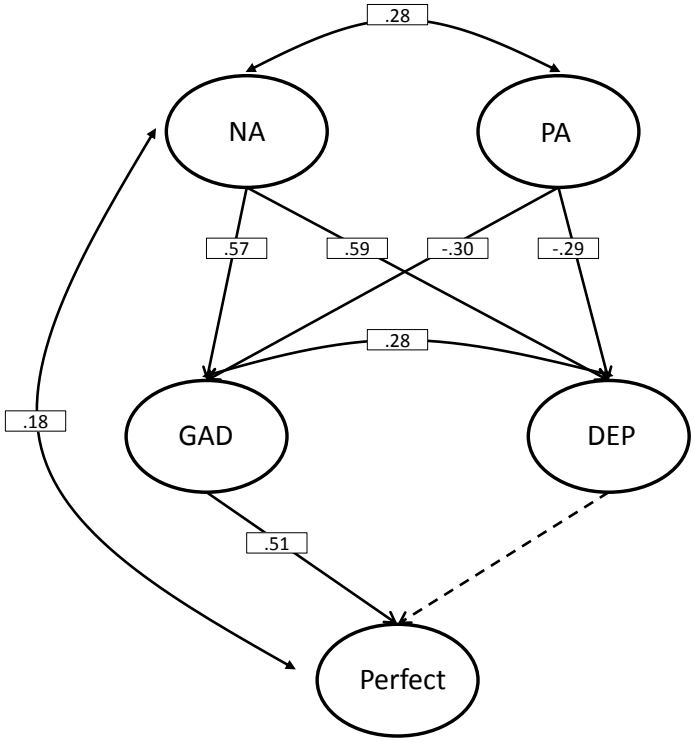
The proposed specific factors of Worry, PosWorry, and Perfectionism were each individually added to the model and tested by nested χ^2 difference tests to test possible model degradation. Figure 5 depicts model 2, the base model with the additional factor for Worry. Paths were allowed between both Worry and GAD and Worry and Depression. All other structural restrictions remained in place from the original model. Fit indices indicated that this model provided an excellent fit to the data χ^2 (20) = 28.76, p = .09, RMSEA = .032, SRMR = .018, NNFI = 1.00, CFI = 1.00, AIC = 78.76. A nested, Satorra-Bentler scaled χ^2 difference test revealed no fit degradation, χ^2diff (11) = 14.83, p = .19. Worry demonstrated significant loadings on both GAD and Depression of .88 and -.08 respectively. The small but significant negative loading of GAD on Depression revealed a suppressor effect at work in the current model as the zero-order correlation between Worry and depression was .47. It would appear that Worry is an appropriate specific factor for GAD, however two concerns remain. First, a true specific factor would ideally demonstrate no relationship with Depression. Though the loading was small and negative, Worry did load significantly on depression. Secondly, the relatively large loading of .88 for Worry on GAD raises issues of possible tautology. That is, given that worry is the cardinal feature of the diagnostic criteria for GAD, might the high loading between Worry and GAD be indicative of a construct defining itself?

Figure 5: Base Model + Worry (model 2)



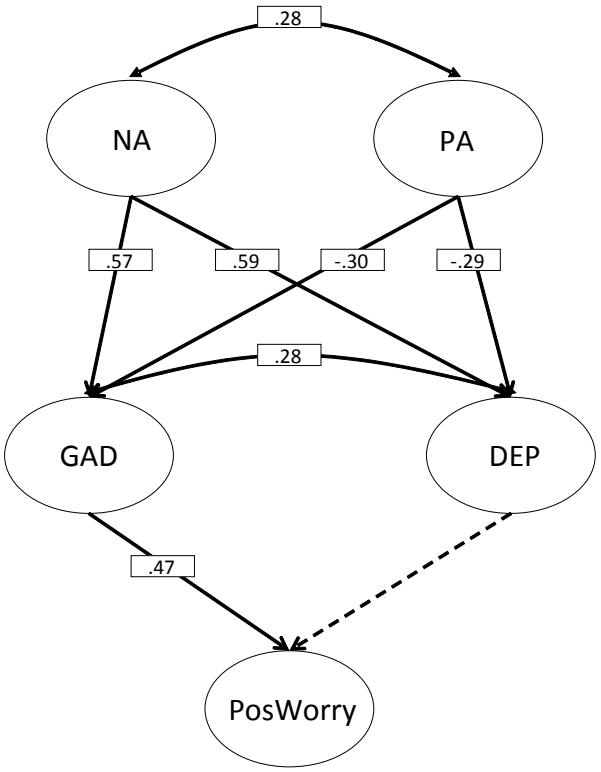
The specific factor Perfectionism was next added to the original model. Figure 6 depicts model 3, the original base model with the additional factor for Perfectionism. Paths were initially allowed between Perfectionism and GAD and Perfectionism and Depression. However, the path between Perfectionism and Depression was found to be non-significant and was removed from the model. Modification indices indicated a point of significant model strain between Perfectionism and NA. A correlation was allowed between these two factors and was found to be significant ($\psi = .18$). The path between Perfectionism and GAD was .51. Fit indices indicated that this model provided an excellent fit to the data χ^2 (14) = 19.70, p = .14, RMSEA = .031, SRMR = .018, NNFI = 1.00, CFI = 1.00, AIC = 63.70. A nested, Satorra-Bentler scaled χ^2 difference test revealed no fit degradation, χ^2diff (5) = 5.64, p = .34.

Figure 6: Base Model + Perfectionsim (model 3)



The specific factor PosWorry was next added to the original model. Figure 7 depicts model 4, the original base model with the additional factor for PosWorry. Paths were initially allowed between PosWorry and GAD and PosWorry and Depression. However, the path between PosWorry and depression was found to be non-significant and was removed from the model. The path between PosWorry and GAD was .47. Fit indices indicated that this model provided an excellent fit to the data χ^2 (29) = 39.61, p = .09, RMSEA = .030, SRMR = .028, NNFI = 1.00, CFI = 1.00, AIC = 91.61. A nested, Satorra-Bentler scaled χ^2 difference test revealed no fit degradation, χ^2diff (20) = 25.68, p = .18.

Figure 7: Base Model + Positive Beliefs about Worry (model 4)



Given that both PosWorry and Perfectionism showed significant relationships with GAD and no significant relationships with Depression, they both appear to be adequate specific factors for GAD. However, it was unknown whether these factors would retain significant relationships while controlling for the presence of the latent factor Worry in the model. Therefore, models for PosWorry and Perfectionism were retested alongside the factor Worry. Here nested χ^2 difference tests were conducted between the newly constructed models and model 2, the original base model plus Worry.

Figure 8 depicts model 5, the base model plus latent factors Worry and Perfectionism. Interestingly, all prior loadings between GAD, Depression, Perfectionism, and Worry remained unchanged from prior models. This also included the correlation between Perfectionism and NA. The zero-order correlation of .57 between Worry and Perfectionism was reduced to .10 when

allowing for the higher-order factor of GAD. This correlation, though small, remained significant. Fit indices indicated that this model provided an excellent fit to the data χ^2 (26) = 33.60, p = .15, RMSEA = .026, SRMR = .019, NNFI = 1.00, CFI = 1.00, AIC = 91.60. A nested, Satorra-Bentler scaled χ^2 difference test revealed no fit degradation, χ^2diff (6) = 4.59, p = .60.

Figure 8: Worry and Perfectionism (model 5)

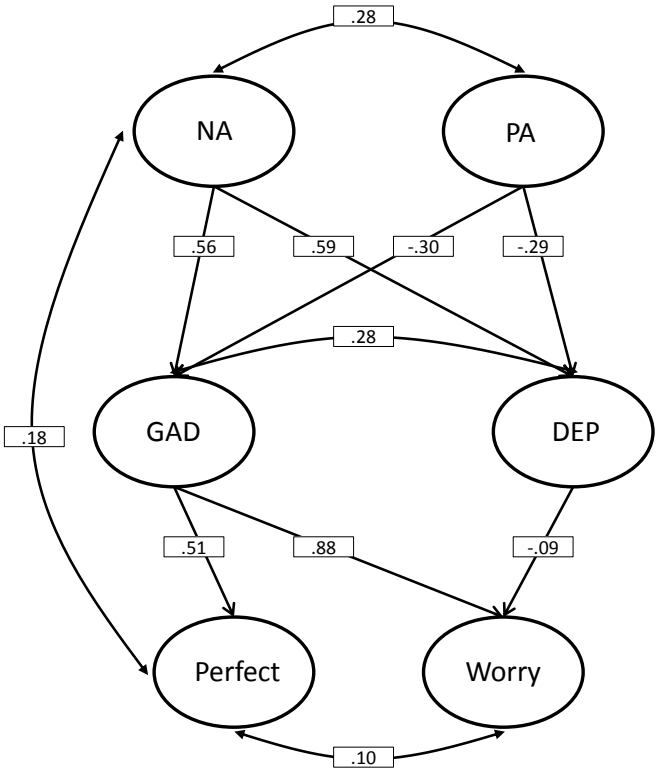
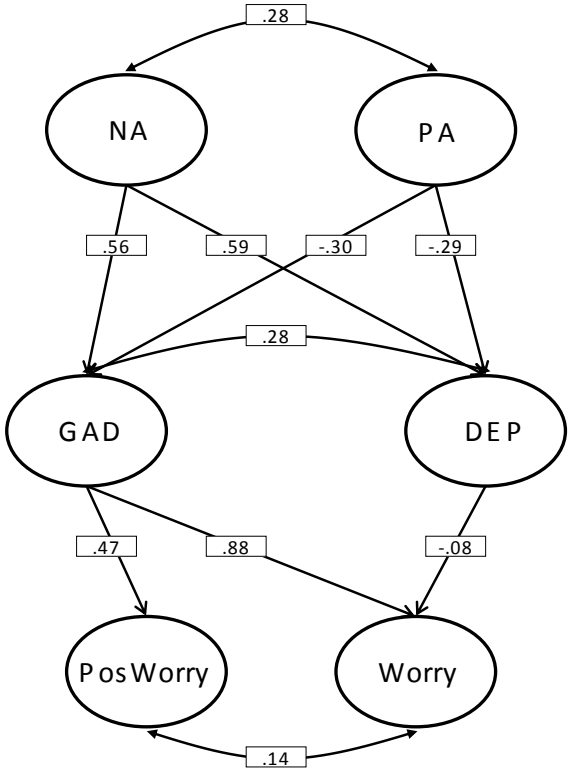


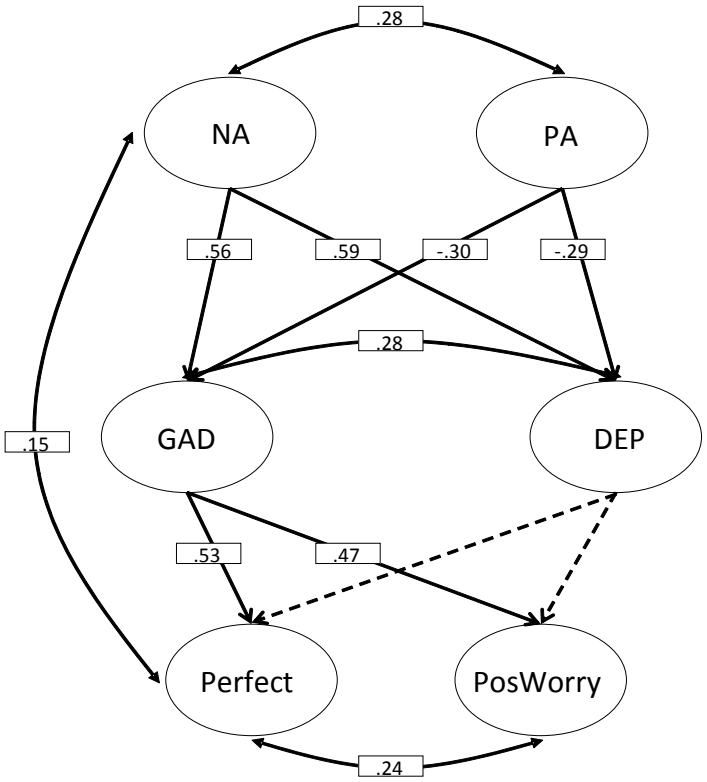
Figure 9 depicts model 6, the base model plus latent factors Worry and PosWorry. Again, all prior loadings between GAD, Depression, PosWorry, and Worry remained unchanged from prior models. The zero-order correlation of .53 between Worry and PosWorry was reduced to .14 when allowing for the higher-order factor of GAD. This correlation also remained significant. Fit indices indicated that this model provided an adequate fit to the data χ^2 (45) = 68.09, p = .015, RMSEA = .035, SRMR = .027, NNFI = .99, CFI = 1.00, AIC = 134.09. A nested, Satorra-Bentler scaled χ^2 difference test revealed no fit degradation, χ^2diff (25) = 38.05, p = .05.

Figure 9: Worry and Positive Beliefs about Worry (model 6)



Finally, a model retaining the two specific factors Perfectionism and PosWorry was tested for goodness-of-fit. Given both the tautological concerns related to the relationship between Worry and GAD and the significant relationship, albeit small and negative, between Worry and Depression, it was determined that Worry should be ruled out as a specific factor for GAD. Figure 10 depicts model 7, the base model plus latent factors PosWorry and Perfectionism. PosWorry and Perfectionism shared significant relationships with GAD, with loadings of .47 and .53 respectively. Neither was significantly related to Depression. Perfectionism remained significantly correlated with NA and a moderate correlation of .24 remained between Perfectionism and PosWorry. Fit indices indicated that this model provided an excellent fit to the data χ^2 (36) = 49.58, p = .07, RMSEA = .030, SRMR = .028, NNFI = 1.00, CFI = 1.00, AIC = 109.58. A nested, Satorra-Bentler scaled χ^2 difference test between model 7 and model 1 revealed no fit degradation, χ^2diff (27) = 35.62, p = .12.

Figure 10: Retained Specific Factors: Positive Beliefs about Worry and Perfectionism (model 7)



Item-Level Analysis of Perfectionism Factor

The OCPD scale of the PDQ-4 contains 8 items pertaining to perfectionism, morality, stubbornness, and hoarding. In light of theorized relationships between OCPD and GAD mentioned above, the first of these, perfectionism, was hypothesized to be the crucial dimension underlying the strength of relationship between the PDQ-4 OCPD scale and the latent factor GAD. In order to validate this assumption a structural model was constructed wherein the PDQ-4 OCPD scale was regressed upon the tripartite model at the item level, both on the model as a whole and on only the factors GAD and Depression within the tripartite structure. Neither model demonstrated adequate model fit as determined by Satorra-Bentler scaled χ^2 tests, χ^2 (67) = 197.53, $p < .001$ and χ^2 (83) = 241.78, $p < .001$ respectively. However, other fit indices indicated adequate fit in both cases,

RMSEA = .068 and .068, SRMR = .055 and .063, NNFI = .95 and .95, CFI = .97 and .96. Model fit was therefore deemed acceptable for the interpretation of OCPD item loadings on tripartite factors.

The two regression approaches yielded nearly identical results in terms of the relationships between the OCPD scale items and the factors GAD and Depression. In both cases, items 41, "I have a higher sense of morality than other people," and 81, "I see myself as thrifty but others see me as being cheap," demonstrated no significant relationship with either GAD or Depression. In the model in which the OCPD scale items were allowed to regress on all tripartite factors, item 41 demonstrated a small ($\beta = .11$) but significant relationship with PA. Items 3, "I often get lost in details and lose sight of the 'big picture'," 16, "I waste time trying to make things too perfect," 29, "I put my work ahead of being with my family or friends or having fun," 54, "I have accumulated lots of things I don't need that I can't bear to throw out," 66, "If others can't do things correctly I would prefer to do them myself," and 89, "people complain that I'm 'stubborn as a mule'" all significantly and positively related to GAD (βs = .34, .40, .30, .18, .37, .15). Items 29 and 54 did not significantly load on depression and item 66 demonstrated a negative ($\beta = -.12$) loading for depression. Items 3 and 16 loaded significantly on depression (βs = .13 and .11). Interestingly, NA shared a significant relationship only with item 54 ($\beta = .14$). In the latter model, which allowed loadings of the OCPD scale items on GAD and Depression only, the loading of item 54 on GAD increased from .18 to .25. Table 8 provides the β weights for each item on the tripartite factors in each model.

Table 5: PDQ-4 OCPD Scale Item β Loadings on Tripartite Factors

	Item 3	*Item 16*	*Item 29*	*Item 41*	*Item 54*	*Item 66*	*Item81*	*Item 89*
NA	-	-	-	-	.14	-	-	-
PA	-	-	-	.11	-	-	-	-
GAD	.34	.40	.30	-	.18	.37	-	.15
Depression	.13	.11	-	-	-	-.12	-	.16

NA = negative affectivity, PA = positive affectivity, GAD = generalized anxiety disorder

Discussion

The current study was aimed at delineating a specific factor for GAD within the integrative hierarchical model of anxiety and depression (Mineka et al., 1998). Three specific factors were proposed: worry, positive beliefs about worry, and perfectionism as represented by a dimensional measurement of OCPD. SEM was used to test the goodness-of-fit and specificity of each of these factors within the integrative hierarchical model. Separate structural models, each consisting of a specific factor in addition to the original tripartite structure (Clark & Watson, 1991; Brown et al., 1998) provided excellent fit. Each proposed specific factor related significantly to the latent factor GAD. The latent factor Worry also shared a significant, albeit small and negative, relationship with the latent factor Depression. Given the status of worry as the cardinal feature of the diagnostic criteria for GAD, it was examined whether the factors PosWorry and Perfectionism would continue to share significant relationships with GAD in the presence of the latent factor Worry. Both Perfectionism and PosWorry did indeed remain significantly related to GAD in the presence of Worry. Further, each of these models provided an excellent fit to the data and no degradation of model fit from previous models was found. Finally, given the possible tautological dilemma of utilizing Worry as a specific factor for GAD, only Perfectionism and PosWorry were retained as

potential specific factors and a final structural model was fitted containing the original tripartite structure and the proposed specific factors Perfectionism and PosWorry. This model provided an excellent fit to the data and no degradation of model fit from the original tripartite model.

There were several important replications of prior work in the present study. The zero-order correlation of .63 between GAD and Depression was identical to that found in Brown et al. (1998). As hypothesized by Watson and Clark (1984, 1988) the inclusion of a higher-order NA factor accounted for much of this covariation When structural paths were opened from NA to GAD and Depression, the correlation between the latter two factors fell from .63 to .28. Significant relationships of .57 and .59 were found between NA and GAD and NA and Depression respectively. Also consistent with prior research, PA significantly predicted Depression (β = -.30). At odds with prior theory and research findings however was an equally strong relationship between PA and GAD (β = -.29). Considering prior work demonstrating a strong relationship between low PA and social phobia (Mineka et al., 1998, Brown et al., 1998, Hughes et al., 2007), this is likely due to a) the high comorbidity between GAD and social phobia (Kessler, et al., 2005; Newman et al., 2007) and b) the lack of inclusion of social phobia measures and by extension, latent factor, in the current study. Finally, the positive relationship between NA and PA (β = .28) was at odds with prior theory and research findings (Clark, Steer, & Beck, 1994; Brown et al., 1998) in which a consistent negative relationship has been demonstrated between the two. It is possible that this correlation represents a response set for the PANAS in which participants systematically endorsed larger or smaller values across the instrument as a whole.

Two specific factors for GAD within the integrative hierarchical model of anxiety and depression were delineated in the current study. Specific factors here refer to lower-order latent factors predicted by diagnostic-level latent factors such as GAD and Depression (in the current

model) as well as social phobia, panic disorder, and obsessive-compulsive disorder (included in Brown et al., 1998). These factors are specific in that they share a relationship with few diagnostic categories. The proposed ideal for the integrative hierarchical model is that each specific factor shares a significant relationship with a single diagnostic category. The original tripartite model (Clark & Watson, 1991) proposed that AA was a specific factor for all anxiety disorders, whereas the integrative hierarchical model (Mineka, et al., 1998) and findings by Brown et al. (1998) established AA as a specific factor for panic disorder alone. AA, a measure of somatic anxiety, fearfulness, and autonomic arousal therefore has been shown to be idiosyncratically indicative of panic disorder.

Tying this finding back to those in the current study, PosWorry and Perfectionism were latent factors found to be idiosyncratically predictive of GAD compared to Depression. Consistent with the conceptualization of Sanderson et al. (1994), item-level analyses of the PDQ-4 OCPD scale revealed that the items most strongly related to GAD were those concerning detail-orientation and perfectionism. Given the absence of research relating GAD to perfectionism and the evidence demonstrating a relationship between GAD and OCPD (Nestadt et al., 1992; Sanderson et al., 1994), it was believed that the method of investigation indicated by prior empirical research was to examine these relationships through a dimensional representation of the OCPD construct. The results of the item-level analyses indicate the need to examine the role of perfectionism in GAD more explicitly. To this effect a follow-up study is planned in which perfectionism will be measured directly. It is expected that this will strengthen and clarify the relationship between GAD and the latent factor for perfectionism. However, a discussion of the function of perfectionism within GAD is certainly warranted at present.

Just as Wells (1995, 1997) has proposed that adaptive and beneficial processes of worry become pathological when negative metacognitive appraisals (worry about worry) are attached to worry behavior, adaptive and beneficial processes of perfectionism may become pathological when they become attached to negative appraisals about future outcomes. In fact there is a robust body of research indicating a two-factor structure to perfectionism (Owens & Slade, 1987; Frost et al., 1993; Slade & Owens, 1998), in which the first factor represents positive, beneficial, and motivating attributes of perfectionism and the second factor represents negative, pathological, and disabling attributes. The former has been variously termed 'normal' (Hamachek, 1978), 'satisfied' (Owens & Slade, 1987), and 'positive' (Slade & Owens, 1998) perfectionism and 'positive striving' (Frost et al., 1993), whereas the latter has been referred to as 'neurotic' (Hamachek, 1978), 'dissatisfied' (Owens & Slade, 1987), and 'negative' (Slade & Owens, 1998) perfectionism, and 'maladaptive evaluative concerns' (Frost et al., 1993).

Though various authors have arrived at a two-factor solution, the content around which the positive and negative valence of each factor was derived has differed from model to model. For instance, Frost et al.'s (1993) positive striving and maladaptive evaluation concerns related to intrinsically versus extrinsically prescribed standards. Slade and Owens (1998) proposed a dual process model of perfectionism based on Skinner's observation that the same behavior may be associated with different emotional experiences as a function of whether it is associated with positive or negative reinforcement (Skinner, 1968). Much like Wells' assertion that the appraisals attached to the worry process determine the pathological or adaptive function of worry, Slade and Owens (1998) posited that whether perfectionism is positive or negative is determined by the reinforcement that accompanies it, such that negative perfectionism is associated with negative reinforcement and positive perfectionism associated with positive reinforcement. Furthermore, they propose that "the

repeated reinforcement of positive perfectionist behavior may in fact lead to the development of negative perfectionism, with the corresponding shift towards feelings of compulsion;" wherein those feelings of compulsion are aimed at avoiding failure as opposed to achieving success (Slade & Owens, 1998). The mechanism of action for this transition from adaptive to maladaptive perfectionism may involve the accompaniment of performance situations with negative mood states (Cervone, Kopp, Schaumann, & Scott, 1994). Here, the desire to avoid negative mood states associated with performance goals may create a pattern of negative reinforcement that supersedes or precludes the positive reinforcement associated with the accomplishment of goals.

As noted in the Introduction, Slade and Owens (1998) proposed that the DSM-IV diagnostic category mostly closely resembling perfectionism is OCPD. What should be added is that they offered that it was negative perfectionism, with its negatively reinforced avoidant properties that is specifically related to OCPD (Slade & Owens, 1998). Such a conceptualization, considered within the context of the demonstrated relationship between GAD and OCPD (Nestadt et al., 1992; Sanderson et al., 1994), might explain the elevated evidence requirements observed in GAD (Metzger, Miller, Cohen, Sofka, and Borkovec, 1990; Tallis, Eysenck, and Mathews, 1991; Pratt, Tallis, and Eysenck, 1997). Individuals motivated to avoid failure would be reluctant to make a possibly incorrect choice. Flett and Hewitt (2006) make just such a case in a recent review of the role of perfectionism in psychopathology. Importantly, they state that it is this element of perfectionism that is related to what they refer to as the obsessive-compulsive style.

In the case of PosWorry, the three scales indicating this latent factor dealt with worry aiding problem-solving, providing motivation, and being a positive personality characteristic. Worry itself has been hypothesized to be a vehicle of emotional avoidance and negative reinforcement (Borkovec, Alcaine, & Behar 2004; Borkovec & Roemer, 1995). As noted above, because much of

what is worried about does not occur, the worry is identified as the causative preventative agent. Positive beliefs about worry are likewise maintained by negative reinforcement, both in the belief that the act of worrying reduces apprehension and anxiety (Wells, 2006) and in the belief that the act of worrying prevents unwanted future outcomes (Borkovec & Roemer, 1995; Borkovec, Hazlett-Stevens, & Diaz, 1999; Wells, 2005). In the current study care was taken to attempt to distinguish phenomena diagnostically or theoretically associated with GAD and phenomena indicative of GAD. This distinction is a crucial one, as the inability to convincingly differentiate worry from GAD was the primary reason for the abandonment of the latent factor Worry as a possible specific factor for GAD in the current study. As mentioned previously, the experiential avoidance scales of the WW-II, "worrying protects the individual from negative emotions in the event of a negative outcome" and "the act of worrying itself prevents negative outcomes," were removed from analyses in an attempt to isolate beliefs and behavior outside of the explicit criteria for GAD.

Nevertheless, a sizable body of literature has established that within GAD, positive beliefs about worry play an integral role in the negative reinforcement of worry through emotional avoidance (Dugas, Marchand, & Ladouceur, 2005; Borkovec, Alcaine, & Behar 2004; Borkovec & Roemer, 1995). In a study examining the symptom specificity of GAD within 17 GAD clients and 28 panic disorder clients, the highest zero-order correlation in the total sample was between positive beliefs about worry and cognitive avoidance, a sub-process of emotional avoidance ($r = .61$, $p < .001$; Dugas et al., 2005). This correlation was marginally larger than that found between worry and positive beliefs about worry ($r = .36$, $p < .05$; diff = .25, $p < .10$) and likely would have been significant with a larger sample.

The zero-order correlation between the latent factors PosWorry and Perfectionism was moderately large and significant ($\beta = .54$). Even after accounting for the common relationship with

GAD the correlation between PosWorry and Perfectionism remained significant (β = .24). It would seem clear then that these two factors share underlying unifying features. It is proposed that there are three such features: 1) emotional avoidance, 2) negative reinforcement, and 3) a future-focused orientation towards possible negative outcomes. It has been argued that maladaptive perfectionism involves motivation to avoid failure (Slade & Owens, 1998; Flett & Hewitt, 2006). Behaviors enacted in an attempt to avoid failure include procrastination (Frost et al., 1990), prematurely ending tasks, checking, reassurance seeking, and excessive consideration before making a decision (Antony & Swinson, 1998). These behaviors often reduce failure at the cost of either avoiding tasks or performances altogether or greatly reducing efficiency in task completion. However, for the perfectionist, the outcome, an avoidance of failure and a reduction of accompanying distress, reinforces the maladaptive behaviors. For the worrier, a similar process is engaged. Wells claims that the typical worry episode is centered around "what if?" questions such as "what if I fail?" (Wells, 2006). The heightened anxiety associated with such questions is reduced by problem-solving, wherein there is a sequence of potential problems and negative outcomes and proposed responses (Wells, 2005, 2006). As mentioned previously, this process serves to negatively reinforce positive beliefs about worry both by reducing anxiety within the worry episode and by the perception that worrying about the potential negative outcome has obviated its occurrence.

In both perfectionism and positive beliefs about worry, the individual is focused on potential future negative outcomes, the distress associated with those outcomes, and the need to avoid both the outcome and the accompanying distress. It is proposed that this sequence of cognitions represents the underlying connection between the latent factors PosWorry and Perfectionism. Furthermore, in both cases, responding behaviors (listed above) are negatively reinforced by the perception that negative outcomes have been successfully avoided. Finally, the distress accompanying both the

initial concern and the feared negative outcome are avoided by worry and perfectionist responses, strengthening the negative reinforcement of the responding behaviors.

Possible obstacles to an accurate examination of the integrative hierarchical model

The current study produced several important replications of prior work and two notable differences: a significant positive relationship between NA and PA and a significant negative relationship ($\beta = -.30$) between PA and GAD statistically equivalent to that found between PA and Depression ($\beta = -.29$). The relationship between PA and NA though positive and significant, was small and did not affect the function of either factor within the larger models. Therefore it would seem more anomalistic than contrary to prior research. Again, it is likely accounted for by a response set wherein respondents systematically calibrated responses upward or downward across the PANAS instrument.

Of greater importance is the relationship found between GAD and PA. As mentioned above, the absence of observed measures and an accompanying latent factor for social phobia is hypothesized to account for this relationship. Such a finding puts into question how accurately the integrative hierarchical model was in fact being tested. Social phobia is the anxiety disorder most commonly comorbid with GAD (Kessler, et al., 2005; Newman et al., 2007). Given this relationship, it is likely that anxious pathology stemming from social phobia was accounted for by responses to GAD instruments. Inclusion of social phobia measures and by extension a latent factor for social phobia would better account for this pathology. It is reasonable to wonder whether variance in GAD responses accounted for other anxious pathology such as that associated with panic disorder, OCD, or PTSD. Given that GAD is the most highly comorbid of the anxiety disorders (Kessler, et al., 2005), such phenomena cannot be ruled out unless explicitly tested. A follow up study is planned in which dimensional instruments for social phobia and panic disorder will be

included, as these are the only remaining mood and anxiety disorders for which specific factors have been identified (low PA and AA respectively).

Future Directions

Two possible weaknesses of the current study might be pointed out. First, the participant sample consisted entirely of undergraduate students drawn from a large subject pool. There were no treatment-seeking individuals, nor were there representatives of the community at large. However, the tripartite and integrative hierarchical models have been proposed as dimensional representations of psychopathology and have not been hypothesized to be limited to clinically impaired individuals. Furthermore, the subject pool utilized by the current study allowed for the collection of a large sample (n = 423), within which a full spectrum of responses were collected on all instruments.

Second, the current study focused solely on the differentiation of GAD and depression. If Perfectionism and PosWorry are to be established as specific factors for GAD within the integrative hierarchical model of anxiety and depression, they would ultimately need to remain significantly and idiosyncratically related to GAD in the presence of other mood and anxiety disorders. This is an especially important detail given the finding in the current study relating low PA to GAD, in which it seems apparent that a failure to account for covariation in social phobia is what allowed this relationship to manifest.

A follow-up study has been planned in which the Penn State University subject pool will again be utilized to take full advantage of the large sample available and the full spectrum of subject responses. Within this study, instruments measuring social phobia and panic disorder will be added to assess for the covariation between the proposed specific factors and dimensional latent factors for these axis I classifications. Also, perfectionism will be examined explicitly by utilizing instruments designed for the measurement of maladaptive perfectionism, such as the multidimensional

perfectionism scale (Frost, et al, 1990). It is hypothesized that perfectionism as measured by such instruments will remain an idiosyncratic predictor of GAD within the integrative hierarchical model. It is also hypothesized that the presence of a latent factor for social phobia will better account for the covariation between PA and GAD, rendering this relationship non-significant.

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Appendix A: Additional Tables

Table 6: Confirmatory Factor Model Fit Indices

	Two-Factor Model	*Four-Factor Model*	*Lower-Order Model*
S-B χ^2	819.14	13.82	7.30
df	14	9	7
p-value	< .001	.13	.40
RMSEA	.371	.036	.010
SRMR	.420	.015	.012
NNFI	.67	1.00	1.00
CFI	.67	1.00	1.00
AIC	847.14	51.82	35.30

S-B χ^2 = Satorra-Bentler scaled chi-square, df = degrees of freedom, p-value = probability, RMSEA = root mean square error of approximation, SRMR = standardized root mean residual, NNFI = non-normed fit index, CFI = comparative fit index, AIC = Akaike's information criterion

Table 7: Satorra-Bentler χ^2Differences

	2 vs. 1	*3 vs. 1*	*4 vs. 1*	*5 vs. 2*	*6 vs. 2*	*7 vs. 1*
Corr	1.09	1.02	1.14	1.06	1.15	1.12
Diff	14.83	5.64	25.68	4.59	38.05	35.62
df	11	5	20	6	25	27
p-value	.19	.34	.18	.60	.05	.12

Corr = Satorra-Bentler χ^2difference test scaling correction, Diff = Satorra-Bentler chi-square difference between models, df = degrees of freedom difference between models, p-value = significance of difference test (goodness-of-fit)

Table 8: Structural Model Fit Indices

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*
S-B χ^2	13.82	28.76	19.70	39.61	33.60	68.09	49.58
df	9	20	14	29	26	45	36
p-value	.13	.09	.14	.09	.15	.015	.07
RMSEA	.036	.032	.031	.030	.026	.035	.030
SRMR	.015	.018	.018	.028	.019	.027	.028
NNFI	1.00	1.00	1.00	1.00	1.00	.99	1.00
CFI	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AIC	51.82	78.76	63.70	91.61	91.60	134.09	109.58

S-B χ^2 = Satorra-Bentler scaled chi-square, df = degrees of freedom, p-value = probability, RMSEA = root mean square error of approximation, SRMR = standardized root mean residual, NNFI = non-normed fit index, CFI = comparative fit index, AIC = Akaike's information criterion