REINFORCEMENT SENSITIVITY THEORY AND PROPOSED PERSONALITY TRAITS FOR THE DSM-V: ASSOCIATION WITH MOOD DISORDER SYMPTOMS

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The current work assesses the relationship between reinforcement sensitivity theory (RST) and Personality Traits for the DSM-5 (PID-5), to explore the degree to which they are associated with mood disorder symptoms. Participants (N = 138) from a large public university in the South were administered a semi-structured interview to assess for current mood disorder and anxiety symptoms. They were also administered self-report inventories, including the Behavioral Inhibition System (BIS) and Behavioral Approach System (BAS) scales and the Personality Inventory for DSM-5 (PID-5). Results indicate that both the BIS/BAS scales and the PID-5 scales were strongly associated with current mood symptoms. However, the maladaptive personality traits demonstrated significantly greater associations with symptoms compared to the BIS/BAS scales. Results also indicated support for using a 2-factor model of BIS as opposed to a single factor model. Personality models (such as the five factor model) are strongly associated with mood symptoms. Results from this study add to the literature by demonstrating credibility of an alternative five-factor model of personality focused on maladaptive traits. Knowledge of individual maladaptive personality profiles can be easily obtained and used to influence case conceptualizations and create treatment plans in clinical settings.

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CHAPTER 1

INTRODUCTION

The present work discusses the relationship between two competing theories of personality, and explores their relative utility in predicting mood disorders. The work first focuses on a clinical description of mood disorders, including their prevalence and cost to society, as well as their relationship to personality. Second, the work provides a brief description and history of a biopsychosocial model of personality, reinforcement sensitivity theory (RST). Evidence for RST, and its relationship to mood disorders is discussed. Third, the present work considers hierarchical personality trait theories, including a brief history and description of the theories, evidence for their validity, and their relationships to mood disorders. Fourth, the links between RST and hierarchical personality trait theories is reviewed. Following this introduction, the aims, methods and results from a study testing the association between RST, hierarchical personality trait theories constructs, and mood disorder is reported and implications discussed.

Mood Disorders: Clinical Description, Prevalence and Costs

Clinical Description of Mood Disorders

The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV-TR*; American Psychiatric Association [APA], 2000) identifies four broad classes of mood disorders. The most common, major depressive disorder (MDD), is marked by the occurrence of one or more major depressive episodes (MDE). An MDE is defined by persistent depressed mood and/or anhedonia most of the day, most days, for a minimum of two weeks. The primary domains affected by a depressive episode are cognitive (e.g., low self-esteem, helplessness, etc.), affective (dysphoric mood), and social-motivational (e.g., social withdrawal). The *DSM-IV-TR* (APA, 2000) identifies several other symptomatic criteria, including: significant weight loss or

weight gain, insomnia or hypersomnia nearly every day, psychomotor agitation or retardation nearly every day, fatigue or loss of energy nearly every day, feelings of worthlessness, excessive or inappropriate guilt, diminished ability to think, concentrate, or make decisions, nearly every day, and recurrent thoughts of death, suicidal ideation, or a suicide attempt. A diagnosis of major depressive disorder not otherwise specified (MDD NOS) is given to individuals when full criteria for MDD is not met, but a number of symptoms are severe enough to warrant a diagnosis.

Bipolar disorder encompasses several subdisorders varying in severity from moderate functional improvement to severe cognitive and behavioral impairment. The majority of bipolar diagnoses exhibit shifts in mood states between manic, hypomanic, depressive, and mixed (both manic and depressive simultaneously) episodes (APA, 2000). However, many individuals only experience manic episodes. The episodic changes are often pervasive, affecting cognition and behavior in addition to mood (Craighead, W. E., Miklowitz, D. J., & Craighead, L. W., 2008).

The *DSM-IV-TR* describes four bipolar disorder types. A history of at least one manic or mixed episode is indicative of bipolar I disorder, although individuals typically experience several manic and depressive episodes during their lifetime (Goldberg, Harrow, & Grossman, 1995; Keck et al., 1995). During a manic episode, individuals will experience a minimum of one week of abnormal and persistent elevated, expansive, or irritable mood (or less than one week if the symptoms lead to hospitalization). They must also experience at least three (four if their mood is only irritable) of the following symptoms: inflated self-esteem or grandiosity, decreased need for sleep, pressured speech, racing thoughts, distractibility, increased goal-directed activity (potentially social, vocational, or sexual) or psychomotor agitation, and excessive involvement in pleasurable, yet potentially harmful, activities (APA, 2000). Mood is often exuberant, but it can

also be irritable. Cognition and perception may be altered so that thinking is quickened (Bleuler, 1924, pp. 466, 468), senses feel heightened (Tuke, 1892, p. 765), and thoughts become disjointed (Rush, 1812, pp. 244 – 245). Behavior tends to be marked by increased work output or increased goal directed activity, heightened sexuality, and in the most severe cases, delusions and hallucinations (Kraepelin, 1921, pp. 68 – 69). During a mixed episode, individuals will experience a minimum of one week of symptoms meeting criteria for both a manic and a depressive episode. The mixing of manic and depressive episodes can result in a tumultuous state of being, and is potentially the most dangerous type of episode (Jamison, 1995, pp. 82-83).

Certain individuals experience another form of the disorder referred to as bipolar II disorder. Individuals diagnosed with this subdisorder experience both hypomanic and depressive episodes. The hypomanic episode must be markedly different from the individual's typical non-episode state, but must not be severe enough to cause impairment in social or vocational functioning or hospitalization (*DSM-IV-TR*, 2000). The *DSM-IV-TR* also defines a hypomanic episode as a period of at least 4 days during which an individual experiences persistent elevated, expansive, or irritable mood coupled with at least three (four if their mood is only irritable) of the five manic symptoms outlined above (APA, 2000).

The remaining subdisorders of bipolar disorder are cyclothymia, which is identified by cyclical fluctuations between hypomanic episodes and mild depressive episodes (i.e. not severe enough to warrant a label of MDE), and bipolar disorder NOS, a diagnosis given to individuals when full criteria for another subdisorder of bipolar disorder is not met, but a number of symptoms are severe enough to warrant a bipolar diagnosis.

Finally, dysthymic disorder is defined by persistent depressed mood and/or anhedonia most of the day, most days, for a minimum of two years. Dysthymic disorder may appear to be

less severe than MDE, specifically due to fewer symptom criteria required to meet full diagnosis. However, chronic dysthymia can take a greater toll on a person's health, vocational output, social responsibilities, and overall well-being compared to a briefer MDE or MDD (Klein, 2000). Furthermore, dysthymic disorder has been found to have a high comorbidity with axis II disorders as well as overlapping mood disorders (e.g. double depression), further increasing an individual's impairment in functioning.

According to the Mood Disorders Work Group for the *Diagnostic and Statistics Manual – Fifth Edition* (*DSM-5*), several revisions are proposed regarding the criteria for manic, hypomanic, and major depressive episodes. Such revisions include the addition of a mixed features specifier for mania, hypomania, and depressive episodes, adding increased energy/activity as a core symptom of mania/hypomania, and the elimination of the bereavement exclusion criteria from major depressive episodes. Regarding major depressive disorder, the work group has proposed the separation of "severe" and "with psychotic features," giving greater importance to mood-incongruent features over mood-congruent features when both are present, and extending the post-partum risk period to six months.

Prevalence and Costs

Mood disorders are among the leading causes of disease burden in developed countries, and are estimated to become among the leading contributors to disability worldwide within the next 20 years (Mathers & Loncar, 2006; Murray and Lopez, 1997). According to the National Comorbidity Survey, lifetime prevalence of mood disorders have been estimated to be as high as 20.8%, with an average age-of-onset occurring at age 30 (Kessler, Berglund, Demler, Jin, & Walters, 2005). The 12-month prevalence rate for mood disorders among US adults is as high as 9.5%. Specifically, 12-month prevalence is 6.7% for MDD, 1.5% for dysthmic disorder, and

2.6% for bipolar disorder (ranging from roughly 1% for Bipolar I disorder, to 1.1% for Bipolar II disorder, and 2.4% for sub-clinical bipolar symptoms; Kessler, Chiu, Demler, & Walters, 2005). Moreover, 4.3% of U.S. adults are classified as having a "severe" form of a mood disorder over a 12-month period. Overall, these percentages set the number of Americans affected by a mood disorder in the millions.

According to the World Health Organization (WHO) World Mental Health Survey Initiative, lifetime prevalence of mood disorders was estimated to be as high as 14.9% (Merikangas et al., 2011). Overall, the 12-month prevalence rate for mood disorders in the world was as high as 7.1%. Specifically, 12-month prevalence was 5.6% for MDD and 1.5% for bipolar disorder (ranging from 0.4% for Bipolar I Disorder, to 0.3% for Dipolar II disorder, and 0.8% for sub-clinical bipolar symptoms).

The prevalence rates of mood disorders may in fact be far more common than estimated in the previous studies above. Research utilizing prospective longitudinal studies found lifetime prevalence of mental health disorders to be approximately twice as high as research utilizing retrospective surveys (Moffitt et al., 2010). Overall, such research indicates a need for better estimates of mental health disorders worldwide, by utilizing prospective longitudinal studies.

Age of onset for mood disorders has seen wide variability from study to study depending on the criteria used. According to Kessler et al. (2005) the average age of onset is 32 years for major depressive disorder, 31 years for dysthymic disorder, and 25 years for bipolar disorder. However, some studies have found an even younger average age of onset for Bipolar I. Regarding Bipolar I, Merikangas, et al. (2007) found an average age of 18.2 years, while Perlis et al. (2004) found onset before age 18 in 50% to 67% of participants and before age 13 in 15% to 28%. As a trend, there appears to be an inverse relationship between age of onset and an

individual's symptom severity and functional impairment (Coryell et al., 2003; Schneck et al., 2004; Suppes et al., 2001).

The severity of a mood episode can result in impaired functioning, sometimes for years after the episode has resolved (Coryell et al., 1993; Fagiolini et al., 2005). Predictors of impaired functioning vary greatly among individuals, and impaired functioning is usually due to a number of stressors. Mood disorders negatively impact health (Spitzer et al., 1995), vocational output (Dore & Romans, 2001; Goetzel, Hawkins, Ozminkowski & Wang, 2003), social responsibilities (Coryell et al., 1993; Dion, Tohen, Anthony, & Waternaux, 1988; Dore & Romans, 2001; Ruggero, Chelminski, Young, & Zimmerman, 2007), and overall well-being of affected individuals and their caregivers (Dore & Romans, 2001; Kleinman et al., 2003; Perlick et al., 2007). Mood disorders constitute a significant financial burden not only to the affected individual, but also to the economy. Indeed, mood disorders are among the greatest contributors to absenteeism and diminished work productivity, a burden in excess of 45 billion dollars per year in the US (Sajatovic, 2005).

Furthermore, mood disorders pose a serious risk to affected individuals' health and safety. They are associated with increased use of healthcare services (Donohue and Pincus, 2007), and with increased rates of suicide, elevated as much as four times that of non-affected individuals (Angst, Staussen, Clayton, & Angst, 2002; Bostwick & Pankratz, 2000). The risk for suicide is further increased in individuals with Bipolar Disorder. According to the *DSM-IV-TR* (2000), between 10% and 15% of individuals with Bipolar Disorder completed a suicide attempt. A study by Jamison and Baldessarini (1999) found rates of completed suicide to be 15 times more prevalent in individuals with this disorder than individuals in the general population, and a study by Brown, Beck, Steer, and Grisham (2000) found rates of completed suicide to be 4 times

more prevalent in individuals with this disorder than individuals with major depressive disorder. Individuals experiencing the combination of depressive mood and manic irritability during a mixed state are at increased risk of suicide (Jamison, 2000).

Another factor that can lead to poor prognostic outcomes in patients is comorbidity with other disorders. Lifetime comorbidity is highly prevalent in both major depressive disorder and bipolar disorder (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Kessler et al., 2005; Merikangas et al., 2011). Merikangas et al. (2007) found that among adults with bipolar disorder, 75% experience comorbidity with an anxiety disorder, 63% experience comorbidity with an impulse control disorder, and 42% experience comorbidity with a substance use disorder. Comorbidity with attention-deficit/hyperactivity disorder (ADHD) has also been found to be well over 50% and requires careful consideration from clinicians when differentiating between the two disorders.

Individuals experiencing mania have been described as highly productive and creative, although with the caveat that manic severity plays a major role in actual productivity (Goodwin & Jamison, 2007; Jamison, 2005). Too much manic energy can result in a wealth of productivity, albeit without necessarily being interpretable or complete (Kraepelin, 1921). Individuals experiencing hypomania are more often described as functionally creative, and indeed many historical writers, artists, and leaders are believed to have experienced the creative benefits of Bipolar Disorder (Jamison, 1993). Despite the benefits of hypomania, the frequency of hypomania is usually less than the frequency of depressive episodes amongst individuals with a bipolar spectrum disorder (Goodwin & Jamison, 2007).

Personality and Mood Disorders

Recent studies have consistently found strong correlations between individual personality

traits and mood symptoms, indicating personality traits may be strong predictors of risk for mood disorders (Alloy, Abramson, Walshaw, et al., 2008; Johnson, Edge, Holmes, & Carver, 2012; Kotov, Gamez, Schmidt, and Watson, 2010). Trait personality dimensions could represent potential prodromes of mood disorders or put individuals at risk for mood disorders. Research into the etiology of personality and psychopathology has led to the support of several distinct models of personality. The current work discusses two broad classes of personality models and their relationship to mood symptoms. Such models of personality have all been found to demonstrate consistently strong correlations with mood symptoms, evidence which will be reviewed after first briefly describing the theories.

Reinforcement Sensitivity Theory

Description and Theory

A broad psychobiological model of personality known as reinforcement sensitivity theory (RST) emphasizes how behavior and affect are guided by individual differences in three biological systems: 1) an approach system referred to as the behavioral activation system (BAS), 2) an avoidance system referred to as the fight/flight/freeze System (FFFS) and, 3) a mediational system referred to as the behavioral inhibition system (BIS; see Alloy, Abramson, Walshaw, et al., 2008; Gray & McNaughton, 2000; or Johnson, Turner & Iwata, 2003). RST posits that neurobiological subsystems mediate differences in motivation reinforcement, personality, psychopathology, and emotional reactivity (Corr, 2004). This theory builds off Gray's biopsychological theory of personality (1982, 1987), which originally described two underlying systems that control motivational behavior and affect, the behavioral inhibition System (BIS), and the behavioral activation system (BAS; also referred to as the behavioral approach system; Fowles, 1980). Gray describes BIS sensitivity and BAS sensitivity as personality traits, such that

an individual's personality – particularly his or her response to reinforcing stimuli – can be explained by individual differences in BIS and BAS sensitivities.

BAS activity is initiated by appetitive stimuli, which gives rise to approach behavior. BAS is theorized to control positive motivation behaviors, such as goal seeking, reward responsiveness, and feelings of positive affect (Depue & Collins, 1999; Gray, 1994). On the other hand, BIS activity was originally theorized to be initiated by aversive stimuli, and gives rise to avoidance behavior by increasing attention and arousal to the environment. BIS was theorized to control avoidance behaviors, such as anxiety, withdrawal, and sensitivity to punishment (Depue and Iacono, 1989; Gray, 1982, 1994).

RST was revised in order to differentiate the BIS from FFFS (Gray & McNaughton, 2000). In the current revision, BAS remains unchanged from the original theory. BIS, in the revised model, controls the resolution of goal conflict and mediates anxiety responses, while FFFS mediates response to fear of punishment (Gray & McNaughton, 2000; McNaughton and Corr, 2004). BIS requires an adequate level of cognitive flexibility and response modulation. Thus, activation of the BIS produces anxiety, which in turn inhibits behaviors in an effort to resolve conflicts between the approach behaviors of BAS and the avoidance/escape behaviors of FFFS (Corr, 2004; Gray & McNaughton, 2000). The anxiety produced by a heightened BIS activity appears to be influenced by both the degree to which BAS and FFFS conflict and by individual BIS sensitivity.

BAS can be divided into several facets. The BAS-reward responsiveness (BAS-RR) facet indicates responsiveness (positive emotions) towards present or future rewards. The BAS-fun seeking (BAS-FS) facet indicates the level of impulsivity related to the approach behavior. Finally, the BAS-drive (BAS-D) facet indicates individual differences in drive to achieve a

desired goal.

When describing BIS and BAS in research, it is important to clearly define the language used. Johnson et al. (2012) describe BAS through sensitivity, outputs, and inputs. They describe BAS sensitivity as "multifaceted individual differences influencing the intensity of BAS outputs for a given level of BAS input;" BAS outputs as, "manifestations of BAS engagement, including motor activity, arousal, elation, and confidence;" and BAS inputs as, "stimuli that serve as cues for goal-directed behavior." Thus, the more sensitive a person's BIS and BAS levels are, the stronger the output of symptoms will be, even with minimal stimulus input.

Evidence for RST

RST grew out of a literature focused on integrating neurobiology (e.g., brain structures and neurotransmitters, such as dopamine) and behavioral systems. Evidence for a broad behavioral system such as BAS (aka Behavioral Facilitation System [BFS]) can be found in animals across phylogenic levels (Schneirla, 1959). BFS theory posited animals engage their environment due to 1) locomotor activity and 2) incentive-reward motivation which result in either positive engagement or responses to threat (e.g., aggression or avoidance; Depue & Iacono, 1989). Regarding humans, BAS has been found to be dimensional, with high levels of BAS associated with positive affect and low levels of BAS associated with the absence of positive affect (Tellegen, 1985; Watson & Tellegen, 1985). For more information on the animal literature see Gray (1982) or Corr (2008).

Evidence regarding the validity of RST theory in humans comes from studies using methods such as self-report measures (Carver & White, 1994), neurobiological assessment (Fowles, 1980; Harmon-Jones & Allen, 1997; Sobotka, Davidson, & Senulis, 1992; Sutton & Davidson, 1997), punishment and reinforcement paradigms (Henriques, Glowacki, & Davidson,

1994), and behavioral observation. The current paper focuses on evidence from self-report.

Self-report measures have been used extensively in the literature to measure individual differences in BIS and BAS (Johnson et al., 2003). Carver and White's (1994) BIS/BAS scales are the most commonly used measure in the literature (Campbell-Sills, Liverant, & Brown, 2004; Heubeck, Wilkinson, & Cologon, 1998; Jorm et al., 1999). Clinical samples assessed with the BIS/BAS scales were found to have stable BIS and BAS levels over time, regardless of their clinical state, suggesting they measure trait personality dimensions, as opposed to state, differences in individuals (Kasch, Rottenberg, Arnow, & Gotlib, 2002).

The joint subsystems hypothesis (JSH; Corr, 2002) posits that a more realistic representation of behavior can be obtained from the concurrent activity of both BIS and BAS together, as opposed to separately. Many studies have found associations between specific BIS/BAS profiles (high, low, or unstable BIS and BAS scores) and psychopathology. Specific profiles have been found to be associated with a wide range of internalizing and externalizing disorders, such as general anxiety disorder (Beevers & Meyer, 2002; Johnson, Turner, & Iwata, 2003; Kimbrel, Nelson-Gray, & Mitchell, 2007), social anxiety disorder (Coplan, Wilson, Frohlick, & Zelenski, 2006; Kimbrel, Nelson-Gray, & Mitchell, 2011), obsessive-compulsive disorder (Fullana et al., 2004), and post-traumatic stress disorder (Pickett, Bardeen, & Orcutt, 2011), attention-deficit/hyperactivity disorder (Barkley, 1997, Matthys, Van Goozen, De Vries, Cohen-Kettenis, & Van Engeland, 1998), psychopathy (Fowles, 1980), and personality disorders (Caseras, Torrubia, and Farré, 2001; Claes, Vertommen, Smits, & Bijttebier, 2009; Pastor et al., 2007). Overall, high BAS and low BIS sensitivity have been associated with externalizing behaviors of psychopathology (Johnson et al., 2003; Newman, MacCoon, Vaughn, & Sadeh, 2005), while high BIS sensitivity has been associated with internalizing behaviors of

psychopathology (Carver, 2004; Colder & O'Conner, 2004). Similar results were found in comparative studies focusing on adolescents (ages 8-12), providing support for the application of RST in demonstrating risk factors for psychopathology in children, as well as adults (Muris, Meesters, Kanter & Timmerman, 2005). The current study will focus specifically on RST's relationship to mood disorders in adults.

RST and Mood Disorders

Individual differences in BIS and BAS sensitivities result in different behavioral and affective tendencies. As seen above, these differences in neurobiological systems may in turn act as risk factors for mood disorders (Davidson, 1998). According to the BAS hypersensitivity model (Depue & Iacono, 1989; Depue, Krauss, & Spoont, 1987; Fowles, 1993), a hypersensitive BAS may be responsible for manic, hypomanic, and depressive episodes. Trait hypersensitivity in BAS can cause highly fluctuating state BAS outputs in various contexts. In bipolar disorder, an individual's ability to regulate emotions is disrupted by over-reacting to BAS-activating events. Thus, mania may be caused by a highly sensitive BAS that generates BAS outputs (e.g., elevated mood, higher self-esteem, increased behavioral activation, and anger) in reaction to appetitive environmental stimuli (Carver & Harmon-Jones, 2009; Casiano, Belik, Cox, Waldman, & Sareen, 2008; Corrigan & Watson, 2005; Depue & Zald, 1993; Perry et al., 2009).

Conversely, unipolar depression may be caused by a highly insensitive BAS that fails to generate positive affect or appropriate behavioral activation in reaction to appetitive environmental stimuli (Depue & Iacono, 1989; Fowles, 1988; Mineka, Watson, & Clark, 1998). Indeed, low BAS sensitivity may suggest a trait feature of unipolar depression. Furthermore, BIS is directly linked to anxiety, with strong associations found between BIS and depression (Campbell-Sills et al., 2004; Hundt, Nelson-Gray, Kimbrel, Mitchell, & Kwapil, 2007; Pinto-

Meza et al., 2006). While low BAS is linked to depression, high BIS is likely a common factor to a wide range of emotional distress (Bijttebier, Beck, Claes, & Vandereycken, 2009).

Evidence for RST's Relevance to Mood Disorders

Evidence exists indicating that BIS and BAS may influence depression in different ways. A profile consisting of a high BIS score in conjunction with a low BAS score has been found to be associated with depression (Fowles, 1987; Kasch et al., 2002; McFarland, Shankman, Tenke, Bruder, & Klein, 2006) and anhedonic depression (Kimbrel et al., 2007). A profile consisting of a high BIS score in conjunction with a high BAS score has been found to be associated with individuals with bipolar disorder (Depue and Iacono, 1989; Johnson et al., 2000; Meyer, Johnson, & Winters, 2001). Several studies have found BAS ratings to predict the severity of depressive symptoms, while BIS ratings did not (McFarland et al., 2006; Pinto-Meza et al., 2006). Furthermore, BIS and BAS have been found to discriminate individuals with MDD from controls, but only low BAS has been found to discriminate recovered individuals with MDD from healthy controls (Pinto-Meza et al., 2006). Thus, low BAS sensitivity may suggest a trait in individuals with MDD, while high BIS sensitivity may be more of a state symptom of MDD, supporting the prediction that low BAS sensitivity influences unipolar depression.

BAS has been found to be associated with current mania symptoms, while both BIS and BAS have been found to be associated with current depressive symptoms, with BAS-FS distinctly related to mania and BAS-RR distinctly related to depression (Meyer, Johnson, & Carver, 1999). In contrast, Biuckians, Miklowitz, & Kim (2007) did not find BAS to be associated with manic symptoms in a small sample of adolescents with early-onset Bipolar Disorder. Among undergraduates, a high expressions of BAS activity, as measured by Carver and White's (1994) BIS/BAS scales, was associated with a life-time bipolar spectrum disorder,

while moderate BAS activity was not (Alloy et al., 2006). Adult onset bipolar disorder may have a different etiology compared to adolescent onset bipolar disorder; indicating BAS findings may not be comparable between the two populations.

Individuals diagnosed with a bipolar spectrum disorder also demonstrated higher levels of reward sensitivity and average levels of punishment sensitivity when compared to normal controls (Alloy et al., 2008). Among patients with a vulnerability to bipolar spectrum disorders, high BIS and BAS scores predicted shorter time to onset of manic and hypomanic episodes (Alloy et al., 2008). Specifically, a high BAS score predicted a more rapidly occurring onset of manic and hypomanic episodes in bipolar spectrum patients compared to control subjects, while a high BIS score predicted less survival time to major depressive episodes in bipolar spectrum patients, controlling for initial symptoms. BAS sensitivity has also been found to predict higher levels of mania within bipolar patients (Meyer et al., 2001) and greater recovery time with patients with MDD (Kasch et al., 2002). Low BAS indicated increased risk for depression (Fowles, 1988; McFarland et al., 2006), manifesting in decreased appetitive motivation and positive affect (Davidson, 1992).

Gray found high BAS sensitivity in individuals characterized by impulsivity and found high BIS sensitivity in individuals characterized by anxiety (Gray, 1982, 1987). Not surprisingly, a profile consisting of positive self-appraisal, high BAS-FS, high BAS-RR, and low BIS has been associated with hypomanic personality (Jones & Day, 2008; Jones, Shams, & Liversidge, 2007). As both hypomanic personality and BAS sensitivity have been described as potential risk factors for bipolar spectrum disorders (Meyer & Hofmann, 2005), hypomanic personality may serve as an indicator for BAS dysregulation (Meyer & Krumm-Merabet, 2003).

Dysregulation of goal setting and disproportionate responses to goals have also been

shown to predict mania in individuals with bipolar disorder. Some studies have found that goal attainment led to greater increases in confidence in those with bipolar disorder than in the general population (Johnson, 2005). Such disproportionate increases in confidence could be related to the highly sensitive reward response maintained by a dysregulation in dopamine signaling.

Differences between BIS and BAS ratings have been found between sexes, with women having a significantly higher BIS than men (Leone, Perugini, Bagozzi, Pierro, & Mannetti, 2001; Newman, MacCoon, Vaughn, & Sadeh, 2005). This finding is particularly important, as women are 50% more likely than men to experience a mood disorder during their lifetime (Kessler, Berglund, et al., 2005).

In general, high BIS has been found to be positively associated with social and emotional difficulties, while high BAS has been found to be associated with lower maladjustment ratings in both children and undergraduates (Coplan, Wilson, Frohlick, & Zelenski, 2006; Hundt, Mitchell, Kimbrel, & Nelson-Gray, 2010). Furthermore, consistent with Corr's (2002) joint subsystems hypothesis, the combination of high BIS and low BAS provided the greatest risk of psychological impairment in children (Coplan et al., 2006).

Summary of Findings

Overall, there is strong evidence to support RST influences mood disorders. Regarding depression, there is strong support suggesting high levels of BIS activity and low levels of BAS activity are associated with depressive symptoms, influencing the severity and duration of depressive episodes. Regarding bipolar disorder, there is strong support suggesting BAS outputs are associated with manic symptoms, and that BAS sensitivity and activity is higher in bipolar disorder, influencing both onset and intensity of manic episodes (Johnson et al., 2012).

Hierarchical Personality Theories

Description and Evidence

Personality psychology has seen a wide variation in the number of proposed taxonomies, each implementing different terminology and dimensional structures. However, agreement regarding a hierarchical organization of personality has developed over several decades, with hierarchical structures typically marked by a small number of broad traits, or factors, over a large number of specific traits, or facets (Markon, Krueger, & Watson, 2005). Although the specific traits found among the lower levels are not yet fully understood, the broad traits have been extensively researched. Models such as the big three (Clark & Watson, 1999; Eysenck, 1947; Eysenck & Eysenck, 1976; Markon et al., 2005) and the big five (Goldberg, 1993; John & Srivastava, 1999; McCrae et al., 2000) models of personality emphasize individual differences over several broad dimensions, including: extraversion, agreeableness, conscientiousness, neuroticism, openness, disinhibiton, and psychoticism.

The big three model is rooted in the work of Eysenck (1947; Eysenck & Eysenck, 1976). Eysenck's original conceptualization of the three factors of personality was neuroticism (characterized by high levels of negative affect), extraversion (indicative of impulsiveness, sociability, liveliness, activity level, and excitability), and psychoticism (typified by aggressiveness and interpersonal hostility). From this framework, similar three-factor models were proposed (Gough, 1987; Tellegen, 1985; Watson & Clark, 1993) and later synthesized into a common three-factor model (Clark and Watson, 1999). Currently, the big three model is comprised of three higher order factors: negative emotionality (e.g., neuroticism and negative affect), positive emotionality (e.g. extraversion and sociability), and disinhibition versus constraint (e.g. impulsivity; Clark & Watson, 1999; Markon et al., 2005).

The big five model stems from research attempting to classify verbal descriptions of personality characteristics (Goldberg, 1993; John & Srivastava, 1999; McCrae et al., 2000). Five higher order factors persistently emerged from structural analyses: neuroticism, extraversion, conscientiousness, agreeableness, and openness. Neuroticism, or emotional instability, is the tendency to experience negative emotions. Extraversion is characterized as the inclination to experience positive emotions and move towards rewarding experiences. Conscientiousness reflects a habit of self-discipline and striving to meet social demands. Agreeableness reflects the proclivity towards compassion and cooperation, as opposed to suspicion and antagonism. Openness is the proclivity to appreciate a variety of experiences. These factors have been replicated across self and peer reports (McCrae & Costa, 1987), age (Digman, 1997), and language and culture (Allik, 2005; McCrae & Costa, 1997). Finally, the big five have been shown to demonstrate greater clinical utility than the diagnostic categories of the *DSM-IV* in such areas as communicative power, general personality descriptions, more sophisticated models of personality pathology, and treatment planning (Samuel & Widiger, 2006).

There is evidence to show that the big three and big five models share several dimensions, with overlap between neuroticism and negative emotionality and between extraversion and positive emotionality (Clark & Watson, 1999; Markon et al., 2005). Although disinhibition was found to be correlated with agreeableness and conscientiousness, half of its variability was found to be independent of the big five traits (Clark & Watson, 1999). Furthermore, openness has been found to have modest positive correlations with the big three factor of positive emotionality, but is still considered a unique trait (Digman, 1997; Markon et al., 2005).

Hierarchical Personality Theories and Mood Disorders

Several models of psychopathology have influenced research associating personality and mood disorders. According to the tripartite model of anxiety and depression (Clark & Watson, 1991), depression is marked by high levels of negative affect and low levels of positive affect, which are associated with neuroticism and extraversion, respectively (Watson, Wiese, Vaidya, & Tellegen, 1999). Further associations between personality and mood can be found in the two-factor internalizing and externalizing model of psychopathology. Internalizing disorders (MDD, dysthymic disorder) are associated with internal feelings of fear and distress, while externalizing disorders (substance use disorders, and antisocial personality disorder) are associated with overt behaviors (Krueger & Markon, 2006). Both internalizing and externalizing disorders have been associated with neuroticism, while externalizing disorders have been additionally associated with disinhibition (Watson, Gamez, & Simms, 2005; Krueger, Markon, Patrick, Benning, & Kramer, 2007). As mood disorders are marked by high levels of distress, they appear to be particularly vulnerable to neuroticism.

Several models attempt to explain the relationship between neuroticism and psychopathology (see Clark, 2005; Krueger & Tackett, 2003). The vulnerability model posits personality traits influence and predict the onset of disorders. The pathoplasty model posits personality traits dictate the duration and severity of a disorder, influencing prognosis of a diagnosis. The scar model argues personality is permanently altered by the presence of psychopathology. Conversely, the complication model argues that change in personality is transient and limited to the duration of a disorder. The common cause model holds that personality and psychopathology share a common etiology. Finally, the spectrum model, or precursor model, argues personality and psychopathology are different outcomes of similar

circumstances. While empirical support has been found for all of these models (Bienvenu & Stein, 2003; Christensen & Kessing, 2006; Clark, Watson, & Mineka, 1994; Klein, Wonderlich, & Shea, 1993; Ormel, Oldehinkel, & Vollebergh, 2004), more longitudinal data is still needed to appropriately compare and contrast them.

Evidence for Hierarchical Personality Theories Relevance to Mood Disorders

A multitude of studies have been conducted examining the relationships between the big three and big five models of personality and psychopathology (Ball, 2005; Bienvenu & Stein, 2003; Clark et al., 1994; Enns & Cox, 1997; Malouff, Thorsteinsson, & Schutte, 2005). Overall, it has been observed that depression symptoms are positively associated with neuroticism and negatively associated with extraversion (Bagby et al., 1996; Bagby et al., 1997; Bienvenu et al., 2001; Clark et al., 1994; Enns & Cox, 1997; Malouff et al., 2005), while mania and hypomania symptoms are positively associated with extraversion and openness (Bagby et al., 1996; Bagby et al., 1997; Hirschfeld & Klerman, 1979; Hirschfeld, Klerman, Andreasen, Clayton, & Keller, 1986; Liebowitz, Stallone, Junner, & Fieve, 1979; Meyer, 2002).

Malouff, et al. (2005) conducted a meta-analysis of 33 studies examining the relationship between mental illness in general and the big five model. Overall, they found mental disorders to be strongly associated with high levels of neuroticism and moderately associated with low levels of conscientiousness, extraversion, and agreeableness. An association between openness and mental illness was not found. Specifically, mood disorders in general were found to be positively associated with neuroticism (i.e., Cohen's d = 1.54) and negatively associated with conscientiousness (i.e., Cohen's d = -1.02), extraversion (i.e., Cohen's d = -0.93), and agreeableness (i.e., Cohen's d = -0.34).

Kotov, et al. (2010) conducted 66 meta-analyses of 175 studies linking big three and big

five personality traits to anxiety, depressive, and substance use disorders. Depressive disorders (MDD, unipolar, and dysthymic) were found to demonstrate a strong positive association with neuroticism (Pearson's r = .47 for MDD, .42 for unipolar depression, and .36 for dysthymic disorder) and a strong negative association with conscientiousness (i.e., Pearson's *r* = -0.36 for MDD, -0.35 for unipolar depression, and -.019 for dysthymic disorder). Dysthymic disorder also demonstrated moderate negative associations with extraversion (i.e., Pearson's *r* = -0.29) and openness (Pearson's *r* = -0.14), and a small positive association with disinhibition (i.e., Pearson's *r* = -0.19). Agreeableness was not significantly associated with depressive disorders.

There is evidence for much overlap between predictors for depression in bipolar disorder and predictors for unipolar depression. First, individuals with either bipolar disorder or MDD have been found to demonstrate lower extraversion and higher neuroticism compared to controls (Bagby et al., 1996; Bagby et al., 1997; Malouff et al., 2005); however patients with Bipolar I disorder were found to demonstrate higher extraversion and lower neuroticism when compared to patients with MDD, as well as lower neuroticism when compared to patients with Bipolar II disorder (Wu et al., 2012). Next, Individuals with MDD were found to demonstrate higher levels of neuroticism when compared to controls across all ages (Malouff et al., 2005; Weber et al., 2012). Finally, individuals influenced by neuroticism (Lozano & Johnson, 2001) were found to demonstrate poorer prognosis and greater psychiatric relapse in bipolar and unipolar depression. Overall, personality traits appear to be highly associated with mood disorders (Clark et al., 1994; Enns & Cox, 1997; Kotov et al., 2010; Malouff et al., 2005) and influence clinical practice by providing aid in identifying adaptive and maladaptive personality profiles, as well as formulating more personalized treatment plans (Samuel & Widiger, 2006; Sanderson & Clarkin, 2002).

Maladaptive Personality Traits

The transition from the *DSM-IV* to the *DSM-5* involved discussion by the personality disorders task force of significant changes to personality disorder criteria and a proposed shift to a hybrid dimensional-categorical approach to diagnosing and classifying personality disorders. The APA board decided more research was needed before implementing those changes to in *DSM-5*. The task force's revision to personality disorder will be included in Section III of *DSM-5*, with the expectation that the model will be re-introduced under a subsequent revision to *DSM-5* (akin to *DSM-III-R*; Krueger, personal communication).

Among the changes proposed by the taskforce was the introduction of personality traits in addition to personality disorders. Specifically, clinicians would rate patients on 5 "personality trait domains" as one method of making a personality disorder diagnosis.[1,2] The five domains and their facets are listed in Table 1. Negative affectivity relates to the degree an individual experiences negative emotions frequently and intensely. Detachment relates to the degree an individual moves away from other individuals and from social interactions. Antagonism relates to the degree an individual creates conflict with other individuals. Disinhibition relates to the degree an individual behaves impulsively. Psychoticism relates to the degree an individual experiences unusual patterns of cognitions, perceptions, and behaviors. In addition to these five

[1] To get a personality disorder diagnosis under the Section III hybrid model of *DSM-5*, a person must have a rating of "quite a bit" or "extremely" on these 5 domains. They must also have a rating of mild impairment or greater on their "levels of personality functioning," which consists of self and interpersonal functioning. In addition, the personality disorder traits must show "relative stability across time and situations, and excludes culturally normative personality features and those due to the direct physiological effects of a substance or a general medical condition."

[2] An alternative method of diagnosing personality disorders in the Section III hybrid model of *DSM-5* will involve using "Personality Disorder Types." These are personality disorder types that were seen in *DSM-IV*. However, only six of the 10 personality disorders found in the *DSM-IV* will remain in the *DSM-5* (e.g. Antisocial, Avoidant, Borderline, Narcissistic, Obsessive-Compulsive, and Schizotypal). To diagnose a personality disorder, clinicians may rate a patient as being a "good or very good match" on one of these types, in addition to having the other criteria outlined in footnote 1 (i.e., mild or greater impairment, stability across time, not culturally normative, and not due to the direct physiological effects of a substance or a general medical condition).

broad maladaptive personality traits domains, each is made up of several trait facets.

The Personality Inventory for *DSM-5* (PID-5) is meant to map onto the personality disorder traits used by the *DSM-5* for a personality disorder diagnosis of the hybrid model. The PID-5 (Krueger, Derringer, Markon, Watson, & Skodal, in press) is a 220-item multiple-choice measure of personality pathology traits. Traits were chosen based on the strongest associations between higher order factors of hierarchical personality models and personality pathology (Hopwood, Thomas, Markon, Wright, & Krueger, 2012). The PID-5 consists of five higher order traits, meant to represent the maladaptive variants of traits found in the Five Factor Model (FFM; Samuel & Widiger, 2008; Widiger & Trull, 2007) and similar models (Widiger & Simonsen, 2005). These five pathologic higher order traits include negative affectivity, detachment, antagonism, disinhibition, and psychoticism.

Of these high five traits, four were based on the strongest associations between personality pathology and four higher order factors of the Five Factor Model and similar models (Hopwood et al., 2012). Negative affectivity is similar to neuroticism; detachment is opposite of extraversion and similar to introversion; antagonism is opposite agreeableness; and disinhibition is similar to impulsivity and conscientiousness. A fifth trait, psychoticism, was added to better account for Cluster A symptoms of personality pathology than openness.

In addition to the five higher order traits, there are also 25 lower order traits. Initial psychometric evidence for the PID-5 has been promising, demonstrating strong internal consistency and factor structure in large samples of undergraduates (Hopwood et al., 2012; Wright, Thomas, Hopwood, Markon, & Pincus, in press), treatment seeking, and population-representative community samples (Krueger, Derringer, Markon, Watson, & Skodol, 2011). The PID-5 has been found to demonstrate a strong relationship with *DSM-IV* personality disorders, as

well as with the trait indicators of the six proposed *DSM-5* personality disorders (Hopwood et al., 2012).

Although there is significant evidence regarding hierarchical models and mood disorders (see above), less is known about the relevance of maladaptive personality traits represented by the PID-5 and their association with mood disorders.

Links between RST and Hierarchical Personality Theories

RST and Hierarchical Personality Theories

RST and hierarchical personality theories were developed under different theoretical approaches and different approaches, yet both have relevance for mood disorders and, to the degree they both reflect enduring personality traits, are likely to show overlap. Moreover, mechanisms predicting mood disorders in RST are likely to be related to mechanisms predicting mood disorders in hierarchical personality theories. Gray (1982) posited that individual differences in BIS and BAS sensitivities underlie individual personality. Furthermore, individual differences in BIS and BAS sensitivities are theorized to influence the personality traits of neuroticism and extraversion (Eysenck, 1967; McCrae et al., 2000). Gray (1987, 1991) posited the combination of high levels of BIS and high levels of BAS would result in neuroticism. Indeed, because extraverted individuals are highly sociable and active, Gray posited the combination of high levels of BAS and low levels of BIS would result in extraversion.

Several studies have examined the relationship between RST and models of personality. Regarding the big three model, it was originally theorized that Eysenck's (Eysenck & Eysenck, 1976) construct of neuroticism would be positively related to BIS and BAS, while extraversion would be negatively related to BIS and positively related to BAS (Gray, 1981). However, the development of the psychoticism scale (Eysenck & Eysenck, 1976) necessitated the movement

of impulsivity measures from extraversion to psychoticism. This addition resulted in psychoticism being negatively related to BIS and positively related to BAS. Heym, Ferguson, and Lawrence (2008) reexamined these relationships according to the revised RST and found similar results, demonstrating that research on personality traits with the revised RST can still be carried out using Carver and White's (1994) BIS/BAS scales. They found psychoticism to be negatively related to BIS, FFFS, and BAS-RR, while being positively related to BAS-D and BAS-FS. Neuroticism was positively associated with BIS, FFFS, and BAS-RR, while being negatively related to BAS-D and BAS-FS. Finally, extraversion was negatively related to BIS and FFFS, but positively related to all BAS subscales. Results were similar to comparative studies focusing on adolescents (ages 8-12), providing support for the relationship between RST and personality traits in children, as well as adults (Muris, Meesters, Kanter & Timmerman, 2005). Overall, high BIS has been linked to neuroticism while high BAS has been linked to extraversion (Carver & White, 1994; Caseras, Avila, & Torrubia, 2003; Heubeck, Wilkinson, & Cologon, 1998; Jorm et al. 1999).

Several studies have examined the relationship between the revised RST and the domains and facets of the Five Factor Model of personality. Smits and Boeck (2006) found BIS to be positively associated with neuroticism and negatively associated with extraversion. All BAS subscales were positively associated with extraversion, while BAS-D and BAS-FS were negatively associated with neuroticism. In a related study, Mitchell et al. (2007) examined the relationship between the Five Factor Model and RST using the Revised NEO-Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) and the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia, Abila, Molto, & Caseras, 2001). They found sensitivity to punishment to be positively associated with neuroticism, agreeableness, and

conscientiousness, while being negatively associated with extraversion and openness. Further, sensitivity to rewards was positively associated with extraversion and neuroticism, but negatively associated with agreeableness and conscientiousness.

Keiser & Ross (2011) examined associations between revised RST and the Five Factor Model at the facet level. Discrepancies were found at the facet level, which provided a more detailed account of RST's relationship to the Five Factor Model than the factor level alone. They found BIS to be positively associated with neuroticism, agreeableness, and conscientiousness when controlling for FFFS and BAS. Within neuroticism, self-consciousness, anxiety, and vulnerability were found to have a positive association with BIS, while angry hostility was negatively associated. Within agreeableness, both compliance and modesty were found to have a positive association with BIS. Regarding conscientiousness, deliberation and order were positively association with BIS, while competence and self-discipline were negatively associated. They also found FFFS to be positively associated with neuroticism and conscientiousness, when controlling for BIS and BAS. Anxiety and vulnerability were positively associated with FFFS at the facet level, although no significant conscientiousness facet was found after controlling for BIS and BAS. Finally, they found BAS to be positively associated with extraversion, and negatively associated with agreeableness when controlling for BIS and FFFS. Within extraversion, excitement-seeking, assertiveness, positive emotions, and gregariousness were found to be positively association with BAS, while warmth was negatively associated. Within agreeableness, compliance, straightforwardness, and modesty were negatively associated with BAS, while altruism was positively associated. Furthermore, statistical differences were found between BIS and FFFS, but only in the agreeableness domain.

Researchers have also examined the associations between BAS subscales and personality

traits. Recent research has found BAS-RR and BAS-D scales to be associated with extraversion, reward-expectancy, and persistence, while the BAS-FS scale demonstrated a strong association with psychoticism, novelty-seeking, and impulsiveness (Knyazev, Slobodskaya, & Wilson, 2004; Zelenski & Larsen, 1999). Thus, different aspects of BAS may be responsible for different stages of reward approach. In the early stages of approaching a reward, BAS-RR and BAS-D could need to be the dominant behaviors to move towards a desired goal. However, the impulsivity of BAS-FS could be a necessary function to effectively achieve the target goal (Dickman, 1990; Leone, 2009).

Current Study

Although research has found evidence linking individual personality traits to mood disorders, questions still remain as to which aspects of personality are most relevant, as well as which model of personality is most strongly associated with mood symptoms. Previous research has examined the relationship between BIS/BAS ratings, personality, and mood disorders. However, the majority of previous studies have used *DSM-IV* personality disorder constructs or out of date RST constructs.

To our knowledge, few studies have examined the associations between revised RST and mood symptoms, and no study has compared the utility of *DSM-5* personality constructs with revised RST when predicting mood symptoms. This study aims to contribute to the literature by exploring the personality traits used in the Section III of *DSM-5*, measured with the PID-5, and current RST's relationship to mood symptoms. Furthermore, in an effort to examine the clinical utility of the PID-5, this study seeks to understand how much the PID-5 personality traits predict mood disorders above and beyond BIS/BAS ratings.

Study Aims

1. The first study aim is to assess the association between the revised BIS/BAS model of personality and mood symptoms.

Hypothesis 1: Depressive symptoms will be negatively associated with BAS and positively associated with BIS and FFFS, while manic symptoms will be positively associated with BAS and negatively associated with BIS and FFFS.

2. The second study aim is to assess the association between the maladaptive personality trait domains and mood symptoms.

Hypothesis 2: Depressive symptoms will be negatively associated with disinhibition and positively associated with negative affectivity and detachment, while manic symptoms will be positively associated with disinhibition and antagonism, as well as negatively associated with negative affectivity and detachment.

3. The final aim is to evaluate the relative predictive utility of the RST versus the maladaptive personality traits in predicting mood symptoms.

Hypothesis 3 and 4: Because the maladaptive personality traits provide a greater emphasis towards general distress and dysfunction, it is hypothesized that the maladaptive personality traits will be more highly associated with depressive symptoms (hypothesis 3) than RST alone. Similarly, it is hypothesized that the maladaptive personality traits will be more highly associated with mania symptoms (hypothesis 4) than RST alone.

CHAPTER 2

METHODS

Participants and Procedures

A total of 138 participants were recruited from the undergraduate population at a major Southern university. All participants received course credit for their participation. Attempts were made to recruit participants with increased symptoms by advertising the study as one appropriate for individuals who have had psychological or psychiatric treatment (i.e., 37.2% reported having received previous mental health treatment). Demographics of the sample broadly reflected the demographics of the university and are reported in Table 2. Inclusion criteria for the study consisted of participants being age 18 and older, as well as fluency in English.

Participants met individually with an experimenter, who obtained written informed consent. They then completed self-report measures of personality traits and mood symptoms, and were interviewed regarding their current mood symptoms (see measures below). The Institutional Review Board of the university from which participants were recruited approved all procedures.

Measures

Carver and White's (1994) BIS/BAS Scales

Carver and White's (1994) BIS/BAS scale is a 24-item multiple-choice measure of affective and behavioral tendencies based on Gray's (1982) RST. Respondents rate items on a scale from 1 (very true for me) to 4 (very false for me).

The BIS scale (7 items) assesses an individual's response to imminent negative outcomes and that individual's proclivity to inhibit his or her behavior in an effort to avoid negative consequences. Attempts to separate BIS and FFFS within the measure have resulted in mixed

results, with weaker psychometric properties found in some studies (Tull, Gratz, Latzman, Kimbrel, & Lejuez, 2010; Vervoort et al., 2010), and support for a two-factor BIS scale in others (Poythress et al. 2008; Heym, et al., 2008). Heym, et al. (2008) found support for a two-factor BIS scale that is consistent with the revised RST. The first factor, labeled BIS-Anxiety (sample item: "I feel pretty worried or upset when I think or know somebody is angry at me"), is comprised of 4 items that reflect worry associated with social comparison and failure. The second factor, labeled FFFS-Fear (sample item: "I have few fears compared to my friends), is comprised of 3 items that reflect distress associated with anticipating punishment.

The items on the BAS scale comprise three distinctive subscales (Carver & White, 1994). The BAS-RR subscale is comprised of 5 items (sample item: "When I get something I want, I feel excited and energized") and assesses responsiveness (positive emotions) towards present or future rewards. This scale correlates positively with extraversion and positive affect in response to pleasant stimuli (Carver & White, 1994; Germans & Kring, 2000, Heubeck, Wilkinson, & Cologon, 1998) and negatively with physical anhedonia (Germans & Kring, 2000). The BAS-FS subscale is comprised of 4 items (sample item: "I often act on the spur of the moment") and assesses the level of impulsivity related to the approach behavior. BAS-FS is correlated with novelty seeking (Cloninger, 1987) and disinhibiton (Watson & Clark, 1993). The BAS-D subscale is comprised of 4 items (sample item: "If I see a chance to get something I want I move on it right away") and assesses individual differences in drive to achieve a desired goal. Support for analyzing the BAS scale has been found at both the subscale level (Ross, Millis, Bonebright, & Bailley, 2002) and at the total level (Campbell-Sills, 2004).

Smillie, Jackson, and Dalgleish (2006) conducted a confirmatory factor analysis on the BAS structure and found that two scales (BAS-RR and BAS-D) specifically relate to key

concepts of BAS theory (reward-reactivity), while the third scale (BAS-FS) is significantly related to trait impulsivity in addition to BAS concepts. Thus, while the measure of impulsivity found in the BAS-FS may provide useful information to researchers, the BAS-RR and BAS-D reflect a purer measure of BAS sensitivity.

Although, the BIS/BAS scales are psychometrically sound when the BIS scale is used to measure BIS-Anxiety and FFFS-Fear as one construct, combining the scales is both inconsistent with current theory and less informative. Therefore, due to differential properties of a two-factor BIS scale, and because previous literature has found support for a two-factor BIS scale from Carver and White's (1994) scale (Poythress et al. 2008; Heym, et al., 2008), the current study will examine current RST by dividing the BIS scale into BIS and FFFS in order accommodate a more precise and theory-driven approach to RST.

BIS/BAS scales have been shown to provide adequate internal consistency (ranging from $\alpha = 0.57$ to $\alpha = 0.76$; Heym et al., 2008), factor structure, and test-retest reliability, as well as convergent and discriminate validity (through measures of extraversion, trait anxiety, positive affect, and novelty seeking; Carver & White, 1994; Jorm et al., 1999; Heubeck, et al., 1998; Heym et al. 2008). Furthermore, the BAS scales have been shown to correlate with reinforcement-based learning (Zinbarg & Mohlman, 1998), positive affect in response to reinforcing stimuli (Germans & Kring, 2000), in anticipation of reward (Carver & White, 1994), success in daily life events (Gable, Reis, & Elliot, 2000), and manic symptoms (Meyer et al., 1999). The BIS scale has been shown to correlate with cues of punishment (Carver & White, 1994; Gable et al., 2000).

In the present study, the internal consistencies and mean inter-item correlations of the BIS/BAS scales were varied in adequacy (BIS-Total $\alpha = 0.76$, MIC = 0.29; BIS-Anxiety $\alpha =$

0.70, MIC = 0.35; FFFS α = 0.57, MIC = 0.28; BAS-Total α = 0.79, MIC = 0.22; BAS-D α = 0.75, MIC = 0.40; BAS-FS α = 0.63, MIC = 0.32; BAS-RR α = 0.64; MIC = 0.25).

Personality Inventory for DSM-5 (PID-5)

The Personality Inventory for *DSM-5* (PID-5; Hopwood et al., 2011) is a 220-item multiple-choice measure of personality pathology traits proposed for the upcoming *DSM-5*. The PID-5 consists of five higher order traits, including negative affectivity, detachment, antagonism, disinhibition, and psychoticism. In addition to the five higher order traits, there are also 25 lower order traits with internal consistencies ranging from 0.70 (Suspiciousness) to 0.95 (Eccentricity; Hopwood et al., 2011). The items consist of statements intended to reflect maladaptive personality traits, such as "I don't get as much pleasure out of things as others seem to," for negative affectivity and "I feel like I act totally on impulse," for disinhibition. Each item is rated on a 4 point scale from 0 (very false or often false) to 3 (very true or often true). In the present study, the internal consistencies and mean inter-item correlations of the PID-5 scales were adequate (negative affectivity α = 0.94, MIC = 0.23; detachment α = 0.94, MIC = 0.28; antagonism α = 0.93, MIC = 0.25; disinhibition α = 0.90, MIC = 0.17; psychoticism α = 0.95, MIC = 0.38).

Interview for Mood and Anxiety Symptoms (IMAS-II) – General Depression and Mania Scales

The IMAS-II (Gamez, Kotov, & Watson, 2010; Watson, et al., 2007) is a 250-item semi-structured interview assessing current (i.e., past month) mood and anxiety symptoms across 11 domains. The IMAS-II is administered by trained interviewers who rate each item on a 3-point scale (absent, subthreshold, and above threshold). Items are designed to cover mood and anxiety symptoms criteria for the *DSM-IV*. For the present study, only the depression and mania scales were used.

Interrater reliability has been found to be high, with ICCs ranging from 0.97 to 0.99 across scales (Watson, et al., 2012). Moreover, internal consistency and mean inter-item correlations of rated items were high in previous studies (i.e., IMAS-II depression α = 0.95, IMAS-II mania α = 0.88; Watson et al., 2012) as well as the present study (i.e., IMAS-II depression α = 0.95, MIC = 0.28, IMAS-II mania α = 0.83, MIC = 0.19).

Inventory of Depression and Anxiety Symptoms, Second Version (IDAS-II) - General Depression and Mania Scales

The IDAS-II (Watson et al., 2012) is a 99-item multiple-choice measure of mood and anxiety symptoms across 18 domains. Respondents indicate the degree to which they experience each symptom during the past two weeks. Items are rated on a 5-point scale ranging from *not at all* to *extremely*. The present study used only the depression and mania scales of the IDAS, which have been found to have strong convergence with other self-report as well as interview measures of these symptoms (Watson et al., 2012). Internal consistency of rated items were high in previous studies (i.e., IDAS-II dysphoria α = 0.88, lassitude α = 0.81, insomnia α = 0.81, suicidality α = 0.86, appetite loss α = 0.85, appetite gain α = 0.78; IDAS-II well-being α = 0.88, ill temper α = 0.85, mania α = 0.82; Watson et al., 2012) as well as the present study (i.e., IDAS-II general depression α = 0.90, MIC = 0.32, IDAS-II mania α = 0.84, MIC = 0.50). These domains have been shown to be highly predictive of *DSM-IV* mood and anxiety disorders in patient samples (Watson et al., 2012).

Analytic Plan

Prior to analyses, data were screened to examine accuracy of data entry, missing values, to identify outliers, and to confirm assumptions. Additionally, data were examined to determine whether assumptions were met for hierarchical linear regression, including: independence,

homoscedasticity, normal distribution of errors, and linearity of the relationship between the independent and dependent variable. After cleaning the data, all analyses were run twice, once using mood symptoms scores from the IDAS-II and once using mood symptoms scores from the IMAS. The following hypotheses were tested:

Hypothesis 1 was depressive symptoms will be negatively associated with BAS and positively associated with BIS and FFFS, while manic symptoms will be positively associated with BAS and negatively associated with BIS and FFFS. To test this hypothesis, two multiple regressions were run with total depressive scores or total mania scores as the outcome and the five RST factors (BIS, FFFS, BAS-RR, BAS-FS, and BAS-D) as the predictors.

Hypothesis 2 was depressive symptoms will be negatively associated with disinhibition and positively associated with negative affectivity and detachment, while manic symptoms will be positively associated with disinhibition and antagonism, as well as negatively associated with negative affectivity and detachment. To test this hypothesis, two multiple regressions were run with total depressive scores or total mania scores as the outcome and the five maladaptive personality factors (negative affectivity, detachment, antagonism, disinhibition, and psychoticism) as the predictors.

Hypothesis 3 was the maladaptive personality traits will be more highly associated with depressive symptoms than RST traits alone. To test this hypothesis, two hierarchical regressions were conducted with total depressive scores as the outcome. For the first hierarchical regression, the first block included RST factors and the second block included maladaptive personality trait factors. For the second hierarchical regression, the first block included maladaptive personality trait factors and the second block included RST factors. Hypothesis 4 was tested similarly to hypothesis 3, but mania served as the outcome instead of depression.

CHAPTER 3

RESULTS

Data Cleaning

Prior to analysis, all variables were examined for accuracy of data entry, missing values, skew and kurtosis, fit between their distributions and the assumptions of multivariate analysis, and their reliability. One participant was identified as a univariate outlier for age and was removed, leaving 138 cases for analysis. Means of RST and hierarchical personality variables were compared to means from other studies using similar samples (Alloy et al., 2008; Meyer et al., 1999; Watson et al., 2012) and found to be in the expected ranges (see Table 2 for descriptive statistics of the sample). Hierarchical personality variables and symptom total scores were identified as having non-normal distributions and were transformed by taking the square-root; these transformations reduced their skew and kurtosis to acceptable levels (i.e. <2). Pairwise linearity was checked using scatterplots and found to be satisfactory.

Bivariate correlations among RST factors are reported in Table 3. As seen in Table 3, BIS and FFFS are significantly correlated. Additionally, BAS subscales are significantly correlated with each other.

Bivariate correlations among maladaptive traits are reported in Table 4. As seen in Table 4, all maladaptive personality traits are significantly correlated with each other.

Bivariate correlations among mood symptoms are reported in Table 5. As seen in Table 5, IDAS-II and IMAS-II are significantly correlated measures of mood symptoms.

Bivariate correlations between RST factors and maladaptive traits are reported in Table 6. As seen in Table 6, BIS and FFFS are significantly correlated with negative affectivity and detachment, while BAS subscales are significantly correlated with antagonism, disinhibition, and

psychoticism.

Analyses

Hypothesis 1: RST predicting mood

For hypothesis 1, it was assumed depression symptoms would be negatively correlated with BAS subscales and positively correlated with BIS and FFFS. Meanwhile, manic symptoms would be positively correlated with BAS subscales and negatively correlated with BIS and FFFS. The top panel of table 7 reports the simple bivariate correlations between RST scales, depression scores, and mania scores.

As hypothesized, depression (on both the IDAS-II and IMAS-II) was positively correlated with BIS and FFFS. Furthermore, when BIS and FFFS were combined into a single construct, it's correlation with depression was higher than BIS and nearly equivalent to FFFS. However, contrary to hypothesis, BAS-D and BAS-FS were *positively* correlated with depression symptoms when measured with the IMAS-II (no correlation with IDAS-II) and BAS-RR was not associated with depression.

With respect to mania, manic symptoms (on both the IDAS-II and IMAS) were correlated with all the BAS scales as expected, with one exception. BAS-RR was positively correlated with manic symptoms, but this effect was only significant for the IMAS-II scale and not the IDAS-II scale. Contrary to hypotheses, manic symptoms were unrelated to the BIS and FFFS.

Next, two separate multiple regressions were run to test which RST scales made *unique* contributions to depression above and beyond the other RST scales. The overall model predicting IDAS-II depression scores based on RST scales was significant, $F(5, 132) = 7.63$, $p < .001$, accounting for 22.4% of the variance (R^2) in IDAS-II depression. Similarly, the overall model

predicting IMAS-II depression based on RST scales scores was significant, $F(5, 132) = 6.56$, $p < .001$, accounting for 19.9% of the variance (R^2) in IMAS-II depression. The top panel of table 8 reports the results from regressions predicting depression scores. As seen in the top panel of table 8, FFFS, BAS-D, and BAS-RR were significant predictors of depression, but BIS and BAS-FS were unassociated after controlling for the other predictors.

Another two similar regressions were run, but this time using RST to predict mania instead of depression. The overall model predicting IDAS-II mania scores based on RST scales was significant, $F(5, 132) = 4.48$, $p < .001$, accounting for 14.5% of the variance (R^2) in mania. Similarly, the overall model predicting IMAS-II mania scores based on RST scales was significant, $F(5, 131) = 4.55$, $p < .001$, accounting for 14.8% of the variance (R^2) in mania. The top panel of table 9 reports the results from regressions predicting mania scores. As seen in Table 9, only BAS-FS significantly predicted mania above and beyond the other RST scales.

Hypothesis 2: Maladaptive Personality Traits predicting mood

For hypothesis 2, it was hypothesized depression symptoms would be negatively associated with disinhibition and positively associated with negative affectivity and detachment, while manic mania symptoms would be negatively associated with negative affectivity and detachment, as well as positively associated with disinhibition and antagonism. The bottom panel of table 7 reports the simple bivariate correlations between maladaptive personality traits, depression scores, and mania scores.

As expected, depression symptoms were positively correlated to negative affectivity and detachment, while mania symptoms were positively correlated to disinhibiton and antagonism. Contrary to hypotheses, no negative relationships were found between depression symptoms and

disinhibition, nor were any found between mania symptoms and negative affectivity or detachment.

Next, two separate multiple regressions were run to test for *unique* contributions of maladaptive personality traits to depression above and beyond the other maladaptive personality traits. The overall model predicting IDAS-II depression scores was significant, $F(5, 132) = 26.30$, $p < .001$, accounting for 49.9% of the variance (R^2) in depression. Similarly, the overall model predicting IMAS-II depression scores was significant, $F(5, 132) = 14.52$, $p < .001$, accounting for 35.5% of the variance (R^2) in depression. The bottom panel of table 8 reports the results from regressions predicting depression scores. As seen in Table 8, negative affectivity, detachment, antagonism, and disinhibition were significant predictors of depression for the IDAS-II depression scale, but only negative affectivity and disinhibition significantly predicted depression for the IMAS-II depression scale.

Another two similar regressions were run, but this time using maladaptive personality traits to predict mania instead of depression. The overall model predicting IDAS-II mania scores was significant, $F(5, 132) = 18.76$, $p < .001$, accounting for 41.5% of the variance (R^2) in mania. Similarly, the overall model predicting IMAS-II mania scores was significant, $F(5, 131) = 11.15$, $p < .001$, accounting for 29.9% of the variance (R^2) in mania. The bottom panel of table 9 reports the results from regressions predicting mania scores. As seen there, only disinhibition and psychoticism significantly predicted mania for both the IDAS-II and the IMAS, while negative affectivity, detachment, and antagonism were not associated with mania.

Hypothesis 3: Personality model comparison in predicting depression

For hypothesis 3, it was assumed maladaptive personality traits would be more highly associated with depressive symptoms than RST traits. As previously reported (see hypothesis 1

results), the RST scales predicted 22.4% (R^2) of the variance for the IDAS-II depression scale and 19.9 % (R^2) for the IMAS-II depression scale. When maladaptive variables were entered into a second block, they explained an additional 31.7% (R^2; $\Delta F = 17.55$, $p < .001$) for the IDAS-II depression scale and 21.4% (R^2; $\Delta F = 9.28$, $p < .001$) for the IMAS-II depression scale. Table 10 reports the regression coefficients and semi-partial correlations from the final models.

A second set of analyses were preformed, but this time the order of entry was reversed, with maladaptive personality traits placed into the model as an initial block and RST traits placed into the model as a second block. As reported previously (hypothesis 2 results), maladaptive variables in the initial block explained 49.9% (R^2) of the variance for the IDAS-II depression scale and 35.5% (R^2) for the IMAS-II depression scale. When RST variables were entered into a second block, they explained an additional 4.2% (R^2; $\Delta F = 2.34$, $p = .046$) for the IDAS-II depression scale and 5.9% (R^2; $\Delta F = 2.53$, $p = .032$) for the IMAS-II depression scale. As before, Table 10 contains the regression coefficients and semi-partial correlations for the final model.

Hypothesis 4: Personality model comparison in predicting mania

For hypothesis 4, it was assumed maladaptive personality traits would be more highly associated with mania symptoms than RST traits. As previously reported (see hypothesis 1), the RST scales predicted 14.5% (R^2) of the variance for the IDAS-II mania scale and 14.8 % (R^2) for the IMAS-II mania scale. When maladaptive variables were entered into a second block, they explained an additional 29.8% (R^2; $\Delta F = 13.61$, $p < .001$) for the IDAS-II mania scale and 20.8% (R^2; $\Delta F = 8.15$, $p < .001$) for the IMAS-II mania scale. Table 11 reports the regression coefficients and semi-partial correlations from these models.

As before, a second set of analyses were preformed, but this time the order of entry was reversed, with maladaptive personality traits placed into the model as an initial block and RST

traits placed into the model as a second block. As reported previously (hypothesis 2 results), maladaptive variables in the initial block explained 41.5% (R^2) of the variance for the IDAS-II mania scale and 29.9% (R^2) for the IMAS-II mania scale. When RST variables were entered into a second block, they explained an additional 2.8% (R^2; F = 1.28, p = .278) for the IDAS-II mania scale and 5.8% (R^2; (ΔF = 2.26, p = .053) for the IMAS-II mania scale. As before, Table 11 reports the regression coefficients and semi-partial correlations from these models.

Exploratory Analyses

Correlations among variables were examined to determine if the pattern on relationships between variables differ as a function of gender. Overall, the pattern of relationships did not differ as a function of gender, with two exceptions. The first was a significantly stronger correlation between detachment and depression on the IDAS-II (r = 0.72, p = .003) and the IMAS-II (r = 0.64, p = .007) among females. The second was a significantly stronger correlation between depression, as measured by the IDAS-II, and BAS-D (r = 0.42, p = .026), and BAS-FS (r = 0.40, p = .012) among males.

CHAPTER 4

DISCUSSION

The present study sought to quantify the relationship between competing theories of personality and mood symptoms. Specifically, the aim of the present study was to measure the association between mood symptoms and the RST model of personality, as well as the maladaptive personality trait model found in the *DSM-5*. Another aim of the study was to compare the two models of personality in order to determine which model is more associated with mood symptoms. Due to the cross-sectional nature of the present study, the results should be interpreted as estimates of concurrent associations and not as causal effects.

Three major findings emerged. First, maladaptive personality traits were associated with mood symptoms. Second, RST traits were associated with mood symptoms. Finally, maladaptive personality traits demonstrated greater associations with mood symptoms than RST traits.

The first major finding was that maladaptive personality traits were strongly associated with mood symptoms. Negative affectivity, detachment, and disinhibition were found to be the strongest predictors of depression, while disinhibition and psychoticism were found to be the strongest predictors of mania symptoms. These results are consistent with the tripartite model of anxiety and depression (Clark & Watson, 1991) in which depression is marked by high levels of negative affect and low levels of positive affect (Watson et al., 1999); comorbidity research regarding the classification of psychopathology symptoms, in which thought disorders, such as bipolar disorder, are associated with disinhibition and psychotic symptoms (Kotov et al., 2011); and previous research linking depression to neuroticism (Bagby et al., 1996; Bagby et al., 1997; Bienvenu et al., 2001; Clark et al., 1994; Enns & Cox, 1997; Malouff et al., 2005) and linking mania to extraversion and openness (Bagby et al., 1996; Bagby et al., 1997; Hirschfeld &

Klerman, 1979; Hirschfeld et al., 1986; Liebowitz et al., 1979; Meyer, 2002). Furthermore, as psychotic symptoms occur in the most severe manic episodes, it is no surprise psychoticism was significantly associated with symptoms of mania.

Disinhibition, however, was positively associated with depression symptoms, contrary to the hypothesis that depression symptoms would be negatively associated with disinhibition. Originally, this was hypothesized because facets such as impulsivity and risk taking reflect high levels of activity, more typically associated with symptoms of mania. However, when all disinhibition facets are considered (i.e., irresponsibility, impulsivity, distractibility, rigid perfectionism, risk taking), one can assume that individuals with high levels of disinhibition facets (i.e., irresponsibility, impulsivity, and distractibility) are more likely to experience the dysfunction associated with depression symptoms. Indeed, distractibility and poor concentration are symptoms of depression. Moreover, aspects of impulsivity, such as urgency and lack of premeditation, have been linked to suicidal attempts amongst individuals with depression (Klonsky & May, 2010).

The second major finding from the present study was that RST factors were also significantly related to mood symptoms, albeit less strongly than maladaptive personality traits and not in expected ways for all scales. FFFS, BAS-D, and BAS-RR scales were found to be unique predictors of depression symptoms, while BAS-FS was found to be a unique predictor of mania symptoms among RST traits. These results are consistent with the findings of other studies examining RST and mood symptoms (Meyer et al., 1999).

Contrary to hypotheses, however, BAS-D was positively associated with depression symptoms when controlling for other RST factors, although the strength of the association was less than other RST factors. In the RST literature, it is not unusual for all BAS subscales to be

negatively related to depression symptoms (Meyer et al., 1999). The fact that BAS-D was positively related to depression in this sample was surprising. Such a discrepancy could be related to idiosyncrasies of the sample. However, it could be argued the more an individual experiences symptoms of depression, the more driven that person is to achieve a specific goal in the pursuit of experiencing reward in the form of positive affect. Indeed, Johnson (2005) found goal attainment leads to greater increases in confidence among individuals with bipolar disorder. A final explanation is depression is a multidimensional syndrome; therefore there could have been overlap with respect to some depression symptoms.

The third major finding from the present work was that maladaptive personality traits were found to be considerably more associated with mood symptoms than RST. Regarding the multiple regressions, maladaptive personality traits accounted for greater proportions of variance in mood symptoms when compared to RST traits. Moreover, maladaptive personality traits were found to add a significant and considerable portion of variance to the overall model *above and beyond* RST factors alone (i.e., an additional 20.8-31.7% of the variance in symptoms). In contrast, RST only contributed an additional 2.8-5.8% of the proportion of variance explained in mood symptoms relative to the maladaptive traits. Several explanations may account this difference. First, the maladaptive personality traits measure a much broader set of personality domains than RST. Such broad coverage of dimensions means that there is a greater likelihood it will assess dimensions with relevance to mood disorder symptoms. Second, the maladaptive personality traits measure is more reliable than the RST measure. In general, scales are more reliable when they incorporate a greater number of items to measure a construct. The PID-5 accomplishes this by utilizing 220 items to account for 5 broad traits (25 facets) of maladaptive personality traits, whereas Carver and White's (1994) BIS/BAS scales utilize only 24 items to

account for 5 factors of RST. The difference in reliability may have contributed to the discrepant overlap in associations.

Additionally, results also demonstrated potential suppression effects among the personality variables. Specifically, when controlling for other variables, antagonism became negatively associated with both depression and mania. An argument could be made that high levels of antagonism facets (i.e., manipulativeness, deceitfulness, callousness, attention seeking, grandiosity) could serve as protective factors against depression. However, the negative association with mania symptoms is surprising, as several of the facets that comprise antagonism are symptomatic components of mania.

Beyond these three primary findings, the present study also found effects relevant for understanding RST. Specifically, there was a positive association between depression and FFFS, but not between depression and BIS. Previous studies have found a positive association between BIS and depression (Fowles, 1987; Kasch et al., 2002; McFarland et al., 2006), while other studies have found no association at all (Pinto-Meza et al., 2006). The current study sought to test the association between the most current version of RST and mood symptoms. Separating the anxiety and fear components of BIS resulted in fear being highly associated with depression symptoms, while anxiety was not. The current findings imply fear, and not anxiety, may be responsible for previous findings relating a general BIS (incorporating anxiety and fear components) to depression. Indeed, the current study found combining BIS and FFFS into a single factor resulted in similar correlations with depression as FFFS alone. It is possible that previous studies that found associations between BIS and depression did so because anxiety and fear were analyzed as one factor. For studies finding weak or nonexistent associations between a general BIS and depression, the anxiety component may have essentially weakened or canceled

the effect of fear. Finally, it is important to note that the FFFS scale used in the present study was comprised of 3 items, while the BIS scale was comprised of 4 items. Scales limited to such a small number of items are likely to incorporate more error into the analyses than scales utilizing more items.

Finally, this study found relative invariance among correlations as a function of gender. However, two exceptions emerged. First, women demonstrated a stronger correlation between detachment and depression. Second, men demonstrated a stronger correlation between BAS (BAS-D and BAS-FS) and depression. This could mean gender moderates depression's relationship with detachment and BAS.

Implications

Theoretical

The results of this study have implications for the mood disorder and personality literatures. Regarding hierarchical personality traits, the maladaptive personality traits were found to have strong associations with both depression and mania symptoms. Numerous studies have explored the influence of normal personality models, specifically the Five Factor Model of personality, when predicting psychopathology (see Kotov et al., 2010). Results from this study give credibility to the use of an alternative five-factor model of personality focused on maladaptive personality. Few studies to date have used this model to predict mood symptoms so further research is required to determine its utility in comparison to models of normal personality and other axis I disorders.

The findings converge with research linking axis I and personality disorders. Multiple large-scale epidemiological studies have reliably found a strong relationship between the two domains (Coid, Yang, Tyrer, Roberts, & Ulrich, 2006; Grant, et al., 2005; Huang, et al., 2009;

Lenzenweger, Lane, Loranger, & Kessler, 2007). Furthermore, several meta-analyses have found personality disorders and normal personality models to be closely associated (O'Connor, 2005; Samuel & Widiger, 2008; Saulsman & Page, 2004). As such, it has been proposed that higher order traits of normal personality models drive personality disorders (Clark, 2007; Widiger & Trull, 2007). As the maladaptive personality model used in the present study was developed to accommodate *DSM-5* personality disorders, and demonstrates strong links to mood disorders, it is theorized it would have similar associations with other axis I disorders, as well as with normal personality models. Overall, this study provides further evidence in support of the role personality functioning plays in axis I disorders.

Furthermore, results indicate a relative superiority of maladaptive personality traits over RST when predicting mood symptoms. However, RST is distinct from other models of personality, theoretically and empirically, and offers a unique explanation of individual differences in psychological functioning. Mood disorders, like any psychological construct, are inherently complex and while maladaptive personality traits may account for greater proportions of variance in mood symptoms, they can not explain mood disorders entirely. Thus, RST remains an important theory of personality and a valuable component in explaining risk factors for mood symptoms.

Regarding RST, results from this study imply fear may better predict depression than anxiety in general. It has been posited that fear is a particular type, or subset, of anxiety (Schwartz & Weinberger, 1980). Indeed, the FFFS system in Carver and White's (1994) BIS/BAS scales is subsumed under an overall BIS scale. Thus, while the anxiety component has demonstrated an association with depression in previous studies (Depue & Iacono, 1989; Johnson et al., 2000; Meyer et al., 2001), it may be more beneficial to consider fear-related

components of anxiety, as opposed to global measures, in future studies of depression.

Consistent with the BAS hypersensitivity model (Depue et al., 1987; Depue & Iacono, 1989; Fowles, 1993), BAS appears to be a strong predictor of both depression and mania, while FFFS only appeared to be associated with symptoms of depression. Specifically, this study found BAS-D and BAS-RR to significantly predict depression symptoms, while BAS-FS significantly predicted mania symptoms. These results provide further evidence that mood symptoms may be the result of individual differences in approach behavior towards rewards.

Clinical Implications

Although more research is needed to expand and confirm the results obtained in this study, it is clear that personality traits are highly related to mood symptoms. Knowledge of individual personality profiles, especially of maladaptive personality traits, can be easily obtained in minutes and used to influence case conceptualizations, make prognoses, and create treatment plans in clinical settings. The assessment of personality has proven beneficial in treatment planning (Bagby et al., 2008; Quilty et al., 2008) and prevention (Smit, Beckman, Cuijpers, de Graaf, & Vollebergh, 2004; Tokuyama, Nakao, Seto, Watanabe, & Takeda, 2003; Verkerk, Denollet, Van Heck, Van Son, & Pop, 2005). Hierarchical personality trait models, such as the Big Five, have been found to have greater clinical utility than *DSM-IV* personality diagnoses in areas such as global personality description, client communication, comprehensiveness of difficulties, and treatment planning (Samuel & Widiger, 2006). The maladaptive personality traits of the *DSM-5* appear to be similarly useful, providing a detailed and comprehensive description of maladaptive aspects of personality, resulting in comparably easy communication and treatment planning.

Study Strengths and Limitations

The greatest limitation to the present study is the cross-sectional design of the study. Cross-sectional designs are primarily descriptive in nature, and are inferior to longitudinal and experimental designs in their ability to provide direct conclusions regarding cause and effect. However, results from this study can provide inferences to support theories regarding risk factors for mood disorders.

A major strength of the study was the use of two measures of mood symptoms; one semi-structured interview in addition to self-report measures of mood symptoms. As a self-report measure, the IDAS-II provided useful data about participants' perceived mood symptoms. The use of rating scales has its own strengths and weaknesses. On one hand, the personality traits in question are operationally defined and distinct. They also utilize dimensions that are consistent between raters, allowing for comparability of responses between participants. On the other hand, self-report measures create a forced-choice scenario, and the concepts being studied are complex. Furthermore, some participants will naturally be more critical in their ratings than others, biasing results. As an interview, the IMAS-II is superior to the IDAS-II in its ability to distinguish clinically relevant symptoms from participants' perceptions of relevant symptoms. As such, the IMAS-II is better able to accurately identify the relationship between mood symptoms and personality.

Important to understanding the results of the present study is the issue of dimensionality. Although hierarchical organization is useful towards studying psychological constructs (descriptively and theoretically; Smith, McCarthy, & Zapolski, 2009), many higher order constructs (e.g., BAS, negative affectivity, disinhibition, depression, and mania) used in the current study were multidimensional composites of several lower order elements. Although

heterogeneous constructs avoid oversimplification of complex phenomenon (Gustafsson & Aberg-Bengtsson, 2010), utilizing a single score to represent a multidimensional construct (e.g. depression and mania total scores) creates ambiguity and introduces error into theoretical models. Consequently, increased error reduces scientific value. As such, it did not make sense to represent BIS and FFFS together as a single entity because it is theoretically subdivided into distinct components with different external correlates. The utilization of multidimensional constructs obscures the construct's covariance with other constructs, as one does not know which components are accountable for the relationship (Smith et al., 2009). For example, the association between negative affectivity and depression provides ambiguous psychological meaning. Instead of examining the association between maladaptive personality factors and mood symptoms, more information may be obtained by disaggregating the factors into their facets. Indeed, a facet level analysis may yield different correlates and provide more precise predictive utility. Similarly, the dependent variables used in the present study (depression and mania) are multidimensional, but were analyzed as unidiminsional constructs. Future studies would benefit from analyzing mood disorders as multiple dimensions (e.g. dysphoria, lassitude, suicidality, insomnia, appetite, temper, well-being, mania, euphoria), increasing precision and interpretability.

A point of weakness of this study is the use of Carver and White's (1994) BIS/BAS scales as a measure of RST. The scales feature a limited number of items (i.e., 24 total). While the primary scales (i.e., BIS and BAS) have been appropriately validated regarding their ability to measure RST as two broad factors, breaking them down into subscales significantly reduces the item total for each subscale. The subscales achieved poor internal consistency, and in general do not achieve the reliability seen in inventories featuring a larger pool of items. Furthermore,

Carver and White's (1994) scales are of a self-report nature, which is considered inferior in comparison to physiological measures of RST.

Another point to consider is the choice to run analyses using five RST factors instead of two. Although five factors best represent the current RST theory, splitting Carver and White's (1994) BIS/BAS scales has its drawbacks. The BAS subscales overlap to a degree, so it is not surprising that they would partially cancel each other out when predicting mood symptoms. The primary goal when running analyses for this study was to identify the most salient aspects of personality in an effort to determine which uniquely and best predict mood symptoms. Ultimately, different BIS/BAS subscales may have affected depression and mania scores in different, conflicting ways.

The study was limited in its ability to extrapolate results based on its sample population. Specifically, the study focused on undergraduates from a Southern public university. Undergraduate students are distinct from other populations, such as community and clinical populations, although attempts were made to recruit students with a history of psychopathology and increased likelihood of mood disorder symptoms. Nevertheless, associations may be more robust with samples from clinical populations.

Although a weakness in one sense, a focus on undergraduates, particularly those with a history of treatment, is not without merit. By 2013, the undergraduate population in the United States is expected to reach nearly 19 million (Hussar & Bailey, 2013). Furthermore, according to the National College Health Assessment (NCHA) 10.3% of college students have been diagnosed with depression. Specifically, of those ever diagnosed with depression, 39% were diagnosed in the past year, 27% were in therapy for depression, and 34% were taking medications for depression (Leino & Kisch, 2005). Furthermore, according the National Survey

Counseling Centers Directors, 39-52.2% of student clients have severe psychological symptoms. Understanding risk factors for mood disorders in undergraduates is important for a multitude of reasons, including academic progress, clinical treatments for undergraduate populations, and enhancing college adjustment and success.

Data from the present study parallels data from other studies using the IDAS-II as a measure of mood symptoms in student, adult, and clinical samples (Watson et al., 2012). Moreover, Watson et al. (2012) did not find significant differences between student and adult samples on any subscale of the IDAS-II. Thus, data from the present study's undergraduate sample can likely be extrapolated to community populations.

Future Studies

Future research could benefit by focusing on maladaptive personality in a broader context of psychopathology. First, as axis I disorders, specifically mood disorders, are highly comorbid with other axis I disorders, it will be important to conduct broader studies incorporating and controlling for other axis I disorders. Future studies could benefit by controlling for symptoms of anxiety when analyzing the association between personality traits and mood symptoms. Additionally, distinguishing participants' symptom severity within diagnostic groups or at the symptoms level, instead of overall severity of depression or mania in general, would add more specificity to conclusions regarding the relationship between mood and maladaptive personality. Another direction for future studies to pursue is the relationship between lower-order maladaptive personality traits (i.e., facets) and mood symptoms. A more detailed analysis of mood and maladaptive personality at the facet level may result in the discovery of lower-order correlates that are most associated with mood symptoms.

Longitudinal studies could aid in determining the relative stability of maladaptive

personality models over time. The big five traits of the FFM have been found to be stable over time. Soldz and Vaillant (1999) conducted a longitudinal study of 63 men and found the Big five traits to be stable of a 45 year time interval. However, it is unclear if models of maladaptive personality yield similar results. On the contrary, personality disorders have been found to demonstrate poor stability by comparison. According to the Collaborative Longitudinal Personality Disorders Study (CLPS), Skodol et al. (2005) found less than half of individuals diagnosed with personality disorders remained at or above full criteria everyone over a 1-2 year time interval (Shea et al., 2002; Grilo et al., 2004). Personality disorders were also found to be remit during situational changes, indicating flexibility over time (Gunderson et al., 2003). Thus, although models of normal personality have demonstrated stability, personality disorders have not. As such, longitudinal studies could determine if models of maladaptive personality yield similar stability to the FFM, or if they reflect the temporal fluctuations seen in personality disorders. Moreover, longitudinal studies could uncover potential causal directions between maladaptive personality and mood disorders.

Conclusions

In summary, results from this study add to the literature by demonstrating credibility of an alternative five-factor model of personality focused on maladaptive traits. Consistent with the hypotheses, maladaptive personality traits demonstrated greater associations with mood symptoms compared to RST. Thus, maladaptive personality traits may be more useful in predicting mood symptoms and provide better utility in research and clinical settings. In addition, consistent with current RST, the present study provides evidence for utilizing a two-factor BIS structure when examining depression symptoms, as the anxiety component of BIS appears unassociated with depression symptoms when controlling for its fear component.

Table 1

Proposed Factors and Facets of DSM-5 Personality Traits

Domains	Traits (Facets) of Maladaptive Personality	Number of Traits
Negative Affectivity	Submissiveness, Restricted affectivity, Separation insecurity, Anxiousness, Emotional lability, Hostility, Perseveration.	8
Detachment	Suspiciousness, Depressivity, Withdrawal, Intimacy avoidance, Anhedonia.	5
Antagonism	Manipulativeness, Deceitfulness, Callousness, Attention seeking, Grandiosity.	5
Disinhibition	Irresponsibility, Impulsivity, Distractibility, Rigid perfectionism, Risk taking.	5
Psychoticism	Eccentricity, Perceptual dysregulation, Unusual beliefs and experiences.	3

Table 2

Demographics

Variable	Overall Sample (N = 138)
Age, M (SD)	20.73 (3.06)
Gender, % (n)	
Male	40.6 (56)
Female	57.2 (82)
Race, % (n)	
Caucasian	57.2 (79)
African American	18.1 (25)
Asian	8.0 (11)
Other	16.7 (23)
Ethnicity, % (n)	
Not Hispanic or Latino	79.1 (102)
Hispanic or Latino	20.9 (27)
Marital Status, % (n)	
Single	91.2 (124)
Married or Partnered	5.1 (7)
Other	3.7 (5)
Education Classification, % (n)	
Freshman	31.9 (43)
Sophomore	23.7 (32)
Junior	21.5 (29)
Senior	23.0 (31)
BIS/BAS Scale Score, M (SD)	
BIS	12.35 (2.54)
FFFS	7.99 (1.99)
BIS Total	20.34 (3.94)
BAS - Drive	10.67 (2.57)
BAS - Fun Seeking	11.49 (2.34)
BAS - Reward Response	17.41 (1.94)
BAS Total	39.57 (5.26)
PID-5 Score, M (SD)	
Negative Affectivity	0.83 (.46)
Detachment	0.62 (.42)
Antagonism	0.52 (.36)
Disinhibition	0.86 (.40)
Psychoticism	0.62 (.56)
Mood Score, M (SD)	
IDAS-II - Depression	40.19 (12.79)
IDAS-II - Mania	7.62 (3.81)
IMAS-II - Depression	17.58 (19.40)
IMAS-II - Mania	3.97 (5.47)

Table 3

Intercorrelations among RST factors

	(BIS+FFFS)	BIS	FFFS	BAS-D	BAS-FS	BAS-RR
(BIS+FFFS)	1					
BIS	**0.90**	1				
FFFS	**0.83**	**0.50**	1			
BAS-D	0.05	0.07	0.00	1		
BAS-FS	-0.13	-0.10	-0.13	**0.46**	1	
BAS-RR	**0.23**	**0.26**	0.13	**0.45**	**0.19**	1

Note. All bolded correlations significant at $p < .05$. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 4

Intercorrelations among Maladaptive Personality Traits

	Negative Affectivity	Detachment	Antagonism	Disinhibition	Psychoticism
Negative Affectivity	1				
Detachment	**0.72**	1			
Antagonism	**0.51**	**0.37**	1		
Disinhibition	**0.58**	**0.50**	**0.55**	1	
Psychoticism	**0.65**	**0.63**	**0.58**	**0.70**	1

Note. All bolded correlations significant at $p < .05$.

Table 5

Intercorrelations among Mood Symptoms of the IDAS-II and IMAS

	Depression		Mania	
	IDAS-II	IMAS-II	IDAS-II	IMAS-II
Depression				
IDAS-II	1	**0.77**	**0.50**	**0.48**
IMAS-II	**0.77**	1	**0.36**	**0.50**
Mania				
IDAS-II	**0.50**	**0.36**	1	**0.60**
IMAS-II	**0.48**	**0.50**	**0.60**	1

Note. All bolded correlations significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms.

Table 6

Intercorrelations among RST Factors and Maladaptive Personality Traits

	(BIS+FFFS)	BIS	FFFS	BAS-D	BAS-FS	BAS-RR
Negative Affectivity	**0.46**	**0.35**	**0.46**	0.15	0.13	0.06
Detachment	**0.18**	0.08	**0.32**	-0.00	-0.00	-0.14
Antagonism	0.03	-0.05	0.08	**0.40**	**0.31**	**0.17**
Disinhibition	0.02	-0.03	0.00	**0.33**	**0.46**	-0.03
Psychoticism	0.08	0.04	0.13	**0.19**	**0.33**	-0.00

Note. All bolded Correlations significant at $p < .05$. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 7

Intercorrelations among Personality Factors and Mood Symptoms

	Depression		Mania	
	IDAS-II	IMAS-II	IDAS-II	IMAS-II
(BIS+FFFS)	**0.32**	**0.28**	0.04	0.08
BIS	**0.21**	**0.21**	0.04	0.09
FFFS	**0.36**	**0.30**	0.02	0.05
BAS Total	0.12	**0.24**	**0.31**	**0.37**
BAS-D	0.16	**0.27**	**0.27**	**0.31**
BAS-FS	0.14	**0.20**	**0.35**	**0.30**
BAS-RR	-0.07	0.05	0.07	**0.21**
Negative Affectivity	**0.63**	**0.60**	**0.42**	**0.36**
Detachment	**0.60**	**0.49**	**0.37**	**0.24**
Antagonism	**0.18**	**0.24**	**0.31**	**0.25**
Disinhibition	**0.47**	**0.43**	**0.55**	**0.49**
Psychoticism	**0.46**	**0.38**	**0.61**	**0.46**

Note. All bolded Correlations significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 8

Regression Coefficients for Personality Factors Predicting Depression Symptoms (N = 138)

	IDAS-II Depression *B(SE)β*	Semi-Partial Correlation	*p*	IMAS-II Depression *B(SE)β*	Semi-Partial Correlation	*p*
RST						
BIS	0.04(0.04)[0.10]	0.08	0.28	0.10(0.09)[0.10]	0.09	0.27
FFFS	**0.18(0.04)[0.36]**	**0.31**	**<0.01**	**0.34(0.11)[0.28]**	**0.25**	**<0.01**
BAS-D	**0.09(0.04)[0.21]**	**0.17**	**0.03**	**0.25(0.09)[0.26]**	**0.21**	**<0.01**
BAS-FS	0.06(0.04)[0.15]	0.12	0.09	0.16(0.09)[0.15]	0.13	0.09
BAS-RR	**-0.13(0.04)[-0.26]**	**-0.23**	**<0.01**	-0.20(0.11)[-0.16]	-0.14	0.08
	R^2 = 0.22			**R^2 = 0.20**		
Maladaptive Personality Traits						
Neg Affectivity	**1.59(0.36)[0.44]**	**0.27**	**<0.01**	**3.73(1.01)[0.42]**	**0.26**	**<0.01**
Detachment	**1.02(0.36)[0.27]**	**0.17**	**<0.01**	1.71(1.01)[0.18]	0.12	0.09
Antagonism	**-1.00(0.30)[-0.27]**	**-0.21**	**<0.01**	-.89(.84)[-0.10]	-0.07	0.30
Disinhibition	**1.06(0.42)[0.23]**	**0.16**	**0.01**	**2.57(1.17)[0.23]**	**0.15**	**0.03**
Psychoticism	-0.00(0.25)[-0.00]	-0.00	0.99	-0.68(0.71)[-0.11]	-0.07	0.34
	R^2 = 0.50			**R^2 = 0.36**		

Note. All bolded Beta values significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 9

Regression Coefficients for Personality Factors Predicting Mania Symptoms

	IDAS-II Mania *B(SE)β*	Semi-Partial Correlation	*p*	IMAS-II Mania *B(SE)β*	Semi-Partial Correlation	*p*
RST						
BIS	0.01(.02)[.05]	0.05	0.58	0.04(0.05)[0.08]	0.07	0.43
FFFS	0.01(.03)[.05]	0.04	0.62	0.02(0.07)[0.03]	0.02	0.76
BAS-D	0.04(.02)[.17]	0.13	0.01	0.09(0.06)[0.16]	0.13	0.10
BAS-FS	**0.08(.02)[.30]**	**0.26**	**<0.01**	**0.15(0.06)[0.24]**	**0.21**	**0.01**
BAS-RR	-0.03(.03)[-.08]	-0.07	0.38	0.04(0.07)[0.06]	0.05	0.52
	R^2 = 0.15			**R^2 = 0.15**		
Maladaptive Personality Traits						
Neg Affectivty	0.12(0.25)[0.05]	0.03	0.62	0.90(0.63)[0.17]	0.10	0.16
Detachment	-0.22(0.25)[-0.09]	-0.06	0.38	-1.25(0.64)[-0.22]	-0.14	0.05
Antagonism	-0.33(0.21)[-0.14]	-0.11	0.11	-0.83(0.53)[-0.15]	-0.12	0.12
Disinhibition	**0.78(0.29)[0.27]**	**0.18**	**<0.01**	**2.48(0.73)[0.36]**	**0.25**	**<0.01**
Psychoticism	**0.82(0.17)[0.53]**	**0.32**	**<0.01**	**1.20(0.45)[0.33]**	**0.20**	**0.01**
	R^2 = 0.42			**R^2 = 0.30**		

Note. All bolded Beta values significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 10

Final Model of Hierarchical Multiple Regression Analyses Predicting Depression Symptoms with All Personality Variables (N = 138)

Predictors	Mood Symptoms					
	IDAS-II Depression			IMAS-II Depression		
	B(SE)β	Semi-Partial	*p*	*B(SE)β*	Semi-Partial	*p*
BIS	0.00(0.03)[0.01]	0.00	0.95	0.03(0.08)[0.03]	0.03	0.72
FFFS	0.07(0.04)[0.14]	0.11	0.07	0.10(0.11)[0.08]	0.06	0.37
BAS-D	**0.07(0.03)[0.20]**	**0.15**	**0.01**	**0.22(0.08)[0.23]**	**0.18**	**0.01**
BAS-FS	0.02(0.03)[0.04]	0.03	0.59	0.09(0.09)[0.09]	0.07	0.33
BAS-RR	-0.05(0.04)[-0.11]	-0.09	0.13	-0.05(0.10)[-0.04]	-0.03	0.63
Neg Affectivity	**1.31(0.43)[0.36]**	**0.18**	**<0.01**	**3.07(1.20)[0.35]**	**0.18**	**0.01**
Detachment	**1.09(0.38)[0.29]**	**0.17**	**<0.01**	**2.47(1.07)[0.26]**	**0.16**	**0.02**
Antagonism	**-1.15(0.32)[-0.31]**	**-0.22**	**<0.01**	-1.55(0.89)[-0.17]	-0.12	0.08
Disinhibition	0.84(0.46)[0.18]	0.11	0.07	1.60(1.30)[0.14]	0.08	0.22
Psychoticism	0.07(0.25)[0.03]	0.02	0.80	-0.58(0.71)[-0.10]	-0.06	0.41

Note. All Beta values reflect the overall, final model. All bolded betas significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

Table 11

Final Model of Hierarchical Multiple Regression Analyses Predicting Mania Symptoms with All Personality Variables

	Mood Symptoms					
	IDAS-II Mania			IMAS-II Mania		
Predictors	*B(SE)β*	Semi-Partial	*p*	*B(SE)β*	Semi-Partial	*p*
BIS	0.00(0.02)[0.00]	0.00	0.94	0.01(0.05)[0.01]	0.01	0.88
FFFS	-0.02(0.03)[-0.06]	-0.05	0.50	-0.02(0.07)[-0.03]	-0.03	0.73
BAS-D	0.03(0.02)[0.14]	0.10	0.12	0.07(0.05)[0.13]	0.10	0.18
BAS-FS	0.02(0.02)[0.07]	0.05	0.45	0.02(0.06)[0.03]	0.02	0.75
BAS-RR	0.01(0.03)[0.04]	0.03	0.66	0.13(0.06)[0.17]	0.14	0.05
Neg Affectivity	0.19(0.30)[0.08]	0.04	0.54	0.69(0.75)[0.13]	0.07	0.36
Detachment	-0.03(0.26)[0.02]	-0.01	0.90	-0.64(0.67)[-0.11]	-0.07	0.35
Antagonism	**-0.49(0.22)[-0.21]**	**-0.15**	**0.03**	**-1.33(0.56)[-0.24]**	**-0.17**	**0.02**
Disinhibition	0.53(0.32)[0.18]	0.11	0.10	**2.24(0.82)[0.33]**	**0.20**	**<0.01**
Psychoticism	**0.81(0.18)[0.52]**	**0.31**	**<0.01**	**1.22(0.45)[0.33]**	**0.19**	**<0.01**

Note. All Beta values reflect the overall, final model. All bolded betas significant at $p < .05$. IDAS-II = Inventory of Depression and Anxiety Symptoms – Second Version. IMAS-II = Interview for Mood and Anxiety Symptoms. BIS = Behavioral Inhibition System. FFFS = Fight/Flight/Freeze System. BAS-D = Behavioral Activation System – Drive subscale. BAS-FS = Behavioral Activation System – Fun Seeking subscale. BAS-RR = Behavioral Activation System – Reward Responsiveness subscale.

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