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Anxiety Sensitivity and Decision Making: Positive and Negative Risk Taking in Laboratory and Naturalistic Settings

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ANXIETY SENSITIVITY AND DECISION MAKING: POSITIVE AND NEGATIVE RISK TAKING IN LABORATORY AND NATURALISTIC SETTINGS

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An Abstract of the Dissertation Presented
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As a group, anxiety disorders represent the most prevalent mental health condition. A hallmark feature of anxiety disorders is avoidant behavior. Along with this, anxious individuals have been shown to exhibit a risk aversion in decision making. However, anxiety disorders are simultaneously highly co-morbid with substance use disorders (e.g., Grant, Stinson, Dawson, & Chou, 2004), suggesting that certain individuals with anxiety disorders engage in particular forms of risk taking. However, much of the current literature on anxiety and risk taking has focused on risk aversion in anxiety, presupposing an inhibited model of anxious responding. In addition, there is little literature which explicitly differentiates between adaptive and maladaptive risk taking or the relevance of context in risk taking, variables which were predicted to be highly important when attempting to interpret risk taking behavior in anxious individuals.

There were three overarching aims of the current study: 1) Investigate etiological and maintenance factors, particularly motivation and emotion regulation, hypothesized to play a role in risk taking behavior in individuals with heightened anxiety; 2) Differentiate between maladaptive (negative) and adaptive (positive) risk taking to examine if type of

risk taking behavior is differentially influenced by anxiety; and 3) Investigate the relation between risk taking in the laboratory and naturalistic settings to identify the role of context.

Participants included undergraduate college students enrolled in psychology courses (N = 143). Participants completed a laboratory portion of the study where they completed three computerized tasks to assess risk taking behavior and self-report inventories. The Anxiety Sensitivity Index-3 (ASI-3) was utilized due to its clinical relevance in anxiety disorders. Following the laboratory session, participants completed a naturalistic portion of the study where they completed a week-long diary of their engagement in and perception of different risk taking behaviors.

Contrary to much of the literature on anxiety and risk taking, anxiety sensitivity was not found to be associated with reduced or heightened risk taking for either adaptive or maladaptive risk taking domains. Anxiety sensitivity also did not influence risk taking in laboratory or naturalistic settings. With regards to original aims, it was found that: 1) Anxiety did not interact with predicted moderating variables to influence risk taking behavior; 2) On laboratory tasks, positive risk taking was differentiated from negative risk taking; however, this distinction was not made in naturalistic settings; and 3) Risk taking in the laboratory was not associated with risk taking in real world settings, suggesting that it should not be assumed that findings from laboratory tasks will readily generalize to real world behavior.

DEDICATION

To my parents, grandmother and brother, for all their support.

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CHAPTER 1

INTRODUCTION

Anxiety disorders are a prevalent mental health concern. Collectively, anxiety disorders make up the most prevalent mental health conditions in the US with a life-time prevalence rate of 28.8% according to the National Comorbidity Survey-Replication (Kessler et al., 2005). Thus, anxiety disorders represent a significant mental health burden in the US. Investigation of decision making processes in anxiety can aid in further understanding the tendency to avoid, a major cross-diagnostic symptom of anxiety disorders. In this regard, decisions which involve risk are particularly important in examining the impact of anxiety on decision making. Although risk is inherently involved to some degree in all decision making (Rangel, Camerer, & Montague, 2008), risky decision making typically involves the potential for losses or punishment offset by uncertain gains (Kahneman & Tversky, 1984). In general, individuals prefer certain gains over gambles even when gambles have probabilistically higher payoffs (Kahneman & Tversky, 1984). Thus, there is a natural tendency towards risk aversion. However, affective state influences the propensity to take risks (Blanchette & Richards, 2010), and anxious individuals tend to be comparatively more risk averse than non-anxious individuals (Maner et al., 2007; Mueller, Nguyen, Ray, & Borkovec, 2010; Raghunathan & Pham, 1999). Under conditions where risk taking is associated with greater payoffs, anxious individuals' greater risk aversion leads to selection of suboptimal choices (Maner et al., 2007). This could be an important mechanism that sustains negative affect.

The perception of risk itself is altered by affect. Specifically, individuals experiencing high state anxiety exhibit pessimistic predictions regarding risk (Lerner & Keltner, 2001). That is, individuals with high levels of state anxiety tend to rate the

probability of a negative outcome occurring as higher than individuals with lower levels of state anxiety (Mitte, 2007; Stöber, 1997). Anxious individuals also exhibit a heightened loss or punishment aversion, which also likely contributes to their risk aversion (Miu, Heilman, & Houser, 2008; Mueller et al., 2010). Anxious individuals' tendency to attend to threatening or dangerous material (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007) likely plays a role in this skewed perception. Paradoxically, sensitivity to losses may also render anxious individuals more risk seeking in situations where losses are inherent (Hartley & Phelps, 2012). Thus, anxious individuals may be more likely to choose uncertain options in conditions where certain options are associated with losses or punishment. Anxiety symptoms themselves may be viewed as aversive, and attempts to avoid or modulate these symptoms may influence risky decision making. Along this line, negative emotions that are high in arousal lead to more maladaptive risk taking (Taking, Leith, & Baumeister, 1996). Thus, anxious individuals may be more risk seeking under certain circumstances.

Although anxious individuals are both more risk and loss averse in general, studies have not clearly delineated circumstances under which anxious individuals are more or less prone to take risks both in laboratory-based and naturalistic decision making. Furthermore, studies have not clearly differentiated risk taking that is positive or beneficial, which will be referred to as positive risk taking, and risk taking that is negative or disadvantageous, which will be referred to as negative risk taking. Understanding the impact of anxiety on the propensity to take positive and negative risk may provide significant insight into mechanisms underlying impairment in anxiety disorders. Thus, this study aims to differentiate positive and negative risk taking and

examine associations between anxiety and propensity to avoid or take positive and negative risks. Because decision making is largely understudied in naturalistic settings where uncertainties and unclear outcome contingencies are generally involved, associations between laboratory-based and naturalistic decision making are largely unknown. The current study aims to examine the impact of anxiety on decision making in both laboratory and naturalistic settings, which allows for the examination of the relations between risk taking in these different settings.

Trait-like measures of anxiety, such as the anxiety sensitivity index (ASI) which assesses levels of anxiety sensitivity (AS), can help to identify individuals who may be at risk of developing clinically significant anxiety-related difficulties. AS is a known risk factor for the development of panic disorder (Schmidt, Lerew, & Jackson, 1999), and AS elevations are found across several anxiety disorders including PTSD, social phobia, and GAD (Cox, Borger, & Enns, 1999). AS will be discussed in depth as the current study will utilize ASI scores as an index of anxiety. In addition, several factors that are associated with anxiety and impact decision making will be discussed. Motivation theoretically underlies all or most of behavior. In anxiety where there is a pervasive loss aversion (Hartley & Phelps, 2012), the underlying motivational focus is expected to be on minimizing losses, which can be accomplished in both a more active or passive manner. Motivational theories which predict opposing activation and avoidance-based systems may not fully capture underlying motivation in anxiety (Higgins, 2005). Regulatory focus theory (RFT) predicts that there are two motivation systems- the prevention system, which aims to minimize losses and ensure safety and the promotion system, which aims to maximize gains and is concerned with advancement (Higgins, 2005). Differences in

the functioning of these two systems may underlie anxiety and its effects on decision making by motivating behavior in a manner that is consistent with active and/or passive avoidance.

Another factor involved in both anxiety and decision making is emotion regulation (ER). ER is defined as attempts to modulate the internal experience or external expression of emotions (Gross, 1998). ER can occur in two ways: 1) Antecedent focused regulation in which an individual attempts to control emotions prior to experiencing them; and 2) response modulation, which involves modifying the expression of the emotion (Gross, 1998). Several ER strategies and functions will be considered in depth due to their relationship with both anxiety and decision making. One antecedent-focused ER strategy, behavioral avoidance (Gross, 1998), will be discussed in depth. Behavioral avoidance is a common symptom across anxiety disorders and high levels of trait anxiety. In addition, this symptom is often targeted in treatments for anxiety disorders. As an ER strategy, behavioral avoidance temporarily reduces anxiety due to evasion of fear-provoking stimuli. Generally, anxious individuals are expected to engage in more behavioral avoidance of risk taking in decision making.

In sum, this study will examine associations between anxiety and positive and negative risk taking in laboratory-based and naturalistic settings, with a focus on factors associated with both anxiety and decision making. Examining associations between personality traits and connection with real-world risk taking have been identified as areas that need further research (Buelow & Suhr, 2009). In addition, there are no studies examining the relations between behavior in the laboratory and naturalistic settings which account for the effects of anxiety. The overarching goal is to illuminate the factors

associated with different types of risk taking in anxiety to reveal sources of impairment and protections in clinical anxiety.

Anxiety

Anxiety broadly involves the fear and apprehension of specific or broad situations, people, or places. Anxious behavior typically involves some level of avoidance of feared situations. Autonomic activation which in turn produces somatic symptoms is also characteristic of anxiety (Spielberger, 2010). Anxiety can be acquired through classical fear learning as demonstrated by Palov's induction of neurotic dogs brought about by an unpredictable, uncontrollable environment, and are maintained by persistent feelings of lacking control (Lazarus, 1991). Anxiety, like all emotions, at times offers important information needed for survival and to prepare individuals for action (Frijda, 1988) and thus can be an adaptive and vital emotional response to one's environment. However, when anxiety becomes predominant, it can negatively impact relationships and/or general functioning, causing distress and impairment.

Anxiety Sensitivity. In attempting to understand anxiety disorders, it may be advantageous to examine transdiagnostic constructs as opposed to specific disorders. In each subsequent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM), anxiety disorders have been further dissected into increasingly numerous subtypes and specifiers (Norton & Philipp, 2008). However, high rates of comorbidity among anxiety disorders challenge the increasing amount of distinction among anxiety disorders imposed by the DSM (Watson, 2005). Upwards of 60% of individuals seeking treatment for an anxiety disorder have another anxiety and/or mood disorder (Norton & Philipp, 2008). In addition, there is evidence supporting the efficacy of transdiagnostic

treatment protocols which are aimed at treating a variety of anxiety disorders rather than a specific disorder (Norton & Philipp, 2008). Consequently, the National Institute of Mental Health (NIMH) is moving away from research involving classically defined DSM diagnoses (Insel, 2013). Thus, the use of transdiagnostic constructs is increasingly important in clinical research.

One such widely studied transdiganostic trait is AS. The AS construct represents an individual's level of responsiveness to their own anxious feelings. Defined as the "fear of fear," or fear and sensitivity to anxiety-related symptoms (Reiss, Peterson, Gursky, & McNally, 1986), AS is elevated across all anxiety disorders (with the exception of specific phobia) and plays a particularly important role in the development of panic disorder (Taylor, Koch, & McNally, 1992). Whereas trait anxiety has to do with the propensity to experience anxiety-like symptoms, AS refers to one's interpretation of his or her own anxious feelings (McNally, Hornig, Hoffman, & Han, 1999). AS has been typically measured by the ASI (Reiss et al., 1986). Originally, AS was conceptualized to be a single, unitary factor; however, numerous studies revealed that this was not the case (R E Zinbarg & Mohlman, 1998). Factor analysis has uncovered a 3-factor structure underlying the ASI which involves: (1) Physical Concerns, or the fear of physical anxious sensations, (2) Cognitive Concerns, which entails the fear of cognitive dyscontrol, and (3) Social Concerns, or the fear of publically observable anxiety symptoms (Taylor & Cox, 1998). The original ASI has been revised several times in order to improve particularly on the 3-factor structure. The psychometric properties of these factors in the original 16-item ASI lacked strength due to a limited number of items. Specifically, both the Social Concerns and Cognitive concerns subscales contain 4 items each in the original measure

(Taylor et al., 2007). Several revisions of the ASI were conducted including the ASI-Revised (ASI-R; Taylor & Cox, 1998a) and the ASI Profile (Taylor & Cox, 1998b), both of which involved adding a substantial number of items in an effort to improve the factor structure. Neither of these measures successfully accomplished this goal. However, one relatively recent revision of the ASI, the ASI-3 (Taylor et al., 2007), has demonstrated significant improvement on this 3-factor structure (Olthuis, Watt, & Stewart, 2014; Taylor et al., 2007; Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012). Thus, the ASI-3 is the measure which best captures the true multidimensional nature of AS (Wheaton et al., 2012).

Although high levels of AS are associated with various psychopathology (e.g., depression, substance abuse), they have specific predictive value in anxiety disorders (McNally, 2002). AS levels at baseline predict the frequency and intensity of panic attacks in prospective studies (Plehn & Peterson, 2002; Schmidt et al., 1999). AS also predicted the number of feared situations in individuals diagnosed with agoraphobia (McNally & Lorenz, 1987). A 3-year prospective study in which AS and anxiety symptoms were initially assessed in 1984 and then in 1987 demonstrated that AS level was significantly predictive of the risk for development of future anxiety disorders (Maller & Reiss, 1992). Specifically, results demonstrated that individuals who had scored most highly on the ASI were five times more likely than low scorers to be diagnosed with any anxiety disorder (Maller & Reiss, 1992). Recent investigations using the ASI-3 have found that scores on the Social Concerns subscale are positively correlated with social phobia while high scores on the Physical Concerns subscale are associated with panic disorder (Olthuis et al., 2014; Wheaton et al., 2012). The Cognitive

Concerns subscale is associated with GAD symptoms (Wheaton et al., 2012) and depressive symptoms (Olthuis et al., 2014). AS is viewed as an "anxiety amplifier" in that high AS individuals are more attuned to and fearful of anxiety symptoms when they occur, which further increases the intensity of these symptoms (Taylor et al., 2007). AS may also be a useful clinical tool in revealing idiosyncratic beliefs about anxiety symptoms, which can be targeted by therapeutic interventions. Along this line, reducing elevated AS in itself may be useful in treating panic disorder (Smits et al., 2008).

Reductions in AS following treatment for anxiety disorders further demonstrate the relevance of AS as a clinically significant construct. Following cognitive behavioral therapy (CBT), patients with anxiety disorders exhibit significant reductions in their ASI scores to normative levels (McNally & Lorenz, 1987; Smits et al., 2008; Telch et al., 1993). Medication-based treatments also decrease ASI scores, some more effectively and long-term than others. While benzodiazepines decrease anxiety symptoms in the short term, they do not decrease ASI scores (McNally, 2002). In contrast, use of imipramine, a tricyclic anti-depressant, results in significant reductions in ASI scores (Mavissakalian, Perel, Talbott-Green, & Sloan, 1998). The relative lack of efficacy of benzodiazepines in reducing ASI scores may be due to a blockade of anxiety symptoms that limits opportunities for individuals to learn that anxiety symptoms are not harmful (Fava et al., 1994).Therefore, exposure to anxiety symptoms is a key component in eliciting AS reductions. Physical exercise may reduce AS levels as physical activity naturally exposes individuals to arousing physical sensations. This may allow anxious individuals to habituate to these arousing sensations and learn that these feelings are not dangerous or harmful (Smits et al., 2008). Smits and colleagues (2008) investigated the impact of a

short-term exercise regime on AS levels and found significant decreases in AS levels following the exercise program. In addition, these reductions were associated with reductions in depressed mood and anxiety symptoms (Smits et al., 2008). In summary, AS is a multi-dimensional construct which has significant clinical relevance. AS, as assessed by the ASI-3, will be used in the current study as an indicator of level of anxiety.

Etiological and Maintenance Factors. Although there are numerous psychological, biological, and social factors influencing anxiety, a full review of all of these factors is beyond the scope of this paper. Several psychological and social etiological factors will be discussed in depth in the following sections due to their dual relationships with anxiety and decision making.

Motivation. Abnormalities in motivation are frequently found in various forms of mental health conditions (e.g., schizophrenia, depression). In particular, anxiety is associated with avoidance motivation (Lazarus, 1993). While there are many theories of motivation (e.g. drive theory), regulatory focus theory (RFT; Higgins, 2005) will be discussed in depth given its relevance to the understanding of anxiety and decision making. RFT explains how individuals pursue goals and may provide insight regarding the way anxious individuals make decisions. According to RFT, there are two motivational systems: A prevention system, marked by vigilance and an overall goal to prevent losses, and a promotion system, marked by eagerness and an overall focus on achievements (Higgins, 2005). These two systems are mutually inhibitory. That is, when one regulatory system is activated in pursuit of a goal, the other system is naturally inhibited (Klenk, Strauman, & Higgins, 2011). Psychologically healthy individuals are

able to switch back and forth between these two regulatory systems flexibly depending on the context of the situation and goals being pursued. In individuals with heightened levels of anxiety, however, it is predicted that a chronic prevention focus is predominant, which may be related to the etiology of certain anxiety disorders (Klenk et al., 2011). Indeed, there is a body of empirical evidence demonstrating a risk aversion, which is associated with a prevention focus, in anxiety (e.g., Maner et al., 2007; Raghunathan & Pham, 1999). Individuals high in anxiety also exhibit a tendency to focus on preventing losses rather than gaining achievements. The active vigilant system associated with loss prevention is also predicted to be involved in many avoidance-related behaviors observed in clinical presentations of anxiety. In addition, a prevention focus is hypothesized to underlie reduced risk seeking behavior in individuals with high levels of anxiety.

RFT also underscores the importance of regulatory fit, which relates to what individuals value (Higgins, 2005). Each goal that is pursued is associated with a specific regulatory focus, and a goal can be pursued in two manners- either eagerly or vigilantly. RFT highlights the fact that a goal may be pursued in an eager fashion, which is associated a promotion focus, or in a vigilant fashion, which is associated with a prevention focus. The fit between an individual's motivational orientation (i.e., promotion- or prevention-focused) and the manner in which they pursue the goal (i.e., eagerly or vigilantly) enhances engagement in goal pursuit (Higgins, 2005). In other words, when an individual experiences regulatory fit, there is a feeling or "correctness and importance" about the goal they are pursuing. For instance, an anxious individual would experience regulatory fit when they pursue a prevention goal in a vigilant manner. The anxious individual may pursue the goal of preventing a grade lower than an A on a

test (i.e., the prevention goal), and this may be accomplished through examining what is going to be on the test and reviewing material many times to prevent the loss of studied information (i.e., the vigilant method). The individual will experience regulatory fit through their avoidance of a grade lower than an A. Experiencing regulatory fit when pursuing goals enhances negative or positive responses to objects or situations, including the value of consumer goods (Avnet & Tory Higgins, 2003)and job satisfaction (Kruglanski, Pierro, Higgins, & Capozza, 2007).

It is important to consider the experience of successes and failures through the use of promotion and prevention systems. Paradoxically, the overuse of the prevention system in anxious individuals is predicted to result in greater prevention failures based on the curvilinear relationship between anxiety and performance known as the Yerkes-Dodson law (Klenk et al., 2011). Hyperarousal or hypervigilance associated with prevention goals may reduce success in reaching prevention goals. Prevention successes reduce hyperactivity of the prevention system (Higgins, 2005), while prevention failures are expected to further increase prevention system's hyperactivity and vigilance (Klenk et al., 2011). Thus, repeated prevention failures resulting from the overuse of the prevention system in anxious individuals will further increase the activation of this system. Over time, anxious individuals become overly reliant on the prevention system. However, repeated prevention failures put anxious individuals at higher risk to experience increased negative affect (Klenk et al., 2011). Prevention failures are related to both anxiety and depressive symptoms (Strauman, 1992), and chronic regulatory failure increases susceptibility to psychopathology in general (Papadakis, Prince, Jones, & Strauman,

2006; Strauman, 1992).This represents a pathway by which motivation may be involved in the etiology and maintenance of negative affect.

Emotion Regulation. Emotion regulation (ER) is a multifaceted processes involving how, when, and what type of emotions individuals experience (Mennin, Heimberg, Turk, & Fresco, 2002). The ability to effectively and adaptively manage emotions is highly important to psychological heath (Gross & John, 2003). As reviewed earlier, Gross's (1998) seminal theory of ER proposes different temporal points in affective processing which motivate the use of particular ER strategies. That is, individuals may enact strategies to manage emotion before they emerge (antecedent-focused ER) or while the emotion is occurring (response modulation ER). Gross's theory serves as the framework for understanding ER; however, researchers differ on definitions of ER and what constitutes an ER strategy. Due to the wide breadth of ER strategies identified, only a selected number of strategies will be reviewed which fit within the framework of Gross's overarching ER theory. Antecedent-focused and response modulation ER techniques will be reviewed, followed by a discussion of interactions between motivation and ER.

Antecedent-focused ER. Antecedent-focused ER strategies are used prior to an emotional response and involve strategies employed both prior to or after an emotion-eliciting situation. Situation selection and situation modification represent two initial ways emotions may be regulated at the situational level. Situation selection and modification may involve approach or avoidance of particular situations to regulate emotions. Due to its relevance to anxiety, avoidance as a situation selection and modification strategy will be elaborated on further.

Attention deployment is another form of antecedent-focused ER. Attentional deployment refers to the relative attention placed on or away from emotions (Gross, 1998) and includes distraction, rumination, worry, and thought suppression (Campbell-Sills & Barlow, 2007). In generalized anxiety disorder (GAD), individuals experience more intense emotional experiences resulting in an increased necessity to regulate emotions (Mennin et al., 2002). Worry, a characteristic symptom of GAD, is conceptualized as an attempt to control intense emotional experiences (Mennin et al., 2002). Rumination is another ER strategy that anxious individuals use to deal with their internal experiences. Rumination involves focused attention on internal symptoms of distress and may perpetuate or exacerbate cognitive biases seen in anxiety. One study found that socially anxious individuals engaged in more rumination following a social interaction experience than non-anxious individuals (Mellings & Alden, 2000). Rumination in turn predicted the amount of negative self-relevant information recalled on a memory task and prolonged negative judgment biases regarding social events (Mellings & Alden, 2000). These results support the involvement of rumination in creating and/or maintaining cognitive biases in individuals with high levels of anxiety.

A final form of antecedent-focused ER strategy is cognitive change. This involves changing the manner in which an individual appraises a situation in order to modify the emotional significance or connotation (Gross, 1998). Cognitive change strategies include denial, isolation, intellectualization, downward social comparison, reappraisal (Gross, 1998), and distancing (Ochsner & Gross, 2008). In general, cognitive reappraisal has been found to be an adaptive strategy. Using cognitive reappraisal strategies reduces the subjective experience of negative emotions and induces simultaneous neural changes

(Ochsner, Bunge, Gross, & Gabrieli, 2002). Cognitive reappraisal is heavily utilized in cognitive-behavioral treatments for a range of mental health problems (Beck & Clark, 1997) and has been demonstrated to be an important ingredient in effecting positive changes in the context of mental health problems. For instance, following individual CBT, self-reported efficacy in cognitive reappraisal mediated the effectiveness of the treatment in reducing social anxiety symptoms (Goldin et al., 2012).

Avoidance. Avoidance is a multifaceted concept which may be used as a specific situation selection and modification ER strategy. Avoidance can be active such as the active regulation of current behavior (e.g., escaping a dangerous or threatening situation) or passive which generally involves the inhibition of a certain behavior/behaviors (e.g., inhibition of responses; Amodio, Master, Yee, & Taylor, 2008). Active avoidance entails escaping or attempting to modify an experience in some form (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Active avoidance of certain situations, objects, or individuals may be adaptive. However, in individuals with anxiety disorders in which avoidance is a key feature, avoidant behavior has usually surpassed an adaptive threshold. Passive avoidance involves the inhibition of a response to avoid an aversive or punishing stimulus (Cornwell, Overstreet, Krimsky, & Grillon, 2013). Animal and human studies have demonstrated examples of both passive and active avoidance that are preceded by different conditioning experiences. In both instances, responses (e.g., pressing a level to stop a loud ringing noise) are acquired through operant conditioning (e.g., negative reinforcement by the cessation of the noise when the lever is pushed). Individuals with high levels of anxiety engage in both active and passive avoidance as situation selection and modification ER strategies.

Avoidance maintains anxiety symptoms because it prevents opportunities to learn non-fearful associations with feared stimuli (Craske et al., 2008; Foa & Kozak, 1986). Long-term consequences of avoidance include increased fear to the avoided situation or stimulus, impairment associated with avoidant behavior, and/or distress resulting from increases in fear (Cisler, Olatunji, Feldner, & Forsyth, 2010). Avoidance restricts natural experimentation with the real world. Due to this lack of experimentation, fear is maintained or even heightened as beliefs about threatening stimuli or situations cannot be disconfirmed and are therefore maintained (Craske, 1999). Fear extinction is interrupted by active avoidance as manifested by safety behaviors exhibited during extinction phases (Lovibond, Mitchell, Minard, Brady, & Menzies, 2009).

Passive forms of avoidance, which involve inhibition of a response to prevent aversive consequences (e.g., withholding a keyboard response to a stimulus that is potentially punishing), is also related to anxiety. The behavioral inhibition system or temperament style is associated with both passive avoidance and anxiety (Hirvonen, Aunola, Alatupa, Viljaranta, & Nurmi, 2013). Behavioral inhibition is characterized by fearfulness or wariness of unfamiliar situations or individuals, withdrawal from unfamiliar peers, and harm avoidance in children (Chronis-Tuscano et al., 2009). In adults, behavioral inhibition represents sensitivity to stimuli that are aversive and non-rewarding as well as higher levels of threat anticipation (Carver & White, 1994). Behavioral inhibition is linked to the development of anxiety disorders. For instance, behavioral inhibition in early childhood predicts a four-fold increased risk of developing social anxiety disorder in adolescence and increases the risk of development of anxiety disorders in general (Chronis-Tuscano et al., 2009). In addition, behavioral inhibition has

been directly linked to passive avoidant behavior in humans (i.e., distance from a potentially threatening object in a virtual reality task; Bach et al., 2014). Similar to active avoidance, passive avoidance interrupts fear extinction resulting in more persistent fear expressions (Cornwell et al., 2013).

Avoidance is highly significant to anxiety disorders. If left untreated, avoidance tends to generalize to progressively more situations, as observed clinically in GAD and social phobia (Kessler et al., 2005; Turner, Beidel, & Townsley, 1992). Anxiety and avoidance of a greater number of situations and/or stimuli may be more severe than anxiety disorders where only specific stimuli are avoided. For instance, in social phobia, individuals with generalized subtypes have greater symptom severity, more distress, and more problematic social functioning compared to individuals with specific social phobia (e.g., public speaking; Turner et al., 1992). These differences were found even in the absence of differences in objective social skills (Turner et al., 1992). Similar results were obtained in an epidemiology study that examined the relative disorder severity, ranging from mild to severe, in individuals meeting criteria for a range of mood and anxiety disorders (Kessler et al., 2005). Serious severity was defined as the presence of a suicide attempt, work disability, general functioning impairment, and other serious mental health problems (e.g., bipolar disorder, substance dependence). Specific phobia, which by nature of the disorder is associated with fear of a specific object or situation, was the least likely of all anxiety disorders to be of serious severity and the most likely to be experienced as mild in severity (Kessler et al., 2005). Overall, there is support for the notion that greater avoidance is associated with more symptoms of anxiety, which in turn is related to greater impairment.

Response-focused ER. Response modulation involves attempts at modifying the actual experience of the emotion (Gross, 1998). Expressive suppression, drug use, exercise, progressive relaxation techniques, and biofeedback are all forms of response modulation (Gross, 1998). Although what is considered an adaptive ER strategy differs depending on the context of the situation (Gross & Thompson, 2007), some response modulation strategies (e.g., exercise) are effective and adaptive ways of coping with emotional experiences (Smits et al., 2008). Persistent use of particular response modulation strategies may be advantageous in the short-term but may confer maladaptive long-term consequences if engaged in for prolonged periods of time. For instance, expressive suppression confers short-term benefits in graduate students, but persistent use of expressive suppression is associated with worse well-being (Myers, McCrea, & Tyser, 2013).

Expressive suppression is considered an attempt to avoid experiencing internal symptoms or a way of conforming to social norms or facilitating social interactions by not displaying negative emotions. While expressive suppression may inhibit many external aspects of the emotion, it does not decrease subjective or physiological makers of negative mood (Gross & Levenson, 1997). In fact, individuals who utilize expressive suppression often report greater negative emotions and less positive emotions compared to individuals who do not use this ER strategy under similar circumstances (Gross & Levenson, 1997; Gross & John, 2003; Hofmann, Heering, Sawyer, & Asnaani, 2010). Anxious individuals are more likely to utilize expressive suppression to regulate emotions (Amstadter, 2008; Cisler et al., 2010). Specifically, individuals with a number of anxiety disorders (e.g., PTSD, panic disorder) report using expressive suppression

more often in emotionally challenging situations (e.g., carbon dioxide challenge) than individuals without anxiety disorders (Amstadter, 2008). In addition, the use of expressive suppression is associated with more anxiety symptoms than the use of cognitive reappraisal strategies (Hofmann et al., 2010). Thus, expressive suppression is considered to play an important role in the development and maintenance of anxiety symptoms (Amstadter, 2008). In particular, the frequent or default use of expressive suppression may increase the negative emotions anxious individuals are attempting to regulate in the first place (Gross & Levenson, 1997). The effects of response modulation strategies on behavior, particularly decision making, in anxious individuals will be discussed in a subsequent section.

Emotion Regulation and Motivation. ER strategies often represent an attempt by individuals to avoid or decrease negative emotions and increase positive emotions (Gross, 1998). However, this hedonic account does not fully explain the function of ER in all situations. Understanding the relation between ER and goal motivation may help to better contextualize ER. The relation between ER and RF is largely understudied; however, a recent examination found links among ER, RF, and anxiety. Llewellyn and colleagues (2012) found that a promotion focus was associated with less anxiety, greater use of adaptive ER strategies (i.e., cognitive reappraisal), and less use of maladaptive ER strategies (i.e., expressive suppression). Importantly, the relation between anxiety and a promotion focus was partially mediated by the tendency to use cognitive reappraisal and expressive suppression. That is, individuals who reported greater engagement in the promotion system also reported greater use of cognitive reappraisal as an ER strategy, which in turn was associated with less anxiety symptoms. Researchers predicted that a

prevention focus would be associated with greater anxiety symptoms based on RFT (see Klenk et al., 2011). Specifically, the prevention system is expected to be overactive in individuals with heightened levels of anxiety due to a heightened focus on losses in anxiety. A relation between anxiety and prevention focus has not been empirically established yet; however, a prevention focus is associated with the greater use of expressive suppression and not associated with cognitive reappraisal (Llewellyn, Dolcos, Iordan, Rudolph, & Dolcos, 2013). Given that expressive suppression may increase anxiety symptoms (Gross & Levenson, 1997; Hofmann et al., 2010), the association between a prevention focus and expressive suppression may suggest that individuals who have a higher prevention focus are at greater risk for the development of anxiety disorders. Overall, results suggest relations among RF, ER, and anxiety which warrant further examination.

Decision Making

Individuals express their underlying desires through choices or decisions they make (Scott, 2000). Decision making generally represents higher order cognitive processes which draw on executive functions; however, intuitive processes are also involved in some aspects of decision making. According to Kable and Glimcher (2009), decision making consists of two separable processes: The valuation process and the choice process. The valuation process involves evaluation of options on a continuum (from low value to high value). The choice process occurs after the valuation process and involves the actual selection of an option. Variables associated with decision making can vary widely. The degree of uncertainty is one of the major variables involved in the decision. In certain decision making situations, a vast amount of knowledge is known or

available regarding expected outcomes. Thus, degree of (un)certainty regarding outcomes may be high or low (Weber & Johnson, 2009). Another important variable in decision making is the amount of gains and losses associated with particular options. These variables, which influence the types of decision individuals make, will be discussed in greater depth in a subsequent section.

Theories. Decision making theories from economics and public administration can offer some insight into how decisions are made at an individual level. Some early theories of decision making posit the decision-maker as completely rational and do not account for the influence of emotion (Turner & Homans, 1961). Early theories were based on the notion that actual and ideal decision making could be determined through modeling based on Bayesian probabilities (Resnick, 2012). According to rational choice theory (Turner & Homans, 1961), individuals make decisions based on the expected utility with the goal of maximizing gains while also minimizing losses (Lindenberg & Frey, 1993). Rational choice theory utilizes mathematical modeling to explain how individuals evaluate options. As information in the system grows, individuals use short-cuts such as heuristics in order to simplify large volumes of information (Lindenberg & Frey, 1993). However, this theory does not account for uncertainty in decision making as there is an implicit assumption that the decision maker is omniscient regarding outcomes (Etzioni, 1967).

Incremental decision making theory (Lindblom, 1959) was developed to explain how policy makers evaluate and choose options, while improving upon limitations of rational choice theory. This theory considers the cognitive limitations inherent in humans when making decisions. Choices are evaluated against existing policies with the focal

point being on the incremental difference between the two, and choices that are most similar to existing policies are considered (Lindblom, 1959). Unlike rational choice theory (Turner & Homans, 1961), incremental theory postulates that decision-makers consider only a select number of alternatives based on the initial evaluation stage in order to reduce the cognitive load of considering a multiplicity of decisions.

Mixed-scanning (Etzioni, 1967) integrates key components of rational choice theory (Turner & Homans, 1961) and incremental decision making theory (Lindblom, 1959). A plethora of choices are first evaluated by the decision-maker. Similar to incremental theory, an initial decision based on the utility of spending time and resources considering certain options is made, and particular choices are considered in greater depth from this initial scan. The initial scan may be revisited periodically, and there may be more than two scan levels to be considered. Thus, this model allows for greater adaptability and flexibility compared to rational choice theory and incremental decision making theory (Etzioni, 1967).

All three theories account for conscious, analytical aspects of decision making. Later decision making theories have moved away from normative models to less analytical theories of decision making (Kahneman & Tversky, 1979). Dual processing theory of decision making hypothesizes that there are two decisional modes: The intuitive/implicit mode, which tends to rely on heuristics and the analytical/explicit mode that relies more on conscious, controlled cognitive processes (Glöckner & Witteman, 2010). The intuitive mode has been linked to affectively charged, emotional decision making, while the analytical mode is associated with integration of mainly cognitive information and is more deliberate and strategic (Starcke & Brand, 2012).

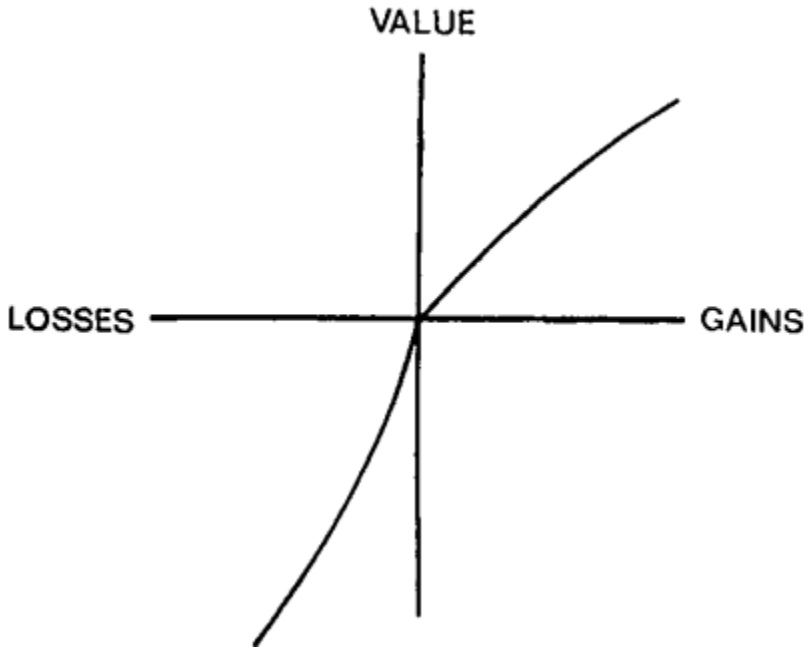
Research has demonstrated evidence of distinguishable intuitive and analytical modes operating in the Iowa Gambling Task (IGT), a frequently utilized decision making paradigm (Stocco, Fum, & Napoli, 2009). In the original version of the IGT, participants are instructed to make selections from four decks of card. Two of the four decks are associated with smaller rewards but also lower penalties, and persistent selections from these decks result in an overall gain. These are considered "good" decks. The other two decks are associated with larger rewards but also larger penalties, and persistent selections from these decks result in an overall loss. These are considered "bad" decks. Individuals receive feedback after each selection signifying the amount they have gained and lost on each trail. In addition, a tally of overall points the individual currently has is displayed at the bottom of the screen. Stocco and colleagues (2009) used a modified version of the IGT in which there were two phases: A learning phase, which is identical to the original version described, and a purely decision making phase in which neither trial-by-trial feedback nor total points are displayed. Thus, during the second phase, participants make selections based on previously learned associations. In addition, a distractor was added during both phases to examine the involvement of executive cognitive resources in both learning and decision making phases of the task. In the learning phase, performance was dependent on learning the pay-off structure of the task, a higher level of process, and distractors interrupted performance. The second phase, the decision phase of the task, was sensitive to loss frequency and magnitude, and choices were made based on immediate emotional reactions. However, performance during the second phase was not sensitive to distractors. These results suggest that the intuitive/implicit mode (i.e., the decision phase) is distinguishable from the

analytical/explicit mode (i.e., the learning phase) supporting dual processes theory (Stocco et al., 2009).

Prospect theory (Kahneman & Tversky, 1979) is yet another theory of decision making which explains how individuals manage risk and uncertainty. Prospect theory predicts that individuals make decisions based on the potential value of losses and gains as opposed to outcomes. That is, individuals choose options based on their subjective probabilities which may differ from objective probabilities. Unlike normative decision making theory, this theory is descriptive because it explains real-life decisions in contrast to optimal outcomes. According to prospect theory, decision making occurs in two stages: The editing stage and the evaluation stage (Kahneman & Tversky, 1979). In the editing stage, individuals consider and weigh outcomes based on their predicted probability of occurring. Components of a decision are separated into riskless and risky components during the editing phase. In the evaluation stage, individuals determine a value associated with options based on both subjective probabilities and subjective value of potential outcomes and ultimately choose the option with the higher utility (i.e., lesser or infrequent losses and/or higher, more frequent gains; Kahneman & Tversky, 1979). In general, individuals tend to be risk averse. Risk aversion refers to the unwillingness to choose options with uncertain payoffs over options with more certain outcomes (but potentially lower payoffs) with the goal of avoiding ambiguity (Lipshitz & Strauss, 1997). Thus, individuals tend to be averse to uncertainty, choosing certain options even when uncertain options have a higher mathematical probability of greater payoffs (Kahneman & Tversky, 1984). Furthermore, most individuals tend to be loss-averse, giving higher value to losses as opposed to gains. The value function (Figure 1) predicted

by prospect theory depicts the relative value given to gains and losses. According to prospect theory, the function is concave for gains and convex for the domain of losses, and the curve is steeper for losses compared to gains (Kahneman & Tversky, 1984). This function demonstrates the relatively higher value given to losses compared to gains.

Figure 1. Hypothetical Value Function Based on Prospect Theory (Kahneman & Tversky, 1979)



Emotions and Decision Making. Contrary to normative theories of decision making, decision-makers are not always (and in fact are often not) rational. In fact, emotion is an essential part of decision making. For example, the accurate processing of emotion prior to decision making has been found to be key to rational and adaptive decision making in studies using the IGT (Bechara & Damasio, 2005). Emotions may be involved in decision making in two ways: Integrally or incidentally (Blanchette &

Richards, 2010). Integral emotion is intrinsically involved or evoked by the material being processed (Blanchette & Richards, 2010). For instance, decision options may include emotional content (e.g., life or death emergency medical situations). Incidental emotion includes transient or stable affective states which are not directly related to the target material, including trait characteristics (e.g., trait anxiety) and mood inductions (Blanchette & Richards, 2010). Given that this project will examine the impact of anxiety sensitivity on decision making, this review will focus on the impact of incidental emotion on decision making and in particular the impact of anxiety on decision making.

Most research examining the effects of incidental emotion on decision making have focused on the propensity to avoid or approach risk (and relatedly, sensitivity to gains and losses). In terms of significance to anxiety, the propensity to be risk averse may be particularly important in understanding which individuals will demonstrate avoidance above and beyond other factors. Due to the importance of risk in decision making and anxiety, the following review will focus exclusively on decision making which involves risk.

To understand potential mechanisms underlying propensity to avoid or approach risks in anxiety, it is important to examine models explaining the processes by which individuals make decisions under uncertain conditions. The lack of certainty of the decision, the key component defining risky decision making, stimulates three different basic methods for coming to decisions (Lipshitz & Strauss, 1997). First, decision makers attempt to *reduce* uncertainty by using methods such as collecting more information, filling in gaps in knowledge with assumptions, and using statistical methods to predict the likelihood of events occurring (Lipshitz & Strauss, 1997). A second strategy involves

acknowledging the associated uncertainty which can be done in two broad ways: Taking uncertainty into account in selecting the course of action or by preparing to avoid or confront the risk involved. Lastly, individuals may make decisions without knowledge of the probabilities and consequences of outcomes, thereby *suppressing* uncertainty (Lipshitz & Strauss, 1997). Suppressing uncertainty can occur through denial of the uncertainty, which may be accomplished by distorting information related to the uncertainty. Alternatively, individuals might rationalize the uncertainty, which involves coping with uncertainty symbolically by going through the process of reducing or acknowledging it but never actually completing these processes. Anxious and non-anxious individuals alike may use these different strategies to manage uncertainty through the decisions they make.

Anxiety. The role of anxiety in decision making has been studied both in the laboratory and in naturalistic settings. Laboratory-based studies on decision making allow for the examination of decision making in a controlled environment and manner. For example, laboratory decision making paradigms can examine particular aspects of decision making, such as risk and reward, levels of which can also be controlled. Laboratory paradigms are important for isolation and control of these characteristics to maximize group differences in decision making. However, a major limitation of research using laboratory paradigms is the relative lack of knowledge of how behavior in the laboratory may directly translate to real-world behavior. Laboratory research only indirectly suggests how behavior may function in the real-world.

In contrast to the constrained and controlled nature of laboratory decision making, naturalistic decision making can involve vague and competing goals, a higher degree of

complexity of integration of information that is often ambiguous (Resnick, 2012). Naturalistic decision making does not tend to follow normative decision making rules. That is, Bayesian modeling does not always aid in explaining actual decisions (Resnick, 2012). The examination of decision making in naturalistic settings has largely focused on the influence of acute stress on decision making as opposed to the influence of decision makers' trait characteristics. The decision making situation under acute stress generally involves the characteristics of high uncertainty, time pressure, and extreme consequences of decisions (Baumann, Sniezek, & Buerkle, 2001). Studies conducted both in the laboratory and in naturalistic settings will be reviewed below. Currently, no published studies examined the influence of anxiety on decision making in both laboratory and naturalistic settings.

Risk Aversion. Trait anxiety and anxiety inductions are associated with a persistent risk aversion both in self-reported behavior and performance on laboratory gambling tasks (Blanchette & Richards, 2010). In one study examining the effects of mood inductions on risk taking, individuals were presented with hypothetical gambling and career options along with the relative probability of outcomes (Raghunathan & Pham, 1999). Individuals who were induced to experience anxiety selected the least risky options compared to controls and individuals who were induced to experience other forms of negative affect (i.e., sadness). Another study using the Balloon Analogue Risk Task (BART; Lejuez et al., 2002) examined the impact of anxiety on decision making in the laboratory (Maner et al., 2007). The BART, which rewards risk taking, involves inflating a virtual balloon on a computer screen by pumping it up. Individuals earn money for each pump which is placed in a temporary bank not visible to the participant.

All balloons have a bursting point that varies by balloon, and if a balloon bursts all money in the temporary bank is lost. At any point, individuals may transfer the money they have earned in their temporary bank to their total permanent bank (which is visible to the participant). The more the balloon is inflated, the greater potential reward; however, the potential risk of losing money earned in the temporary bank also increases. Maner and colleagues (2006) examined decision making in different populations using the BART. Individuals high in trait social anxiety, those who were high in trait anxiety, and those with anxiety disorders made more risk avoidant choices compared to controls, individuals with mood disorders, and individuals with learning disabilities (Maner et al., 2007). Overall, findings suggest a pronounced risk aversion in anxious individuals which is distinct from participants experiencing other forms of chronic or transient negative affect.

Affective states, such as anxiety, may result in the misattribution of the affective state to the decision situation, known as the affect as information phenomenon (Pham, 2007; Raghunathan, Pham, & Corfman, 2006). Emotion-understanding represents the ability to accurately identify the source of internal emotions and influences the extent to which affect is used as information. Low levels of emotion-understanding, or a lack of awareness of the source of emotion, play a large role in the misattribution of negative affect to the decision situation (Yip & Côté, 2012). Following an anxiety induction, individuals low (vs. high) in emotion-understanding took fewer risks (Yip & Côté, 2012). An interesting finding was that when participants were informed of the source of their anxiety, the differences between individuals with low and high emotion-understanding in risk taking disappeared. These findings suggest that the source of affect was misattributed

in low emotion-understanding individuals resulting in behavior congruent with the affect (Yip & Côté, 2012). Thus, when individuals are uncertain regarding the source of their affect, their current affect is more likely to influence decision making (Raghunathan et al., 2006). Acute stress can have a negative impact on decision making by interrupting cognitive processes involved in decision making (Starcke & Brand, 2012). However, the interpretation of acute stress as a challenge as opposed to a threat reduces the negative effects of stress on decision making (Starcke & Brand, 2012), which further supports the importance of the interpretation of affective information on decision making processes. Choices may be evaluated and made based on the attribution of the incidental affect to these options instead of the objective underlying probability of outcomes. This is in line with prospect theory's prediction that individuals select options based on subjective perceptions of underlying probabilities.

ER also influences risk taking behavior in anxious individuals. Risk aversion may be a situation selection or modification ER strategy in anxious individuals, especially when risk averse decision making involves avoidant behavior. In a study directly examining the influence of ER on risk taking, participants were instructed to utilize a particular emotion regulation strategy (i.e., reappraise, suppress, or no instructions) during a fear or disgust mood induction, and then participants completed the BART (Heilman, Crişan, Houser, Miclea, & Miu, 2010). Individuals who were instructed to reappraise took more risks on the BART than participants instructed to suppress or given no particular instructions. The use of cognitive reappraisal under naturalistic conditions also increased risk-taking in individuals who were experiencing a transient negative mood (Heilman et al., 2010). In contrast, the use of expressive suppression did not alter

risk aversion in individuals who were experiencing negative mood states (Heilman et al., 2010). Importantly, risk taking is advantageous on the BART up to a certain point. These results suggest that task performance is improved both in laboratory and naturalistic settings through the use of cognitive reappraisal but not by expressive suppression. Anxious individuals are more likely to use expressive suppression to regulate emotions and less likely to use reappraisal strategies (Amstadter, 2008), which likely contribute to risk aversion in anxious individuals.

Motivational factors may also influence risk averse behavior in anxious individuals. As reviewed earlier, individuals experience greater regulatory fit when there is a match between the goal being pursued and the manner in which the goal is pursued. Regulatory fit enhances the feeling of "rightness" and increases engagement in the goal pursuit (Higgins, 2005). For instance, an individual with a prevention focus will experience greater regulatory fit when they pursue goals in a vigilant or risk averse manner. Direct assessments of RFT on decision making behavior have found that individuals with a promotion focus engaged in more risk taking, whereas individuals with a prevention focus were conservative in their decisions (Crowe & Higgins, 1997). Following experience of a failure on an unsolvable anagram, individuals with a promotion focus were able to count backwards more quickly and found more correct solutions for anagrams presented after the initial failure, compared to individuals with a prevention focus (Crowe & Higgins, 1997). In addition, participants with a prevention focus made choices that guarded errors in performing a task, while individuals with a promotion focus were better at accruing more correct responses on a subsequent recognition memory task (Crowe & Higgins, 1997). More specifically, individuals with a

prevention focus exhibited a more conservative, vigilant response bias by responding "no" (i.e., they have not previously seen the item) to more items in a recognition memory task. In contrast, participants with a promotion focus exhibited a less conservative response bias as they tended to respond "yes" (i.e., they have previously seen the item) to items (Crowe & Higgins, 1997). In summary, a variety of factors such as using incidental affect as information in decision making, reliance on certain ER strategies, and motivational factors underlying anxiety contribute to risk averse behavior in anxious individuals.

Loss Aversion. Anxious individuals also have an increased sensitivity to losses (Mitte, 2007; Mueller et al., 2010) and are more physiologically reactive to losses (Miu et al., 2008). Findings from studies demonstrating decreased loss aversion in patients with amygdala lesions provide indirect evidence for a heightened loss aversion in anxious individuals. That is, if there is a linear relationship between loss-aversion and amygdala activity, one would expect a heightened loss aversion in anxious individuals given the amygdala hyperactivity typically seen in individuals with anxiety disorders and high levels of trait anxiety (Hartley & Phelps, 2012). Increased sensitivity to losses may play a role in increased risk aversion in anxious individuals. For instance, when performing the IGT, individuals with GAD learned more quickly than controls to avoid choices associated with long-term losses and made less selections from high loss decks (Mueller et al., 2010). Thus, individuals with generalized anxiety disorder (GAD) are particularly sensitive to long-term losses (Mueller et al., 2010).

Heightened loss aversion may be due to the increased value anxious individuals give to losses. One study examined decision making in socially anxious individuals in

real-world settings through the use of the cognitive appraisal of risky events (CARE) questionnaire (Kashdan, Collins, & Elhai, 2006). When socially anxious individuals did not expect benefits from risk taking (i.e., risky sexual behavior, aggression), they exhibited significantly less risk taking compared to both socially anxious participants expecting benefits and controls (Kashdan et al., 2006). The exceptionally low risk taking in socially anxious individuals suggests that they are in a "prevention mode" which results in greater significance given to social losses, such as rejection, than social gains, such as positive relationships with others (Kashdan et al., 2006). In summary, studies demonstrate a heightened loss aversion in anxious individuals in both naturalistic and laboratory settings, which suggests that they assign greater significance to losses.

In anxious individuals the curve in the loss domain depicted in Figure 1 may be even steeper. Supporting this prediction, anxiety alters processing of risk and associated reward or costs, which results in skewed evaluations of the actual underlying cost-benefit probabilities in decision making (Paulus & Yu, 2012). Numerous studies demonstrate a tendency to overestimate risk and draw more pessimistic conclusions regarding outcomes in anxious individuals (e.g., Lerner & Keltner, 2001; Mitte, 2007). Individuals with higher levels of fear, as measured by the state domain of the State Trait Anxiety Inventory, made more pessimistic predictions regarding outcomes regardless of whether underlying probabilities of outcomes were known or not (Lerner & Keltner, 2001). Authors suggested that fearful people tend to choose more risk free options in contrast to options that are potentially more rewarding but uncertain, signifying the decreased importance placed on gains as opposed to losses in fearful individuals (Lerner & Keltner, 2001). One study assessed subjective cost ratings individuals made to outcomes of

hypothetical scenarios by instructing participants to rate the probability of negative and positive outcomes happening to themselves or other individuals (Mitte, 2007). Individuals with high trait anxiety estimated the costs of negative events to be higher and expected that they are at greater risk for experiencing negative consequences in comparison to ratings made by participants with low trait anxiety (Mitte, 2007). The tendency to draw pessimistic conclusions regarding outcomes may also be driven by underlying attentional biases. The presence of attentional biases towards threatening information, as well as the tendency to interpret ambiguous and uncertain stimuli and situations as threatening (Hartley & Phelps, 2012), has been established in anxiety (see Bar-Haim et al., 2007 and Cisler & Koster, 2010 for reviews). These negative attentional and interpretation biases are likely involved in the pessimistic perception of outcomes in anxiety (Hartley & Phelps, 2012).

Motivational factors may also play a role in loss aversion in anxious individuals. According to RFT, success in reaching goals is defined by the regulatory focus system. Within the promotion system, a success is defined by achieving gains, and a non-success is defined as not achieving any gains. In contrast, a success within the prevention system is defined as a non-loss, and a failure is defined as a loss (Higgins, 2005). Due to this inherent focus on losses by the prevention system, anxious individuals may be more apt to use the prevention system in pursuing goals. Overall, anxious individuals display a persistent loss aversion and likely give more importance to losses due to biased attention and interpretation biases as well as motivational factors underlying anxiety.

Risk Seeking. In contrast to much of the literature demonstrating a risk aversion in anxiety, some studies have found increased risk taking in anxious individuals. One

laboratory study examined the effect of trait anxiety on performance on the IGT while simultaneously measuring physiological reactions such as heart rate and skin conductance (Miu et al., 2008). The IGT generally rewards risk averse decision making, and the original version is reliant on central cognitive resources. Anxious individuals performed worse on the IGT due to their frequent selection of decks with higher rewards and greater penalties (bad decks). This is in contrast to studies demonstrating decreased risk taking on the IGT in anxious individuals (e.g., Mueller et al., 2010). Reasons for the discrepancy in findings are discussed below. Along with worse performance, anxious individuals exhibited increased physiological responses to advantageous trials associated with punishment (Miu et al., 2008). Thus, there was a disconnection between somatic cues and behavior according to the somatic marker hypothesis (Miu et al., 2008). The somatic marker hypothesis, which suggests that individuals utilize afferent feedback to inform decisions, can aid in understanding physiological contributions to decision making. According to the somatic marker hypothesis, physiological cues are important in conveying information about stimuli to the individual. Individuals who do not attend to or misinterpret these cues due to emotional difficulties (e.g., high trait anxiety; Miu et al., 2008) or lesions to certain brain regions (e.g., ventromedial prefrontal cortex; Bechara, Damasio, Damasio, & Lee, 1999), make disadvantageous choices.

High anxiety individuals experienced greater somatic signals to punishment when performing the IGT (Miu et al., 2008). However, this sensitivity did not lead to better decision making. The authors speculated that heightened anxiety itself may serve as an irrelevant task distractor (Miu et al., 2008). That is, decision making which is reliant on central cognitive functions may be disrupted in anxious individuals because anxiety

detracts them from the task (Miu et al., 2008). Along this line, it is suggested that anxiety takes up analytical/computational processes resulting in difficulties in executive attentional control (Eysenck, Derakshan, Santos, & Calvo, 2007). Findings suggesting that acute anxiety may take up processing resources and result in alterations in decisional processes are also in line with this hypothesis (Starcke & Brand, 2012). Specifically, cortisol may interfere with the functional relationship between the amygdala and the ventromedial prefrontal and orbitofrontal cortex that are involved in reaching advantageous decisions and emotional processing (Starcke & Brand, 2012). ER strategies used by anxious individuals may also interfere with adaptive decision making. Miu and colleagues (2008) posit that propensity to ruminate may result in poor performance due to interference of distracting verbal information resulting from rumination. This verbal interference resulting from rumination may interrupt the ability of anxious individuals to properly learn the reward and punishment contingencies associated with the four decks on the IGT. Thus, although anxious individuals tend to have a bias away from risky decision making, they may also exhibit impaired decision making when they are distracted by task irrelevant information (e.g., their own anxiety symptoms, rumination). Studies have not explicitly examined the moderating influence of the use of rumination or other ER strategies on IGT performance. Accounting for the influence of rumination and other ER strategies may help to understand the discrepancies seen in studies examining the influence of anxiety on IGT performance (Miu et al., 2008; Mueller et al., 2010).

Higher risk taking in anxious individuals has been observed in naturalistic settings. In a study examining risk taking in socially anxious individuals in naturalistic settings, anxious individuals engaged in more risky behavior, such as risky sexual

behavior and aggression, when they expected positive benefits from these behaviors (Kashdan et al., 2006). That is, socially anxious individuals exhibit heightened risk taking when they expect these behaviors will have beneficial effects such as an increase in their social status. Additionally, engagement in risky behaviors may provide anxious individuals with a heightened sense of control. If symptoms of anxiety (e.g., shyness or avoidance) result in distress, the engagement in risk taking may serve as an ER strategy as it represents a stark contrast to usual inhibited behavior. Thus, risk taking may be used as a situation selection or modification ER strategy.

Negative risk taking behavior may also be engaged in as a response modulation ER strategy in anxious individuals. For example, women with panic disorder are at a greater risk for developing alcohol dependence (Merikangas et al., 1998). According to the self-medication hypothesis (Khantzian, 1985), alcohol abuse represents attempts to down-regulate panic symptoms. Similarly, social anxiety disorder is associated with higher prevalence rates of cannabis use disorders (Buckner et al., 2012). Furthermore, individuals with social anxiety disorder transit from using cannabis recreationally to developing problematic cannabis use faster than individuals without social anxiety disorder. Interestingly, individuals with co-occurring social anxiety disorder and cannabis use disorder were more likely to be employed than individuals with social anxiety disorder alone (Buckner et al., 2012). Thus, cannabis use may render symptoms of social anxiety disorder more manageable, in which case socially anxious individuals may utilize substances such as cannabis as a response modulation ER strategy. There is also a higher rate of nicotine abuse in panic disorder. Individuals with panic disorder may use nicotine as an affect regulation strategy, with the expectation that smoking will alleviate aversive

anxiety symptoms (Zvolensky & Bernstein, 2005). However, nicotine abuse may render individuals more likely to experience panic attacks as cessation and withdrawal result in aversive physiological symptoms, and nicotine abuse itself will lead to increased aversive bodily sensations and health problems over the long-term (Zvolensky & Bernstein, 2005). Generally, evidence suggests that maladaptive substance use, which is a form of maladaptive or negative risk taking, is utilized as an ER and experiential avoidance strategy in individuals with anxiety disorders. Negative risk taking results from the expectation that use of certain substances will allow individuals to cope better (Zvolensky & Bernstein, 2005) and the reinforcement provided by greater functionality some individuals are afforded over the short-term through the use of particular substances (Buckner et al., 2012).

Maladaptive and Adaptive Risk Taking.

Negative Risk Taking. Risk taking is often presented in the literature in a negative tone. Negative risk taking is defined by both characteristics of the decision situation (i.e., outcome of the decision) as well as the manner in which the decision is executed (Gullone, Moore, Moss, & Boyd, 2000). For example, drug abuse, risky sexual activities, dangerous driving, and exposing oneself to generally dangerous experiences have clear negative consequences that surpass any potential reward. Although anxious individuals are expected to be risk aversive (Hartley & Phelps, 2012), paradoxical findings demonstrate that some individuals do not actually avoid negative risks in their daily lives as demonstrated by increased aggression and risky sexual activities in some studies by anxious individuals (Kashdan et al., 2006). As discussed previously, engaging in negative risk taking may be an attempt to regulate negative emotions. For instance,

anxious individuals may choose to engage in risky activities as a situation selection or modification ER strategy. Negative risk taking may also be engaged in as a response modification ER strategy, such as greater substance use in individuals with anxiety disorders (Buckner et al., 2012; Merikangas et al., 1998; Zvolensky & Bernstein, 2005). Alternatively, decision making may be impaired by factors associated with heightened anxiety, such as the use of certain ER strategies (e.g., rumination) or hyperarousal. These factors could interrupt cognitive processes leading to impairments in decision making processes such as evaluation of options, learning probabilities, and contingencies of particular outcomes. This interruption in decision making processes may result in increased negative risk taking.

The propensity to engage in negative risk taking, whether as an ER strategy itself or due to impairment in decision making, is likely to be influenced by impulsivity. Impulsivity is associated with greater negative risk taking, as seen in individuals who experience significant difficulties with impulse control (e.g., ADHD, substance use disorders; Fernie, Cole, Goudie, & Field, 2010; Mäntylä, Still, Gullberg, & Del Missier, 2012). When an anxious individual is also highly impulsive, he or she may not exhibit typical risk aversion associated with anxiety but may rather take more risks. For instance, the increased risk taking observed in socially anxious individuals with strong positive expectancies could be due to a higher level of impulsivity in these individuals (Kashdan et al., 2006). Additionally, interference in cognitive decision making processes in anxious individuals who are impulsive may result in higher negative risk taking. This may be especially significant in comparison to non-impulsive anxious individuals, who are more

likely to engage in a very low degree of both positive and negative risk taking (Kashdan et al., 2006).

Positive Risk Taking. Risk taking can be advantageous (i.e., positive risk taking) when behavior is socially acceptable and the possibility of negative outcomes is relatively low (e.g., loss of a small amount of money) with potentially high payoffs. Positive risk taking has been defined in mental health care service as making decisions that sometimes entail heightened short term risks but lead to long-term positive outcomes (Morgan, 2004). While avoidance of positive risks may underlie maintenance of anxiety disorders (Muris, Mayer, & Schubert, 2010), positive risk taking has not yet been differentiated from negative risk taking empirically.

Positive risk taking is an important and often central component of treatment for anxiety disorders (e.g., exposure to situations on a fear hierarchy). Similarly, a person deciding to receive exposure therapy for anxiety disorders, such as prolonged exposure (PE) for PTSD (Foa & Kozak, 1986), in and of itself represents positive risk taking. PE entails exposure to a trauma narrative, which is associated with the short-term risk of increased distressing emotions and cognitions and heightened physiological arousal. PE's short-term risk is offset by the longer-term benefits of increasing habituation to the traumatic event, which decreases the potency of distressing emotional, cognitive, and physiological symptoms and results in an overall reduction of PTSD symptoms (e.g., Rauch et al., 2009).

Behavior that is generally regarded as socially acceptable, such as high risk sports and activities that involve competition, and is not associated with the severity or increased likelihood of adverse outcomes present in negative risk-taking is considered to

be positive risk taking (Gullone et al., 2000). As is true of thrill-seeking, positive risk taking must involve some aspect of threat to the individual. Courage or bravery captures both the inherent risk in a given situation and the tendency to approach that situation despite the risk and, thus, can be considered as positive risk taking. Courage has been defined as approach behavior while simultaneously experiencing fear (Rachman, 1984). Importantly, courage may interfere with the development of anxiety disorders (Muris et al., 2010). Although courage and bravery are relatively understudied, they have been assessed empirically in relation to decision making and anxiety. One study examined association between courage, self-reported actions taken in the real-world, and anxiety in children (Muris et al., 2010). Courage, assessed with the Courage Measure for Children (CM-C), was positively correlated with reports of courageous behavior and parent reports of the child's level of courage. Courage as measured by the CM-C was also negatively correlated with anxiety. Although not often directly recognized, courage is an essential component in the treatment of anxiety disorders, as therapists routinely ask their clients to engage in activities (e.g., exposure to a feared stimulus) which require courage as part of treatment (Rachman, 1984). Therefore, courage and bravery have significant relations to anxiety and could guide the assessment of positive risk taking.

Given that individuals with anxiety may not always avoid certain negative risks, delineation of positive risk taking and its relation with anxiety is a critical gap in the current literature. Understanding contributions of ER and RF on propensity to avoid or approach both negative and positive risks in anxiety will also increase understanding of the nature of risk taking behavior in anxiety.

Hypotheses

1. Based on previous findings demonstrating greater risk aversion in anxious populations (Maner et al., 2007; Mitte, 2007; Raghunathan & Pham, 1999), it is expected that AS levels will be associated with avoidance behaviors on laboratory decision making tasks. The BART, IGT, and a passive avoidance task will be utilized to assess decision making in the laboratory.
    a. On the BART, where some risk taking is advantageous, AS levels are predicted to be positively associated with more avoidant behavior in this task. (i.e., worse performance on the BART). It is also expected that there will be an interaction between AS and regulatory focus for overall success on the task (i.e., the sum collected). Specifically, individuals with low AS scores will perform particularly well on the BART when they exhibit a promotion focus. This prediction was supported by a pilot study using the BART and likely signifies a match between motivational goals and personality traits.
    b. In general, it is expected that AS will be positively associated with performance on the IGT. However, given prior studies demonstrating impaired decision making on the IGT in anxious individuals, performance is expected to be dependent on an interaction between levels of AS and rumination, which may serve as a distractor. Specifically, the relation between AS and performance on the IGT is predicted to be moderated by the tendency to ruminate. Higher AS levels are expected to be associated with worse performance in individuals with high levels of rumination.

c. In a passive avoidance task, AS is expected to be positively associated with a higher amount of errors associated with withholding a response to a rewarding stimuli (i.e., omission errors). AS level is also expected to be negatively associated with responding to punishing stimuli (i.e. commission errors). Additionally, it is predicted that the relation between the overall points earned on the task and AS levels will be moderated by RF. Specifically, higher AS levels are expected to be associated with relatively less earnings on the task especially in individuals who have higher prevention levels due to a focus on losses as opposed to gains.

2. A naturalistic decision making diary, which will take place over the course of seven days, will be utilized to examine negative and positive risk taking behaviors in the real-world in the same individuals who completed the laboratory tasks. The following predictions are made:

    a. Higher AS levels are predicted to be associated with decreased positive risk taking. In addition, high levels of AS will be associated with greater expected negative consequences from engaging in positive risk taking.

    b. It is hypothesized that high AS individuals will engage in increased negative risk taking when they endorse strong positive expectancies from engaging in the behavior. In addition, the tendency to use maladaptive ER strategies (i.e., expressive suppression) and trait impulsivity is expected to moderate the relationship between AS and propensity to take negative risks. In particular, AS will be positively associated with negative risk

taking in individuals who endorse greater use of expressive suppressive and have higher levels of trait impulsivity.

3. Associations between decision making in the laboratory and in naturalistic settings will be examined.
    a. Individuals who demonstrate less risk taking behavior on the BART and passive avoidance laboratory tasks will also be less likely to engage in positive risk taking in naturalistic settings. Further, it is predicted that AS will moderate the relationship between positive risk taking in laboratory and in naturalistic settings. Specifically, the relationship between positive risk taking behavior in the laboratory and naturalistic settings is expected to be particularly strong in individuals with higher levels of AS, with these individuals engaging in exceptionally low levels of risk taking.
    b. Individuals who display more risk taking behavior on the IGT will also display more negative risk taking behavior in naturalistic settings. It is expected that the relations between naturalistic and laboratory behavior settings will be moderated by either AS or impulsivity. There are no studies examining these relationships; therefore, no formal predictions will be made regarding the nature of these relationships.

CHAPTER 2

METHOD

Participants

Participants were 120 men and women ages 18 and over. Based on pilot testing, there was a 12% attrition rate from the diary portion of the study. Therefore, to obtain a sample size of 120 participants with complete data for both laboratory and diary portions of the study, a total of 135 participants were recruited. All participants were recruited from undergraduate psychology courses at the University of Maine. Individuals who were enrolled in courses that required completion of some form of research participation were sent the following email:

Dear Students,

I am inviting you to participate in my research study, Decision Making, which will investigate decision making processes both in and outside of the laboratory. For the initial session, you will complete computer tasks and questionnaires in a laboratory in Little Hall. This session will take approximately 1 hour. Following this session, you will be asked to complete questionnaires assessing daily decision making over the course of a week, starting on the nearest Monday. Daily questionnaires will take approximately 10-15 minutes each day to complete. You will receive 2 credits of research participation for completion of all study procedures. You will also receive $5 if you complete all 7 days of the daily decision making questionnaires. You must be 18 years of age or older to participate in this study without parental consent. If you are interested in

participating, please log on to Sona (umaine.sona-systems.com) and sign up for a timeslot for the Decision Making study.

Thank you,

Amanda Kutz

The study was posted to Sona, an online experiment management system. Participants signed up for the study online. Those who are 18 years and older were eligible to participate. Individuals who were under 18 years of age were required to provide parental consent if they wished to participate.

Measures

Anxiety Sensitivity Index-3 (ASI-3). The ASI-3 (Taylor et al., 2007; Appendix B) is an 18-item self-report measure, which assesses an individual's level of fear or anxiety to his or her own anxious sensations. Participants rate items on a 5-point Likert-type scale ranging from 0 (*very little*) to 4 (*very much*). The ASI-3 assesses sensitivity to anxiety symptoms across three domains: Physical Concerns (e.g., "It scares me when my heart beats rapidly*"),* Social Concerns (e.g., "I worry that other people will notice my anxiety"), and Cognitive Concerns (e.g., "When I feel 'spacey' or spaced out, I worry that I may be mentally ill").

The ASI-3 represents a revision of the original 16-item ASI (Reiss et al., 1986) , which reportedly consists of the same three factors (i.e., physical, social, and cognitive concerns). However, this 3-factor structure has not been consistently found across studies (Richard E Zinbarg, Mohlman, & Hong, 1999), which raised a need for a revised measure that can adequately assess AS as a multifactor construct (Taylor et al., 2007). The Social and Cognitive Concerns subscales in the original measure contained only four items each,

and it was unclear whether these items had a high degree of content validity (Taylor et al., 2007). Measures with low number of items could negatively impact reliability (Nunnally & Bernstein, 1994). Additionally, a large amount of measurement error in trait-like constructs has been attributed to low content validity (Nunnally & Bernstein, 1994). To address these issues, the 36-item ASI-R (Taylor & Cox, 1998a) and 60-item Anxiety Sensitivity Profile (Taylor & Cox, 1998b) were developed. However, both measures have unstable factor structures, similar to the original ASI (Deacon, Abramowitz, Woods, & Tolin, 2003; Zvolensky et al., 2003). The ASI-3 was constructed by taking items from the ASI-R which assessed each of the three domains of the ASI (i.e., physical, cognitive, and social), with the overall goal of establishing an efficient measure of AS across all three domains (Taylor et al., 2007).

Items from the original version of the ASI with a high level of content validity were included in the ASI-3. Content validity was defined as items that "unambiguously corresponded to only one of the domains of physical, cognitive or social concerns" (Taylor et al., 2007, p. 178). All three domains are assessed by six items each in the ASI-3. Factor analyses of the ASI-3 revealed that three-factor model fit the data better than a one- or two-factor model. Furthermore, the 3 factor structure of Physical, Social, and Cognitive Concerns is more stable in the ASI-3 than the original ASI. Cronbach alpha coefficients for the Cognitive and Social Concerns subscales were larger compared to the original ASI (Taylor et al., 2007). Although three factors were highly correlated to each other, inter-item correlations within each subscale were much higher (range: α = .75-.93) than correlations between scales (range: α = .45- .78) suggesting related, but distinct, subscales (Taylor et al., 2007).

The construct of AS has been extensively implicated in greater risk for the development of anxiety symptomology, and individuals with a wide range of clinical anxiety disorders, panic disorder in particular (Schmidt & Cook, 1999), exhibit elevations in AS. AS is prospectively associated with the occurrence of panic attacks (McNally, 2002; Schmidt et al., 1999), which may be due to the preponderance of items assessing Physical Concerns on the original ASI where 8 of the 16 items assess this domain (Taylor et al., 2007). However, Cronbach alpha coefficients for the Physical Concerns domain were not significantly lower in the ASI-3 (nonclinical: $\alpha = .79$, clinical: $\alpha = .86$) compared to the original ASI (nonclinical: $\alpha = .83$, clinical: $\alpha = .89$). Due to its relatively new inception, the ASI-3 has not been used as extensively as the original ASI. However, recent studies demonstrated the utility of the subscales in predicting unique variance in anxiety and depressive symptoms. Physical Concerns have consistently predicted unique variance in panic attacks, while Social Concerns predicted levels of social anxiety (Olthuis et al., 2014; Taylor et al., 2007). Cognitive Concerns have been associated with depression (Olthuis et al., 2014), panic disorder, and GAD (Taylor et al., 2007), suggesting that this domain may be associated with more generalized negative affect than anxiety specifically. The ASI-3 was utilized in the current study as a continuous measure of AS across 3 domains (i.e., physical, social and cognitive). The ASI-3 had high internal consistency ($\alpha = .91$).

State-Trait Anxiety Inventory-Trait Version (STAI-T). The STAI-T (Spielberger, Gorsuch, & Lushene, 1970; Appendix B) is a 20-item scale that assesses levels of trait anxiety in an individual. Ratings are made on a 4-point Likert-type scale (1= *almost never* to 4= *almost always*). Only the Trait inventory was used in the current

study. Research has shown good reliability and validity for the STAI-T (van Knippenberg, Duivenvoorden, Bonke, & Passchier, 1990). Trait anxiety was assessed to examine if AS had any predictive value for decision making concurrently or over trait anxiety as measured by the STAI-T. Internal consistency for the STAI-T was adequate (α = .83).

Social Phobia Scale (SPS). The SPS (Mattick & Clarke, 1998; Appendix B) is a 20-item questionnaire assessing current symptoms of social phobia. Responses are made on a 5-point Likert scale (0= *not at all typical of me* to 4= *extremely typical of me*). The SPS has high internal consistency (α = .94) and high test-retest reliability (*r* = .93). The SPS has been shown to have high convergent validity with other anxiety measures and high predicative validity of problems associated with social phobia. Additionally, concurrent validity with other scales of social anxiety has been established (Brown, Turovsky, Heimberg, Juster, & et al, 1997). The SPS was used to examine relations between social phobia and laboratory-based and naturalistic decision making. Reliability for the SPS was strong (α = .93).

Behavioral Inhibition/Activation Scale (BIS/BAS). The BIS/BAS (Carver & White, 1994; Appendix B) is a 24-item scale measuring behavioral inhibition (i.e., system which regulates aversive motives) and activation (i.e., system which regulates appetitive motives). Ratings are made on a 5-point Likert scale (0= *quite untrue of you* to 4= *quite true of you*). The BIS/BAS has high reliability, and each subscale has high convergent validity (Yu, Branje, Keijsers, & Meeus, 2011). BIS scores are highly correlated with internalizing problems such as anxiety and depression, whereas BAS scores are highly correlated with externalizing problems and extraversion (Yu et al., 2011). This

questionnaire was included in the study to test for predicted associations between risk-aversion and behavioral inhibition and risk-taking and behavioral activation. The BIS/BAS measure, which includes approach and avoidance scales, was used as the measure of motivation in analyses, replacing the RFQ, due to reliability issues with the RFQ (see below). Subscales of the BAS and the BAS total score were used as a proxy of promotion focus as both BAS and promotion focus assess approach motivation. The BIS scale was used as a proxy of prevention focus as both BIS and prevention focus assess avoidance motivation. The BAS consists of three subscales: BAS drive, reward responsiveness, and fun seeking. Reliability for BAS drive ($\alpha = .80$), reward responsiveness ($\alpha = .80$), and fun seeking ($\alpha = .71$) were adequate. Internal consistency for the BAS composite score was high ($\alpha = .85$). Internal consistency for the unitary BIS scale was also high ($\alpha = .81$).

Center of Epidemiology Survey- Depression (CES-D). The CES-D (Radloff, 1977; Appendix B) is a 20-item questionnaire aimed at assessing depressive symptoms in the past two months on a 4-point Likert scale (0= *rarely* to 3= *most of the time*). The CES-D was developed to assess for depression in the general population (Radloff, 1977). High internal consistency ($\alpha = .85$- .90; Radloff, 1977) and adequate test-retest reliability ($r = .51$ - .67; Radloff, 1977) have been found. The CES-D has good criterion validity as scores on the CES-D have been correlated with other measures of depression (Beekman, Deeg, Limbeek, & Braam, 1997). Depressive and anxious symptoms often co-occur; thus, the CES-D was used to ensure that differences in decision making were not confounded by depressive symptoms. In the current sample, Cronbach's alpha was acceptable ($\alpha = .72$).

Ruminative Responses Scale (RRS). The RRS (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Appendix B) is a 22-item questionnaire which assesses an individual's self-reported tendency to engage in rumination. This version of the RRS represents a shortened version of the original 32-item Response Styles Questionnaire (RSQ). A two-factor structure was found for the measure: Brooding, which is described as "passive comparison of one's current situation with some unachieved standard" and reflection, which is described as "purposeful turning inward to engage in cognitive problem solving" (Treynor et al., 2003, pp.256). Brooding is associated with more concurrent and long-term depressive symptoms, whereas reflection is associated with more depressive symptoms concurrently but less depressive symptoms over time (Treynor et al., 2003). The RRS has high internal consistency ($\alpha = .85$) and adequate test-retest reliability for the Brooding ($r = .62$) and Reflection ($r = .60$) subscales (Treynor et al., 2003). The 22-item RRS was used in the current study because the tendency to ruminate is associated with anxiety symptomology and was hypothesized to impact decision making in and outside of the laboratory. Internal consistency of the RRS was high ($\alpha = .94$).

Emotional Regulation Questionnaire (ERQ). The ERQ (Gross & John, 2003; Appendix B) is a 10-item measure assessing individual differences in the use of two well-defined emotion regulation strategies: Cognitive reappraisal and expressive suppression. Participants rate items on a 7-point Likert-type scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Both the cognitive reappraisal factor and the suppression factor have good internal consistency ($\alpha = .79$ and .73 respectively) and adequate test-retest reliability ($r = .69$). The reappraisal factor has convergent validity with reinterpretation coping strategies, while the suppression factor is negatively associated with the use of

venting as a coping strategy (Gross & John, 2003). Furthermore, negative mood is negatively related to reappraisal and positively related to suppression. The ERQ was included in the present study to assess the moderating role of suppression and reappraisal in anxiety and decision making. Internal consistency for the cognitive reappraisal subscale was good (α = .81) and acceptable for the suppression subscale (α = .76).

Regulatory Focus Pride (RFQ). The RFQ (Higgins et al., 2001; Appendix B) is an 11-item measure assessing strength of self-reported promotion or prevention regulatory pride and contains two subscales: Promotion and Prevention. The promotion subscale assesses history of success with promotion goals (i.e., goals involving achievement or advancement) while the prevention subscale assesses subjective success with prevention goals (i.e., goals involving safety or protection). Both the promotion and prevention scales have good internal consistency (α = .73 and .80) and adequate test-retest reliability (*r* = .79 and .81 respectively). The promotion and prevention scales are independent of one another (Higgins et al., 2001). In terms of construct validity, the promotion scale is positively related to 'Reward Responsiveness' and 'Fun Seeking' factors of the behavioral activation system while the prevention scale has a negative association with 'Fun Seeking' (Higgins et al., 2001). In addition, individuals using a promotion focus are more inclined to use approach eagerness in achieving task goals, whereas individuals using a prevention focus are more apt to use avoidant vigilance in achieving the same goals (Higgins et al., 2001). The RFQ was used to assess the predicted interaction effect between regulatory focus, anxiety, and decision making. The promotion scale of the RFQ had poor internal consistency (α = .51) and the prevention scale of the RFQ had good internal consistency (α = .73). Both the promotion and the

prevention scales of the RFQ have a low number of items (*n* = 6 and *n* = 5, respectively), likely contributing to the low reliability. Due to this low reliability, an alternate measure of motivation was used in all subsequent analyses involving motivation (specifically, the BIS/BAS scale).

Intolerance of Uncertainty Scale- Short Form (IUS-12). The IUS-12 (Carleton, Norton, & Asmundson, 2007; Appendix B) is a short-form of the original Intolerance of Uncertainty Scale. The 12-item measure assesses responses to ambiguous and uncertain situations on a 5-point scale (1= *not at all characteristic of me* to 5= *entirely characteristic of me*). The IUS-12 has strong convergent and divergent validity as well as high internal consistency (Carleton et al., 2007). Factor analyses have revealed three distinct subscales: Intolerance of Uncertainty, Prospective Anxiety and Inhibitory Anxiety. This measure was utilized in the present study to assess relations between intolerance of uncertainty and risk-taking. Internal consistency for the Intolerance (α = .91), Prospective Anxiety (α = .84), and Inhibitory Anxiety (α = .87) subscales, as well as the overall composite score (α = .96) were all strong.

Barratt Impulsiveness Scale-11 (BIS-11). The BIS-11 (Patton, Stanford, & Barratt, 1995; Appendix B) is a 30 item measure assessing the personality and behavioral construct of impulsivity. This is an entirely distinct measure from the BIS scale of the BIS/BAS scales described above. Items are scored on a 4-point Likert scale (1= *rarely/never* to 4 = *almost always/always*). The original BIS measure has been revised many times, and the BIS-11 represents the most updated and psychometrically sound version of the measure (Stanford et al., 2009). Three overarching factors have been determined through the various revisions: Motor Impulsiveness, Non-planning

Impulsiveness, and Attention Impulsiveness. The total score has good internal consistency (α = .83). Additionally, the scale has good convergent validity with measures assessing similar constructs (e.g., reward responsiveness, thrill-adventure seeking) and discriminant validity with expected measures (e.g., inhibition) (Stanford et al., 2009). The BIS-11 was used in this study as risk-taking is associated with impulsivity. Internal consistency of the BIS-11 total scale was high (α =.83). The BIS-11 consists of three subscales: attentional impulsivity, non-planning impulsivity, and motor impulsivity. Internal consistency for attentional impulsivity (α = .66), non-planning impulsivity (α = .63) and motor impulsivity (α = .69) were all questionable. Therefore, only the BIS-11 total score was used as a measure of impulsivity.

Galassi College Self-Expression Scale (College Self-Expression Scale). The College Self-Expression (Galassi, Delo, Galassi, & Bastien, 1974; Appendix B) scale is a 50 item self-report questionnaire designed to measure assertiveness in college students. Items are rated according to how an individual behaves in situations on a 4-point scale (0= *almost always* to 4= *never or rarely*). High scores indicate more assertive behavior. Studies have demonstrated convergent validity with other assertiveness measures and have also shown that the College Self-Expression Scale uniquely includes a factor measuring positive assertion, or open expression of positive emotions and attitudes (Henderson & Furnham, 1983). Many of the questions that I added to the Cognitive Appraisal of Risky Event Questionnaire (CARE; Fromme, Katz, & Rivet, 1997, discussed in depth below) assess positive risk-taking, which may tap into the construct of assertiveness. Therefore, this questionnaire was utilized to assess convergent validity

between assertiveness and positive risk-taking. For the present sample, Cronbach's alpha was .85, indicating good internal consistency.

Diary Measures

Cognitive Appraisal of Risky Events Questionnaire (CARE). The CARE (Fromme et al., 1997; Appendix D) questionnaire was utilized to assess risk taking behavior across six domains in young adult populations. These domains include, Illicit Drug Use, Aggressive and Illegal Behaviors, Risky Sexual Activities, Heavy Drinking, High Risk Sports, and Academic or Work Behaviors which have been identified through factor analyses (Fromme et al., 1997). Individuals rate their involvement in these activities, expected benefits of involvement, and expected risks of involvement in 30 activities falling into one of these six domains (Fromme et al., 1997). Expected benefits are rated on a 7-point Likert scale (i.e., 1 = *not at all likely* to 7 = *extremely likely*) that they would experience some positive consequence as a result of engaging in each activity. Expected risks are also rated on a 7 point Likert-type scale (i.e., 1 = *not at all likely* to 7 = *extremely likely*) that they would experience some negative consequence as a result of their involvement in each activity.

The questionnaire was adapted in the following two ways. First, participants rated activities in the past 24 hours, instead of past six months. Participants simply rated whether they engaged in each activity (i.e., a "yes" or "no" response) as opposed to rating the number of times they engaged in the activity as in the original questionnaire. Second, 13 items assessing positive risk taking were added to assess positive dimensions of risk taking. These 13 items were adapted from a measure assessing courage in children, the Courage Measure for Children (CM-C; Muris et al., 2010).

Reliability was assessed for all subscales. Overall negative risk behavior (α = .78) and academic/work behaviors (α = .81) showed high internal consistency. Illicit drugs use (α = .69), illegal and aggressive behaviors (α = .65), risky sexual behaviors (α = .52), heavy drinking (α = .41) and high risk sports (α = .69) showed acceptable to poor internal reliability. Several factors might have contributed to low reliability of these subscales. In particular, a low number of items (e.g., for heavy drinking, *n* = 3) and low base rates of certain negative risk taking behavior (e.g., risky sexual behaviors) may have negatively affected reliability. In accordance with previously established guidelines (Kline, 2005), only subscales with reliability rates of greater than or equal to .70 (i.e., overall negative risk behaviors and academic/work behaviors) were used independently in analyses. However, all subscales were included to compute a composite score.

Positive and Negative Affect Scale (PANAS). The PANAS (Watson, Clark, & Tellegen, 1988; Appendix D) is a 20-item questionnaire developed to assess current affect. Items are rated on a 5-point Likert-type scale (i.e., 1= *very slightly* or *not at all* to 5 = *extremely*) based on the extent to which the participant is experiencing different emotions at the current time. Reported Cronbach's alpha coefficients have been high for both the Positive Affect scale (α = .86 - .90) and the Negative Affect Scale (α = .84 - .87). Test re-test correlations for an 8-week period range from .47-.68 for Positive Affect and .39-.71 for Negative Affect, reflecting the variability of mood across time (Watson et al., 1988). The PANAS was administered prior to each computerized decision making tasks as well as daily along with the adapted CARE questionnaire to assess for the influence of positive and negative affect states on daily decision making.

Computer Tasks

Each task involves earning points or virtual money. Participants were informed prior to beginning the first task that any points or money earned in the task would be virtual and that there would be no actual cash prize based on their earnings in these tasks. However, to increase incentive and motivation to do well, they were informed that individuals who perform better than average on these tasks would be entered into a raffle to win one of two $20 Amazon gift cards. In actuality, all participants were entered into this raffle and they were informed of this deception at the end of the study (see Debriefing Script, Appendix E).

Balloon Analogue Risk Task (BART).

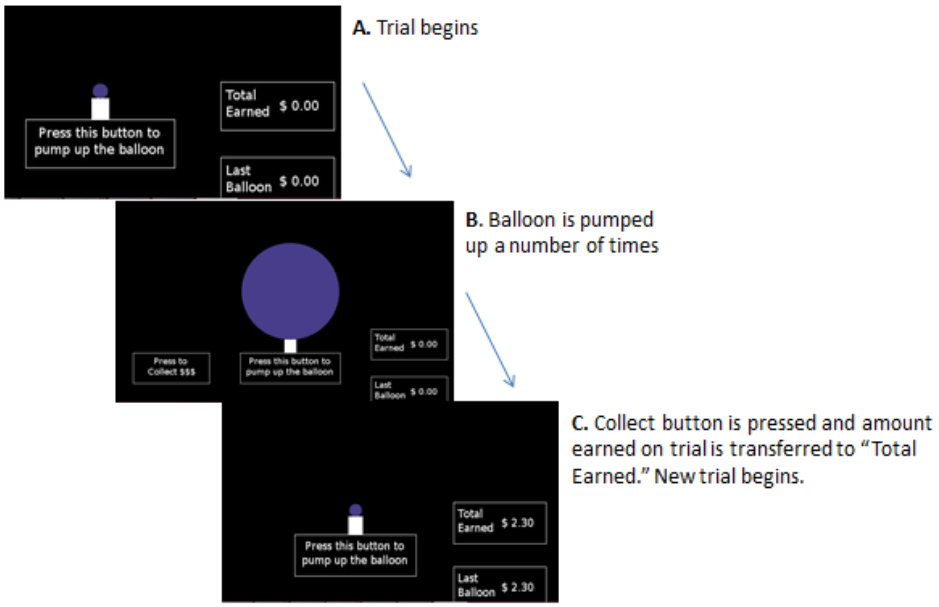
BART: Psychometrics. The BART (Lejuez et al., 2002) is a computerized task that is a reliable and valid measure of risk taking (e.g., Fernie et al., 2010; Lejuez et al., 2002). Performance on the BART is associated with real-world risk taking behaviors. Specifically, risk taking as measured by BART performance is significantly associated with alcohol use, including level of use and problems related to alcohol use (Fernie et al., 2010). Delinquency and engaging in behaviors which are dangerous to one's health (e.g., substance use) is also related to BART performance in adolescents, specifically taking more risks on earlier trials in the task when contingencies are more unknown (Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006). Risk taking on the BART is also dissociable from similar constructs, such as personality traits of impulsivity and sensation seeking. For example, BART performance was associated with substance use above and beyond trait impulsivity and sensation seeking (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005). Of importance to the current investigation, anxious individuals

show avoidance of risk taking on the BART compared to individuals experiencing other forms of negative affect (e.g., depression; Maner et al., 2007). Relations between risk taking on the BART, anxiety, motivation, and emotion regulation were examined. Additionally, to test whether this task may be a proxy of positive risk taking in the real world, relations between performance on the BART and positive risk taking in naturalistic settings (as assessed by the decision making diary) were explored.

BART: Procedure. In this task, participants are instructed to inflate a virtual balloon presented on the computer screen. The display contains this balloon, a reset button labeled *Collect $$$*, a box showing permanent money-earned, labeled *Total Earned*, and money earned on the last balloon, in a box labeled *Last Balloon* (see Figure 2). Participants were informed that they would earn virtual money by inflating the balloon. On each trial, individuals earned an increasing amount of money in a temporary bank as they pumped up the virtual balloon. Each balloon pump is worth 5 virtual cents. Participants were informed of this; however, the money in their temporary bank was not visible to them. Participants were informed that they may transfer money earned in their temporary bank over to their permanent bank (displayed as *Total Earned*) at any point during each trial by clicking on the *Collect $$$* button. They were also informed that each balloon would explode at a certain threshold. The explosion threshold changed on a trial-by-trial basis, which participants were not explicitly informed of. On trials where the balloon exploded, no virtual money was earned. Thus, with each click to inflate the balloon, there was an increased chance of gaining more virtual money as well as an increased risk of the balloon exploding. Each trial ended when the participant clicked on the *Collect $$$* button eliciting a slot machine sound effect, or when the balloon

exploded eliciting a “pop” sound effect, depending on whichever of these events came first. Participants were re-informed at the beginning of this task that the “money” that they were earning in this task is virtual and that there was no cash prize for any of the money earned.

Figure 2. BART Task.



Several factors can vary in the BART. First, the number of trials may vary. Research has shown that 10 trials produce sufficient reliability and 11 and above trials produce good reliability. Versions of the BART containing 30 and 90 trials were tested to assess how well BART performance models risk taking behavior (Wallsten, Pleskac, & Lejuez, 2005). This study found no differences in reliability measures between a version of the task involving 30 trials compared to one using 90 trials (Wallsten et al., 2005). The current study utilized the 90 trial version in order to obtain more data per subject.

Although the 30 trial version is often used in favor of the 90 trial version for the sake of time constraints, a pilot study using the 90 trial version of the task found that the task took 15 minutes to complete (Kutz & Yoon, in preparation). Another variable often manipulated in the BART is the level of reward in the task. Pumps may be programed to be worth either 1 cent, 5 cents or 25 cents. Studies have demonstrated that the reward structure does not affect behavior of highly impulsive individuals, but does affect behavior of individuals low in trait impulsivity in that these individuals are increasingly less likely to take risks as the reward level increases (White, Lejuez, & de Wit, 2008).

Several outcome measures of interest were be used for analytical purposes on the BART. These included the sum collected, adjusted average pumps, and sum of balloon bursts. The *sum collected* is the total amount of virtual money earned on the BART and is a measure of task success. The *adjusted average pumps* is the average amount of balloon pumps on unexploded balloons and is a measure of risk taking behavior with more pumps indicating more positive risk taking. The *sum of balloon bursts* is the amount of balloon bursts throughout the task and is also a measure of risk taking with more balloon bursts being indicative of more negative risk taking.

The BART was run through the program PEBL (Psychology Experiment Building Language; Mueller & Piper, 2014). Participants were given the following instructions prior to completing the BART:

> *Throughout the task, you will be presented with 90 balloons, one at a time. For each balloon you can click on the button labelled 'Press This Button to Pump Up the Balloon' to increase the size of the balloon. You will accumulate 5 cents in*

a temporary bank for each pump. However, you will not be shown the amount you have accumulated in your temporary bank.

At any point, you can stop pumping up the balloon and click on the button labelled 'Collect $$$'. Clicking this button will start you on the next balloon and will transfer the accumulated money from your temporary bank to your permanent bank labelled 'Total Earned'. The amount you earned on the previous balloon is shown in the box labelled 'Last Balloon'.

It is your choice to determine how much to pump up the balloon, but be aware that at some point the balloon will explode. The explosion point varies across balloons ranging from the first pump to enough pumps to make the balloon fill the entire computer screen. If the balloon explodes before you click on 'Collect $$$', then you move on to the next balloon and all money in your temporary bank is lost. Exploded balloons do not affect the money accumulated in your permanent bank.

There is NO cash prize for virtual money earned in the task. However, individuals who perform better than average across the computer tasks will be entered in a lottery to win one of two $20 amazon gift cards. Do you have any questions? Press any key to begin.

Iowa Gambling Task (IGT).

IGT: Psychometrics. The IGT (Bechara, Damasio, Damasio, & Anderson, 1994) is a commonly used paradigm to assess decision making under uncertain conditions in a manner that simulates real-life decision making. Performance on the IGT was originally assessed in individuals with ventromedial prefrontal cortex (VMPFC) lesions and

individuals with amygdala damage, while somatic signals (i.e., skin conductance) were measured. The amygdala and VMPFC are both involved in mediating the activation of somatic states (Bechara et al., 1994; Bechara & Damasio, 2005). These investigations showed that disruption of either of these areas was detrimental to adaptive decision making but did not impact overall intellectual functioning (Bechara et al., 1994; Bechara & Damasio, 2005), That is, these individuals tended to consistently choose options which yielded long-term losses as opposed to options which yielded long-term gains. Normal controls exhibited somatic signals when receiving rewards and punishments and, as they gained experience with the task, exhibited anticipatory signals prior to the selection of a deck. Individuals with VMPFC damage exhibited somatic signals to receiving rewards and punishments similar to controls. However, they did not exhibit anticipatory somatic signals. Individuals with amygdala damage did not show any somatic signals throughout the task (Bechara & Damasio, 2005). Taken together, these findings support the somatic marker hypothesis, which proposes a mechanism by which emotions influence decision making behavior. The somatic maker hypothesis predicts that decision making deficits are due to problems integrating somatic makers (e.g., skin conductance) and cognitive reasoning abilities as seen by the decision making difficulties and integration of somatic signals in individuals with VMPFC or amygdala damage (Bechara et al., 1994).

No studies have directly examined reliability of the IGT. However, learning effects are observed in general upon repeated use of the IGT (e.g., Ernst et al., 2003a; Lejuez, Aklin, Zvolensky, & Pedulla, 2003), with the exception of adolescents with behavior disorders who fail to show learning effects with repeated administration (Ernst, et al., 2003b). Based on evidence from the extensive studies using the IGT in clinical and

non-clinical populations, the IGT is considered to assess emotion-based decision making, given the importance of integration of somatic signals in adaptive decision making on the task (Buelow & Suhr, 2009). Importantly, in clinical populations, worse performance on the IGT is associated with personality traits such as sensation seeking and impulsivity (Buelow & Suhr, 2009). Additionally, some studies have found that negative affect, high trait anxiety, and depression are all associated with poor performance on the IGT (Miu et al., 2008; Must et al., 2006; Suhr & Tsanadis, 2007).

Examining associations between personality traits and connection with real-world risk taking have been identified as areas that need further research (Buelow & Suhr, 2009), both of which were addressed in the current project. Relations between anxiety, motivation, and emotion regulation were examined in the context of performance on this task. In addition, to explore if poor performance on this task is a proxy of negative risk taking in real-world settings, relations between performance on the IGT and negative risk taking in naturalistic settings (as assessed by the decision making diary) were explored as well.

IGT: Procedure. In the IGT, participants were presented with four decks of cards on the computer screen and were instructed to choose cards from these decks. Participants were informed that each time they chose a card, they would gain virtual money. However, on certain draws they would simultaneously lose a small or large amount of points. The frequency of loss and the amount of the loss depends on the deck selected. Some decks are "bad decks" and would lead to overall losses, whereas other decks are "good decks" and led to overall gains. In this version of the task, decks were numbered 1-4, and the deck itself was represented by a blank box. On each turn, for

example, choosing from decks 1 and 2 resulted in a reward of $100 whereas choosing from decks 3 and 4 resulted in a reward of $50. Selecting decks 1 and 2 resulted in higher penalties (e.g., $1000) such that choosing from these decks consistently resulted in a net loss. Therefore, decks 1 and 2 were considered "bad decks" (Figure 3). Conversely, decks 3 and 4 resulted in lower penalties (e.g., $50) such that choosing from these decks consistently resulted in a net gain. Decks 3 and 4 were thus considered "good decks" (Figure 4). Good and bad decks were counterbalanced to control for any confounding influence of deck order on decision making. Participants were re-informed at the beginning of the task that the "money" which they were earning in the task is virtual. Importantly, no differences in performance have been found when participants are playing for real versus virtual rewards (Bowman & Turnbull, 2003). The outcome measure of interest was the *sum collected* which was total virtual money collected at the end of the task. Greater *sum collected* amounts indicated better task performance and less risk taking.

Figure 3. IGT: Four Trials Selecting from a Bad Deck.

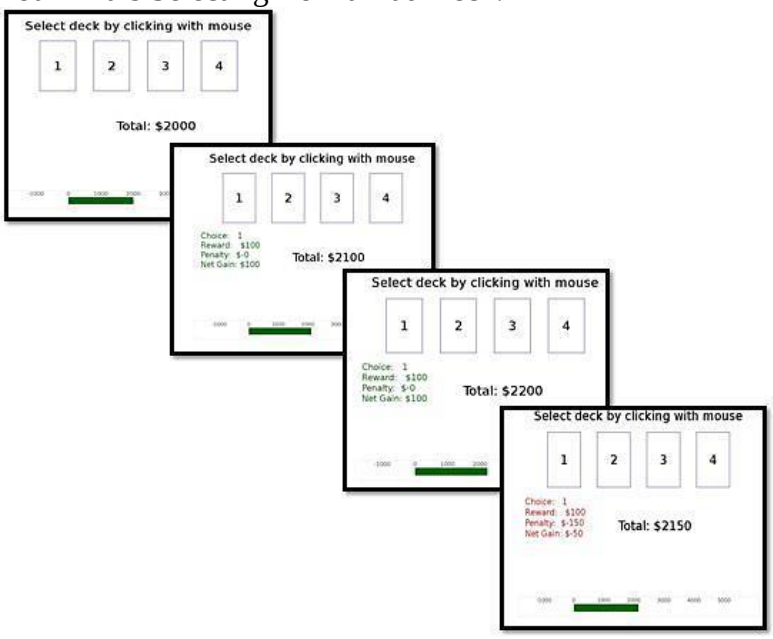
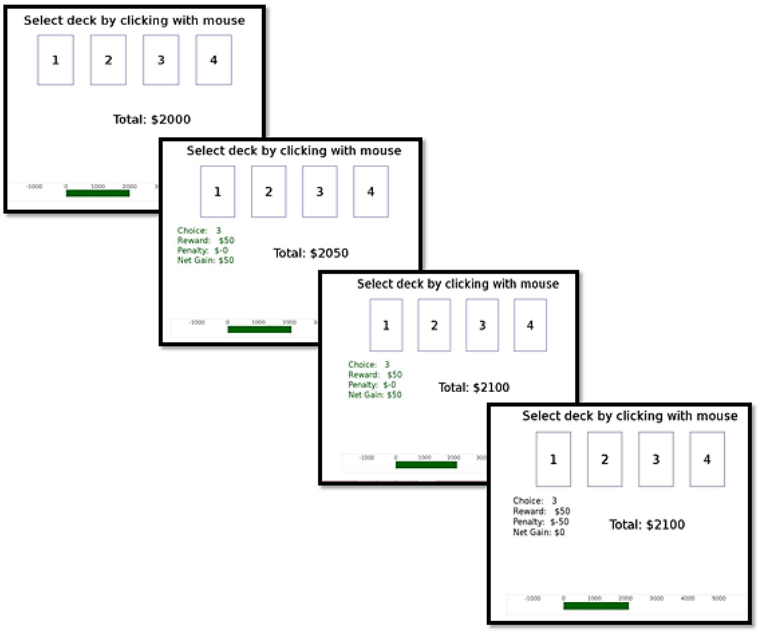


Figure 4. IGT: Four Trials Selecting from Good Decks.



The IGT was run using PEBL programming language. Participants were given the following instructions for completing the IGT:

> *You are about to take part in a task that involves gambling with play money. You will start with a $2000 loan. On each trial, you will select a card from one of four decks. After you select each card, you will be given a reward and possibly be required to pay a penalty. Your goal is to maximize the profit on your loan, and you may choose from any deck at any time to do so. Click the mouse to continue.*
>
> *For each card you draw, you will get a reward. This reward depends on the deck you choose, and each deck has a fixed reward. You will also get a penalty, which will cost you money. Sometimes the penalty will be zero, and sometimes it will be larger, at times even larger than the reward you get for choosing that deck. You should try to get as much money as possible by the end of the task. Press the mouse to continue.*
>
> *At the bottom of the screen, there is a graph that shows you your current earnings. The more money you have, the larger the bar will be. There is NO cash prize for virtual money earned in this task. However, individuals who perform better than average will be entered in a lottery to win one of two $20 amazon gift cards. Do you have any questions? Press the mouse to begin.*

Passive Avoidance.

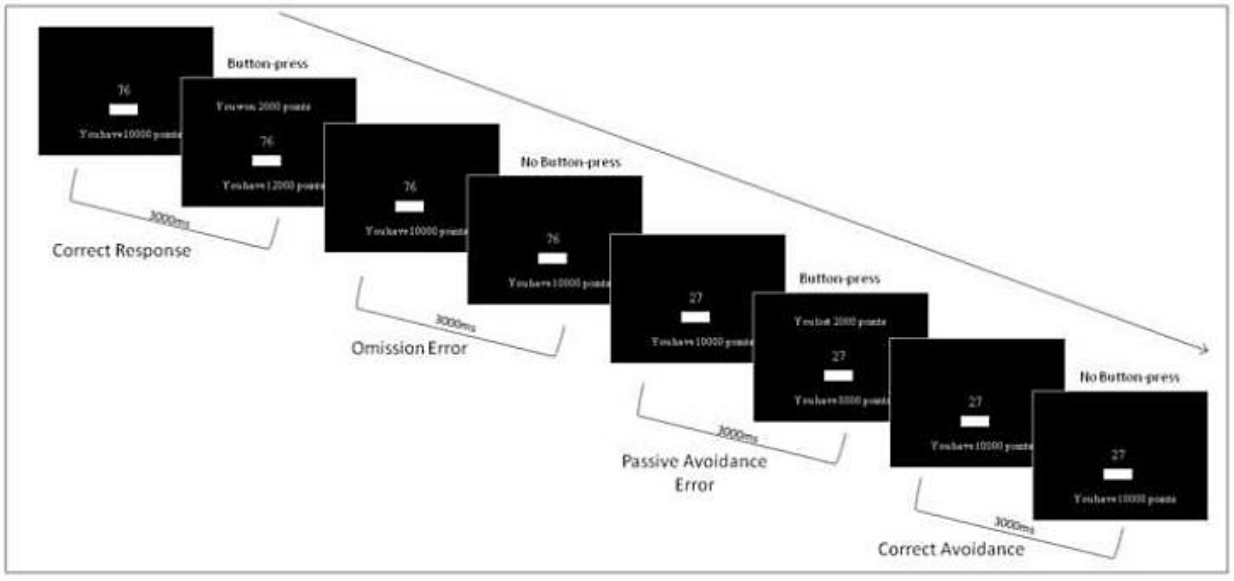
Passive Avoidance: Psychometrics. The passive avoidance (PA) task used in the current study is based off of paradigms used in animal go/no-go paradigms (Finger, Mitchell, Jones, & Blair, 2008). In these paradigms, a singular stimulus is presented with

a reward or punishment. Responding to a stimulus therefore may result in either a reward or punishment. Withholding a response, or passively avoiding a response, resulted in neither reward nor punishment. The overall objective of the task was to earn points. Therefore, this task assesses instrumental decision making and the formation of stimulus-reward and stimulus-punishment contingencies (Finger et al., 2008; Kosson et al., 2006). The PA task differs from the human go/no-go paradigm as individuals are not verbally instructed to respond or withhold a response to specific stimuli (Kosson et al., 2006). This task has not been used extensively in human populations; therefore, reliability and validity metrics are not readily available.

Passive Avoidance: Procedure. Several versions of the PA task have been utilized in human participants. The current version of the PA task was consistent with the design utilized by Kosson and colleagues (2006). Specifically, there were 10 blocks of trials containing 12 different two-digit numbers. Each number was associated with a reward (e.g., gain 100 points) or punishment (e.g., lose 100 points). Half of the stimuli were associated with a reward while the other half were associated with a punishment. Rewards and punishments ranged from 1 to 2000. Not responding to a stimulus resulted in no reward or punishment (i.e., no loss or gain of points). Each stimulus was presented on the screen for 1000 milliseconds. If a response was made while the stimulus was on the screen, a message appeared above the number indicating whether the individual was rewarded (e.g., "You have won 100 points.") or punished (e.g., "You have lost 100 points."). If no response is made, the next stimulus appeared on the screen after 3000 milliseconds. Participants began the task with 10000 points, and a running total of points was presented on a separate screen following each stimulus, regardless of the participants

response or lack thereof to the stimulus. Participants were pseudo-randomly assigned to one of two versions of the tasks where the numbers associated with reward and punishment was switched for each version of the task. The outcome measures of interest on the passive avoidance task included the sum collected, commission errors and omission errors. The *sum collected* was the overall amount earned on the passive avoidance task across the 10 blocks. *Commission errors* were the number of responses to punishing stimuli (i.e., those associated with losses). *Omission errors* were responses withheld to rewarding stimuli (i.e., those associated with gains).

Figure 5. Passive Avoidance Task: Correct Response, Correct Avoidance, and Commission and Omission Errors.



The passive avoidance task was run using E-Prime software (Psychology Software Tools). Participants were given the following instructions for completing the PA task:

You will be presented with a series of numbers. You will use the space bar to make responses in this task. Some of the numbers are good and you will gain points by pressing the space bar while they are on the screen. Other numbers are bad and you will lose points if you press the space bar while they are on the screen. If you do not respond you will neither lose nor gain any points. You should try to gain as many points as possible by the end of the task. There is NO cash prize for virtual money earned in this task. However, individuals who perform better than average will be entered in a lottery to win one of two $20 amazon gift cards. Do you have any questions? Press the space bar to begin.

Diary

Following the in-lab session, participants were asked to complete a week-long diary portion for course credit. The diary involved filling out an adapted version of the CARE and the PANAS to assess real-world decision making and current mood each day for seven days. Qualtrics allows for the creation of "panels," which can contain subject numbers and email addresses. For ease of distributing the surveys, panels were created weekly and used only for survey distribution purpose. Participants began the diary portion on the first Monday following their lab session and ended the following Sunday. Participants received prompts daily at 4 pm to complete each survey by 11:59 pm that night via emails distributed through Qualtrics. For participants who have not yet taken the survey, reminders were automatically triggered by the system at 10 pm that evening.

General Procedure

Participants who opted to participate signed up for the study via the online experiment scheduling website Sona (umaine.sona-systems.com). Various timeslots

throughout the day were made available, and eligible participants signed up on a first-come first-serve basis.

Study sessions took place in a designated laboratory in the Psychology Department. All sessions were conducted by trained undergraduate research assistants. Upon arrival to the study session, participants were asked to read and sign an informed consent form (see Appendix A) for the first portion of the study (i.e., the lab session) before participating. The experimenter for the study session reviewed the content of the consent form with the participant to ensure that study procedures are clarified. In addition, before beginning the session, the experimenter answered any questions the participant has about study procedures and participating.

Once participants were clarified about study procedures and agreed to participate, the study session began with all participants completing the battery of computer tasks (i.e., BART, IGT, and Passive Avoidance) on a designated computer. Prior to each task, participants completed a PANAS questionnaire, to control for mood induced performance on these tasks if relevant. Presentation of these tasks was counterbalanced for all participants to control for potential order effects. Each computer tasks took approximately 10-15 minutes to complete. The instructions (listed above) were presented on the screen and read aloud by the experimenter to all participants. Following the computer tasks, participants completed a battery of questionnaires containing the following: a demographics questionnaire, ASI-3, TANX, SPS, BIS/BAS, CES-D, RRS, ERQ, RFQ, IUS-12, BIS-II, and the College Self Expression Scale. These questionnaires took approximately 30 minutes to complete. The demographics questionnaire included

the date, age, race, education, and questions regarding their history of mental health treatment (both medication-based and therapy/counseling-based).

Following completion of the surveys, participants were given verbal and written instructions (see Appendix C) regarding the diary portion of the study. Participants were informed that they would be sent links each day prompting them to complete the survey. A rationale for examining relationships between laboratory-based and naturalistic behavior was provided to increase compliance. In addition, participants were informed that they would receive 2 credits for completion of both the laboratory portion and diary-based portions of the study. They were informed that they would earn an extra $5 for completion of all 7 days of the diary portion. Further, they were notified that if they opt out of completing the diary portion, they should inform the experimenter of their decision, and they would receive 1 credit for their participation.

CHAPTER 3

RESULTS

A correlational design was employed in the current study to examine associations between anxiety and risk taking in laboratory and naturalistic settings. There were three overarching goals: 1) Better understand the role of AS in risk taking behavior; 2) Define and characterize the construct of positive risk taking in relation to negative risk taking; and 3) Examine the relations between risk taking behavior in laboratory and naturalistic settings.

Participant Characteristics

Demographics. The total sample consisted of 148 college students (see Tables 1 and 2). Participants ranged in age from 18 to 45. The majority of the sample was female (76.22 %) and white (87.8%). This is consistent with the overall demographics of psychology students at the University of Maine. In addition, the State of Maine is predominately white, resulting in the relative lack of ethnic and racial diversity of the sample.

Table 1. Age by Gender

	Male (*n* = 33)	**Female (*n*= 109)**	**Total (*N*= 143)**
Mean (SD)	20.39 (5.20)	19.60 (3.90)	19.78 (4.21)
Range	18-43	18-45	18-45

Note: One subject did not indicate a gender. There was an option for "other gender" which was not endorsed by any subjects.

Table 2. Ethnicity by Gender

	Male (*n* = 33)	**Female (*n* =109)**	**Total (*N* = 143)**
Ethnicity			
White	30 (88.2%)	99 (88.4%)	130 (87.8%)
Hispanic or Latino	0 (0%)	6 (5.4%)	6 (4.2%)
Black	1 (2.9%)	2 (1.8%)	3 (2.0%)
Asian	1 (2.9%)	3 (2.7%)	4 (2.7%)
American Indian/Alaska Native	0(0%)	4 (3.6%)	4 (2.7%)
Native Hawaiian/Pacific Islander	0 (0%)	0 (0%)	0 (0%)
Mixed Race	0 (0%)	2 (1.8%)	2 (1.4%)
Other Background	2 (5.9%)	5 (4.5%)	7 (4.7%)

Note: One subject did not indicate a gender. There was an option for "other gender" which was not endorsed by any subjects.

Preliminary Data Preparation and Analyses

Self-Report Measures. Means (SDs) of the study variables are presented in Table 3 (self-report data). Univariate outliers were defined as data points with z-scores exceeding ± 3.29 (Cousineau & Chartier, 2010). Outliers were transformed rather than excluded to maintain power. To this end, a transformation technique involving moving extreme values to the next most extreme value that is not an outlier (i.e., winsorizing) was used. Winsorization allows for the relative preservation of data while reducing the skew caused by outliers on the overall distribution (Field, 2009). Outliers were identified and winsorized for the ASI-3 (n = 1), BAS total scale (n = 1), and reward responsiveness subscale of the BAS scale (n = 3). There were no outliers for the RFQ or the RRS.

Missing data varied across the measures. For measures in which a sum score was calculated, sum scores were not calculated for individuals who skipped individual items

on a given measures. On average, there were 5.48 (*SD* = 5.33) items missing per measure. Number of missing items per measure ranged from one to 25 items.

When testing the hypotheses, variables which have been theoretically associated with AS, moderator variables, and outcome measures were controlled for to assess whether AS and moderators are associated with the outcome variable above and beyond other related variables. This theoretically driven method of choosing covariates has been shown to be superior to purely data-driven methods of choosing covariates (Raab, Day, & Sales, 2000).

Table 3. Descriptive Statistics of Self-Report Measures

	N	Range	Mean	SD
ASI-3	141	0-56	16.13	11.79
TANX	143	27-60	41.86	8.26
SPS	141	0-55	17.95	13.87
CES-D	141	8-41	21.97	6.88
RFQ- Promotion	145	12.00-30.00	22.30	3.49
RFQ- Prevention	142	9.00-25.00	17.85	4.02
ERQ- Reappraise	144	6-42	27.01	6.79
ERQ-Suppression	146	4-27	13.72	5.37
RRS- Total	139	22-75	39.45	12.70
RRS- Ponder	146	5-19	8.67	3.46
RRS-Brood	143	5-19	9.50	3.50
BAS- Fun Seek	146	5-16	12.02	2.46
BAS- Drive	146	4-16	11.03	2.55
BAS- Reward Resp	146	12-20	17.65	2.13
BAS- Total	144	16-52	40.63	5.94
BIS	147	9-28	20.63	4.27
IUS-12- Total	144	12-59	31.65	10.07
IUS-12- PA	146	7-34	20.64	6.00
IUS-12- IA	145	5-25	10.98	4.73
BIS-11- Total	135	33-86	61.00	10.77
CSES	123	116-225	168.81	19.71

Note. ASI = Anxiety Sensitivity Inventory- 3; TANX = Trait Anxiety Inventory; SPS = Social Phobia Scale; CES-D = Center for Epidemiologic Studies Depression Scale; RFQ- Promotion = Regulatory Focus Questionnaire, Promotion; RFQ- Prevention = Regulatory Focus Questionnaire, Prevention; ERQ- Reappraise = Emotion Regulation Questionnaire, Cognitive Reappraisal; ERQ- Suppress = Emotion Regulation Questionnaire, Suppression Scale; RRS- Total = Rumination Response Scale- Total Score; RRS- Ponder = Rumination Response Scale, Pondering Scale; RRS- Brood = Rumination Response Scale, Brooding Scale; BAS- Fun Seek = Behavioral Activation Scale, Fun Seeking; BAS- Drive = Behavioral Activation Scale, Drive; BAS- Reward Resp = Behavioral Activation, Reward Responsiveness; BIS = Behavioral Inhibition Scale; IUS-12- Total = Intolerance of Uncertainty-12, Total Score; IUS-12- PA = Intolerance of Uncertainty-12, Prospective Anxiety, IUS-12-IA = Intolerance of Uncertainty-12, Inhibitory Anxiety; BIS-11- Total = Barratt Impulsiveness Scale -11- Total Score; CSES = College Self-Expression Scale.

Computerized Decision Making Tasks. Means (SDs) of performance on computerized risk taking tasks are presented in Table 4. Univariate outliers were also identified in dependent variables. Outliers for BART sum (n =1), BART adjusted pumps (n =1), BART balloon bursts (n = 1), IGT deck choices (n = 1) and IGT sum (n = 2) were winsorized. There were no outliers for any of the outcome measures of the PA task. There was minimal missing data due to experimenter error and equipment failure (n = 4). BART adjusted pump score and BART sum score were found to be correlated perfectly with one another (r = 1.00, p < .01; see Table 9). Therefore, only BART adjusted pumps was chosen as the dependent variable because this is the typical outcome measure used in prior studies (e.g., Lejuez et al., 2002).

Table 4. Performance on the Computerized Risk Taking Tasks

	N	**Range**	**Mean**	**SD**
BART- Sum	142	4.80-73.40	27.80	11.04
BART- Bursts	142	11-86	37.20	11.34
BART- Pump	142	118-2060	819.47	372.87
BART- Adj	142	1.2-34.0	11.28	5.96
IGT- Choice	143	-78-108	11.22	27.75
IGT- Sum	143	-2000-3100	-90.77	805.38
PA- Com. Err.	146	.12-1.00	.48	.22
PA- Om. Err.	146	.00-.62	.25	.14
PA- Sum	146	-755021- 2330251	817701.29	727278.36

Note. BART- Sum = Total sum collected on the BART; BART- Burst = Total sum of balloon bursts on the BART; BART- Pump = Sum of balloon pumps on the BART; BART- Adj = Average balloon pumps on the BART adjusted for balloon bursts; IGT- Choice = Number of choices from bad decks subtracted from number of choices on good decks on the IGT task; IGT- Sum = Total sum collected on the IGT task; PA- Com. Err. = Errors of commission on the Passive Avoidance Task; PA- Om. Err. = Errors of omission on the Passive Avoidance Task; PA- Sum = Total sum collected on the Passive Avoidance Task.

Correlations among computerized decision making outcome measures are presented in Table 5. BART adjusted pumps was significantly associated with BART balloon bursts, signifying that as risk taking increased (i.e., BART adjusted pumps), balloon bursts also increased. BART adjusted pumps and balloon bursts were also associated with PA sum score. In addition, BART adjusted pumps, but not BART balloon bursts, was associated with more advantageous IGT deck selections, a higher IGT sum score and less commission errors on the PA task. Advantageous IGT deck selections was associated with a higher IGT sum score, less commission errors on the PA task and a higher PA sum score.

Table 5. Correlations between Decision Making Task Outcome Measures

	1.	2.	3.	4.	5.	6.	7.
1. BART- Adj	---						
2. BART- Bursts	.79***	---					
3. IGT- Choice	.14	.15	---				
4. IGT- Sum	.17*	.16	.78***	---			
5. PA- Com. Err.	-.20*	-.16	-.23**	-.11	---		
6. PA- Om. Err.	-.17*	-.11	.01	-.07	-.43***	---	
7. PA- Sum	.30***	.24**	.18*	.13	-.75***	-.08	---

Note. BART- Adj = Average balloon pumps on the BART adjusted for balloon bursts; BART- Bursts = Total sum of balloon bursts on the BART; IGT- Choice = Number of choices from bad decks subtracted from number of choices on good decks on the IGT task; IGT- Sum = Total sum collected on the IGT task; PA- Com. Err. = Errors of commission on the Passive Avoidance Task; PA- Om. Err. = Errors of omission on the Passive Avoidance Task; PA- Sum = Total sum collected on the Passive Avoidance Task.
*$p < .05$; **$p < .01$; ***$p < .001$.

Daily Decision Making Diary. Negative and positive risk taking dimensions were calculated from the CARE questionnaire. Means (SDs) are presented in Table 6. The original questionnaire contains six subscales which included the following: illicit

drug use, aggressive and illegal behavior, risky sexual activities, heavy drinking, high risk sports, and academic/work behaviors. Outliers for negative risk taking (n = 2), positive risk taking (n = 1), academic/work behaviors (n =3), social risk taking (n = 2) and non-avoidance of negative emotions (n = 1) were identified and variables were winsorized.

A composite positive risk taking score was calculated from items added to the CARE questionnaire to assess positive risk taking (i.e., social risk taking, non-avoidance of negative emotions and openness to new activities) and the high risk sports items. Reliability was assessed for all positive risk taking subscales. Similar to the negative composite score, all subscales were used to create the positive composite score regardless of individual scale reliability rates. The positive risk taking composite score (α = .86), social risk taking (α = .75) and non-avoidance of negative emotions (α = .75) showed high internal reliability. Openness to new activities had poor internal reliability (α = .58). Once again, reliability may have been affected by a low number of items as the openness subscale had a total of two items.

Table 6. Decision Making Diary Descriptives

	N	Range	Mean	SD
Negative Risk	137	12.50-15.56	13.20	.69
Aggression	137	4-5.50	4.11	.22
Substance Use	137	3.50-5.50	3.62	.26
Sex Risk	137	2.50-3.50	2.56	.14
Work Risk	137	2.50-4.27	2.92	.44
Positive Risk	137	9.00-15.04	10.46	1.11
Nat. Assert.	137	2.50-4.50	3.13	.44
Non-Avoid	137	3.50-5.50	4.03	.44
Openness	137	1.00-2.00	1.21	.23
Sport Risk	137	2.00-3.50	2.09	.20
Social Risk	137	4.00-6.83	4.90	.60

Note. Negative Risk = Negative Risk Taking Composite; Aggression = Aggression Subscale of the Negative Risk Taking Scale; Substance Use = Risky Substance Use Subscale of the Negative Risk Taking Scale; Sex Risk = Risk Sexual Behavior Subscale of the Negative Risk Taking Scale; Work Risk = Work/School-Related Risk Taking Subscale of the Negative Risk Taking Scale; Positive Risk = Positive Risk Taking Composite; Nat. Assert. = Naturalistic Assertiveness Subscale of the Positive Risk Taking Scale; Non-Avoid = Non-Avoidance of Negative Emotions Subscale of the Positive Risk Taking Scale; Openness = Openness to New Activities Subscale of the Positive Risk Taking Scale; Sport Risk = High Risk Sport Subscale of the Positive Risk Taking Scale; Social Risk = Social Risk Taking Subscale of Positive Risk Taking Scale.

Moderated Regression Analyses. Multicollinearity was assessed by examining tolerance values with a cut-off of equal to or less than .10. Points of undue influence were assessed in regression analyses. Specifically, multivariate outliers, leverage, and influential cases were examined. For multivariate outliers, studentized deleted residuals were examined with a cut-off value of ± 3. Influential points were assessed by examining leverage points and Cook's distance values. For leverage points, a cut-off of .06 was used and a cut-off of greater than 1.00 was used for Cook's distance. Assumptions of

homoscedasticity and normality were assessed by examining studentized residuals plotted against unstandardized predicted values for all regression analyses. Regression is robust to violations of normality and homogeneity (Box, 2005). Thus, violations are noted, but data was not transformed. For moderated regression analyses, all variables were centered prior to conducting analyses in order to prevent multicollinearity between main effects and interaction terms.

Hypothesis One

Hypothesis one concerned participants' performance on the laboratory tasks assessing decision making.

Hypothesis One- A. Participants with higher AS were predicted to show lower risk taking on the BART. Specifically, AS would be negatively correlated with adjusted balloon pumps and balloon bursts on the task. In addition, it was predicted that success on the BART task, as measured by the adjusted pump score, would be dependent on interactions between motivation and AS. In particular, participants with higher AS and higher approach motivation would exhibit lower risk taking compared to lower AS, higher approach motivation individuals and higher AS, lower approach motivation individuals due to a mismatch between their motivation focus and level of anxiety. Similarly, higher AS individuals who have lower avoidance motivation levels were predicted to also show significantly lower earnings on the BART (i.e., BART sum) than lower AS, low avoidance motivation individuals and higher AS, high avoidance motivation individuals.

Bivariate correlation analyses were conducted to examine the relations between ASI scores, BIS/BAS scores, average adjusted pumps, and balloon bursts on the BART

task (Table 7). Correlation values between 0.1 and 0.3 were considered weak correlations; values between 0.3 and 0.5 were considered moderate correlations; and values above 0.5 were considered strong correlations (Cohen, 1988). There were a significant weak, negative correlation between AS and BAS Fun Seeking and a significant moderate, positive correlation with AS and BIS. These findings were in line with the predictions that AS would be negatively correlated with approach motivation and positively correlated with avoidance motivation. Contrary to the predictions, risk taking on the BART was not correlated with AS.

Table 7. Correlations between ASI and BART Outcome Measures

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**
1. ASI-3	--							
2. BAS Drive	-.03	---						
3. BAS- Reward Resp	.05	.39***	---					
4. BAS- Fun Seek	-.18*	.47***	.36***	---				
5. BAS Total	-.08	.79***	.74***	.79***	---			
6. BIS	.40***	-.08	.22***	.23***	-.23	---		
7. BART- Adj	.01	-.03	-.03	-.05	-.01	.03	---	
8. BART- Bursts	-.01	-.12	-.09	-.13	-.15	.04	.79***	---

Note: ASI-3 = Anxiety Sensitivity Index- 3; BAS- Fun Seek = Behavioral Activation Scale, Fun Seeking; BAS- Drive = Behavioral Activation Scale, Drive; BAS- Reward Resp = Behavioral Activation, Reward Responsiveness; BIS = Behavioral Inhibition Scale; BART adjusted = Average balloon pumps on the BART adjusted for balloon bursts; BART bursts = Total sum of balloon bursts on the BART.
*p < .05; *** p < .001

Interaction between AS and Approach Motivation. A series of hierarchical multiple regression analyses were conducted to assess the interaction between AS and motivation (i.e., BAS scales, BAS total score and BIS, regressions run separately) on

BART outcome measures, including the average balloon pumps adjusted for balloon bursts (i.e., BART adjusted) and sum of balloon bursts (i.e., BART bursts).

BAS Drive by AS. There was no indication of multicollinearity (all tolerance values > .91). A multivariate outlier was identified for the interaction between BAS drive and AS for BART adjusted pump scores. Analyses were conducted with and without this outlier, and results remained unchanged; therefore, the outlier was included in the analyses. Although there were several points exceeding leverage cut-offs, no points exceeded the Cook's distance cut-off. To assess for homogeneity of variance, studentized residuals were plotted against unstandardized predicted values. Upon visual inspection of these plots, the plot for BART bursts was somewhat heteroscedastic, showing a slight increasing funnel shape. The plot for BART adjusted pumps appeared homoscedastic. Shapiro-Wilk's test indicated that the studentized residuals were normally distributed for BART adjusted pumps and balloon bursts.

A hierarchical multiple regression analysis was conducted to examine the interaction between AS and BAS drive for BART adjusted pumps. AS and BAS drive were added simultaneously into step one of the model which accounted for .1% of the total variance in BART adjusted pumps, $R^2 = .001$, $F(2, 132) = .08$, $p = .92$. The interaction between AS and BAS drive was entered into step two of the model. The model was not significant, and the interaction between AS and BAS drive did not significantly account for additional variance in BART adjusted pumps, $\Delta R^2 = .000$, $\Delta F(1, 131) = .000$, $p = .99$.

A hierarchical multiple regression analysis was also conducted to examine the interaction between AS and BAS drive for BART balloon bursts. AS and BAS drive were

added simultaneously into step one of the model which accounted for 1.2% of the total variance in BART balloon bursts, R^2 = .012, F(2, 132) = .81, p = .45. The interaction between AS and BAS drive was entered into step two of the model. The interaction between AS and BAS drive did not account for additional variance in BART balloon bursts, ΔR^2 = .001, ΔF(1, 131) = .16, p = .69.

Reward Responsiveness by AS. There was no indication of multicollinearity (all tolerance values > .94). No multivariate outliers were identified, and no data exceeded leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test indicated that the studentized residuals were normally distributed.

A hierarchical multiple regression analysis was conducted to examine the interaction between AS and reward responsiveness for BART adjusted pumps. AS and reward responsiveness were added simultaneously into step one of the model which accounted for .2% of the total variance in BART adjusted pumps, R^2 = .002, F(2, 132) = .12, p = .89. The interaction between AS and reward responsiveness was entered into step two of the model. The interaction between AS and reward responsiveness did not account for additional variance in BART adjusted pumps, ΔR^2 = .001, ΔF(1, 131) = .12, p = .73.

A hierarchical multiple regression analysis was conducted to examine the interaction between AS and reward responsiveness for BART balloon bursts. AS and reward responsiveness were added simultaneously into step one of the model which accounted for 1.0% of the total variance in BART balloon bursts, R^2 = .010, F(2, 132) = .69, p = .50. The interaction between AS and reward responsiveness was entered into

step two of the model. The interaction between AS and reward responsiveness did not account for the additional variance in BART balloon bursts, $\Delta R^2 = .008$, $\Delta F(1, 131) = 1.09$, $p = .30$.

BAS Total by AS. There was no indication of multicollinearity (all tolerance values > .95). No multivariate outliers were identified. There were no points exceeding leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test indicated that the studentized residuals were normally distributed.

A hierarchical multiple regression analysis was conducted to examine the interaction between AS and BAS total score for BART adjusted pumps. AS and BAS total score were added simultaneously into step one of the model which accounted for 0% of the total variance in BART adjusted pumps, $R^2 = .000$, $F(2, 130) = .02$, $p = .98$. The interaction between AS and BAS total score was entered into step two of the model. The interaction between AS and BAS total score did not account for additional variance in BART adjusted pumps, $\Delta R^2 = .001$, $\Delta F(1, 129) = .17$, $p = .68$.

A hierarchical multiple regression was also conducted to examine the interaction between AS and BAS total score for BART balloon bursts. AS and BAS total score were added simultaneously into step one of the model which accounted for 2.1% of the total variance in BART balloon bursts, $R^2 = .021$, $F(2, 130) = 1.37$, $p = .26$. The interaction between AS and BAS total score was entered into step two of the model. The interaction between AS and BAS total score did not account for additional variance in BART balloon bursts, $\Delta R^2 = .009$, $\Delta F(1, 129) = 1.16$, $p = .28$.

Interaction between AS and Avoidance Motivation. There was no indication of multicollinearity (all tolerance values > .80). Multivariate outliers were identified for the interaction between BIS and AS for BART adjusted pumps (n = 2). Analyses were conducted with and without outliers, and the outcome was not changed; therefore, outliers were included in final analyses. There were no points exceeding leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test indicated that the studentized residuals were normally distributed.

A hierarchical multiple regression was conducted to examine the interaction between AS and BIS score for BART adjusted pumps. AS and BIS score were added simultaneously into step one of the model which accounted for 0% of the total variance in BART adjusted pumps, R^2 = .000, F(2, 133) = .03, p = .97. The interaction between AS and BIS score was entered into step two of the model. The interaction between AS and BIS score did not account for additional variance in BART adjusted pumps, ΔR^2 = .000, ΔF(1, 132) = 0, p = .99.

A hierarchical multiple regression was conducted to examine the interaction between AS and BIS score for BART balloon bursts. AS and BIS score were added simultaneously into step one of the model which accounted for .2% of the total variance in BART balloon bursts, R^2 = .002, F(2, 133) = .12, p = .89. The interaction between AS and BIS score was entered into step two of the model. The interaction between AS and BIS score did not account for additional variance in BART balloon bursts, ΔR^2 = .002, ΔF(1, 132) = .08, p = .78.

Contrary to the predictions, the interaction between motivation and AS did not explain risk taking on the BART. Specifically, the interaction between AS and approach motivation (BAS subscales and total BAS scores) did not predict BART adjusted balloon pumps or BART balloon bursts. The interaction between AS and BIS score also did not predict BART adjusted balloon pumps or BART balloon bursts. Overall, positive risk taking, as assessed by BART risk taking, was not related to anxiety, approach-avoidance motivation or anxiety at different levels of approach-avoidance motivation,

Hypothesis One- B. The relations between AS and outcome measures on the IGT were predicted to be moderated by the tendency to ruminate. In particular, participants with higher levels of AS and higher levels of rumination were predicted to take more maladaptive risks on the IGT as shown by more "bad deck" selections (i.e., a higher IGT choice score) and lower earnings on the IGT (i.e., a lower IGT sum score).

Bivariate correlations were conducted to assess the relations between ASI scores, rumination and IGT choice and sum scores. As presented in Table 8, there was a significant, moderate correlation between AS and rumination which was in line with the predictions. However, correlations between AS, rumination and IGT outcome measures were not significant.

Table 8. Correlations between AS, Rumination, and IGT Outcome Measures

	1	**2**	**3**	**4**
1. ASI-3	---			
2. RRS- Total	.56***	---		
3. IGT- Choice	.01	.07	---	
4. IGT- Sum	-.07	-.02	.78***	---

Note. ASI-3 = Anxiety Sensitivity Inventory- 3; RRS- Total = Rumination Response Scale- Total Score; IGT- Choice = Number of choices from good decks subtracted from number of choices on bad decks on the IGT task; IGT- Sum = Total sum collected on the IGT task.
*** $p < .001$

Rumination by AS. There was no indication of multicollinearity (all tolerance values > .80). Multivariate outliers were identified for the interaction between rumination and AS for IGT deck choices (n = 3). Analyses were conducted with and without outliers, and the outcome did not change; therefore, outliers were included in final analyses. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test was significant for IGT deck choice (p = .01) and IGT sum score (p = .01) indicating that the studentized residuals were not normally distributed. Visual inspection of the histogram showed a slight negative skew for both deck choice and sum scores and a leptokurtic distribution of the residuals for IGT deck choice. The residuals for IGT sum scores appeared leptokurtic.

A hierarchical multiple regression was conducted to examine the interaction between AS and rumination for IGT choice[1]. AS and rumination were added simultaneously into step one of the model which accounted for .8% of the total variance in IGT deck choices, R^2 = .008, $F(2, 126)$ = .49, p = .61. The interaction between AS and rumination was entered into step two of the model. The interaction between AS and rumination did not account for additional variance in IGT deck choices, ΔR^2 = .002, $\Delta F(1, 125)$ = .20, p = .66.

A hierarchical multiple regression was also conducted to examine the interaction between AS and rumination for IGT sum score. AS and rumination were added

[1] Deck choices on the IGT are analyzed in a variety of different ways across studies. Many studies analyze deck selections across blocks of trials (e.g., Mueller et al., 2010). Specifically, data is typically grouped into five blocks of 20 trials for the 100 total trials. Data in the current study was examined across blocks and this did not change the outcome as neither AS, rumination nor the interaction between AS and rumination was associated with disadvantageous or advantageous deck choices across any of block. These results are therefore not presented.

simultaneously into step one of the model which accounted for .3% of the total variance in IGT sum score, $R^2 = .003$, $F(2, 126) = .20$, $p = .82$. The interaction between AS and rumination was entered into step two of the model. The interaction between AS and rumination did not account for additional variance explained in IGT sum score, $\Delta R^2 = .004$, $\Delta F(1, 125) = .46$, $p = .50$.

In contrast to predictions, neither AS nor the interaction between AS and rumination explained risk taking on the IGT. Heightened anxiety did not impair performance. In addition, highly anxious, highly ruminative individuals did not tend to perform worse on the IGT as expected.

Hypothesis One- C. ASI scores were hypothesized to be positively related to omission errors and negatively related to commission errors on the passive avoidance (PA) task. In addition, it was predicted that motivation would moderate the relations between AS and outcome measures on the passive avoidance task. Specifically, it was predicted that participants with higher levels of AS and higher BIS levels would commit more omission errors than their counterparts.

Bivariate correlation analyses were conducted to assess the relations between ASI scores and PA outcome measures, including PA omission errors, PA commission errors and PA sum score. Table 9 presents correlations between AS, motivation and PA outcome measures. Correlations between motivation and AS were previously discussed (see Hypothesis One- A for a summary of results). Contrary to the predictions, AS was not correlated with any of the PA outcome measures. BAS fun seeking was significantly, but weakly, correlated with PA commission errors. No other measures of approach or avoidance motivation were correlated with the PA outcome measures.

Table 9. Correlations between AS, Motivation and PA Outcome Measures

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**
1. ASI-3	--								
2. BAS Drive	-.03	---							
3. BAS- Reward Resp	.05	.41***	---						
4. BAS- Fun Seek	-.18*	.47***	.36***	---					
5. BAS Total	-.08	.79***	.74***	.78***	---				
6. BIS	.40***	-.08	.25***	-.23***	-.23	---			
7. PA- Om. Err.	-.09	-.12	-.12	-.03	-.11	-.05	---		
8. PA- Com. Err.	-.12	.12	.01	.17**	.12	-.05	-.43***	---	
9. PA- Sum	.14	-.07	.01	-.15	-.10	.06	-.08	-.75**	---

Note. ASI-3 = Anxiety Sensitivity Inventory- 3; BAS- Drive = Behavioral Activation Scale, Drive; BAS- Reward Resp = Behavioral Activation, Reward Responsiveness; BAS- Fun Seek = Behavioral Activation Scale, Fun Seeking; BAS Total = Behavioral Activation, Total Score; BIS = Behavioral Inhibition Scale; PA- Om. Err. = Errors of omission on the Passive Avoidance Task; PA- Com. Err. = Errors of commission on the Passive Avoidance Task; PA- sum = Total sum collected on the Passive Avoidance Task.
* p < .05; **p < .01; *** p < .001

Interaction between AS and Approach Motivation.

BAS Drive by AS. There was no indication of multicollinearity (all tolerance values > .98). A multivariate outlier was identified for the interaction between BAS drive and AS for PA omission errors ($n = 1$) [2], which was included in final analyses. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test was significant for PA omission error ($p < .01$), indicating that the studentized residuals were not normally distributed. Shapiro- Wilk's test was also significant for PA commission ($p = .03$), indicating that the studentized residuals were not normally

[2] When this outlier was removed, there was a trend for a significant effect (p = .055) of the first step of the model; however, removing this outlier did not change the significance of the interaction.

distributed. Visual inspection of the histogram showed that the residuals of PA omission errors had a platykurtic shape and the residuals of PA commission errors were positively skewed. Shapiro-Wilk's test indicated that the studentized residuals for PA sum score were normally distributed.

A hierarchical multiple regression was conducted to examine the interaction between AS and BAS drive for PA omission errors. AS and BAS drive were added simultaneously into step one of the model which accounted for 2.4% of the total variance in PA omission errors, R^2 = .024, F(2, 136) = 1.64, p = .20. The interaction between AS and BAS drive was entered into step two of the model. The interaction between AS and BAS drive did not account for additional variance in PA omission errors, ΔR^2 = .008, ΔF(1, 135) = 1.12, p = .29.

A hierarchical multiple regression examining the interaction between AS and BAS drive for PA commission errors was run. Impulsivity was related to AS, BAS drive and PA commission errors; thus, impulsivity was added as a covariate to the model. Impulsivity was entered into step one of the model, which accounted for 3.9% of the total variance in commission errors, R^2 = .039, F(2, 127) = 5.13, p = .03. Higher impulsivity was related to significantly more commission errors (t(127) = 2.27, β = .20, t= p = .03). AS and BAS drive were added simultaneously into step two of the model and the amount of additional variance explained in PA commission errors approached significance, ΔR^2 = .042, ΔF(2, 125) = 2.86, p = .06. The interaction between AS and BAS drive was entered into step three of the model. The interaction between AS and BAS drive did not account for additional variance in PA commission errors, ΔR^2 = .009, ΔF(1, 124) = 1.29, p = .26.

A hierarchical multiple regression was conducted to examine the interaction between AS and BAS drive for PA sum score. AS and BAS drive were added simultaneously into step one of the model which accounted for 2.7% of the total variance in PA sum score, $R^2 = .027$, $F(2, 136) = 1.90$, $p = .15$. The interaction between AS and BAS drive was entered into step two of the model. The interaction between AS and BAS drive did not account for additional variance in PA sum score, $\Delta R^2 = .004$, $\Delta F(1, 135) = .58$, $p = .45$.

Reward Responsiveness by AS. There was no indication of multicollinearity (all tolerance values > .93). A multivariate outlier was identified for the interaction between reward responsiveness and AS for PA omission errors ($n = 1$). Analyses were conducted with and without this outlier, and the outcome did not change; therefore, the outlier was included in final analyses. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test was significant PA omission errors ($p < .01$), indicating that the studentized residuals were not normally distributed. Visual inspection of the histogram showed that PA omission error residuals had a negative skew. Shapiro-Wilk's test was also significant for PA commission errors ($p < .01$), indicating that the studentized residuals were not normally distributed. Visual inspection of the histogram showed that the residuals of PA commission errors were positively skewed. Shapiro-Wilk's test result suggested that the studentized residuals for PA sum score were normally distributed.

A hierarchical multiple regression was conducted to examine the interaction between AS and reward responsiveness for PA omission errors. AS and reward

responsiveness were added simultaneously into step one of the model which accounted for 2.6% of the total variance in PA omission errors, $R^2 = .026$, $F(2, 136) = 1.84$, $p = .16$. The interaction between AS and reward responsiveness was entered into step two of the model. The interaction between AS and reward responsiveness did not account for additional variance in PA omission errors, $\Delta R^2 = .00$, $\Delta F(1, 135) = .43$, $p = .84$.

A hierarchical multiple regression was also conducted to examine the interaction between AS and reward responsiveness for PA commission errors. As stated previously, impulsivity was significantly associated with both AS and PA commission errors and, therefore, was controlled for. Impulsivity was entered into step one of the model, which accounted for 3.9% of the total variance in commission errors, $R^2 = .039$, $F(2, 127) = 5.13$, $p = .03$. As reported above, impulsivity was associated with a higher rate of commission errors ($t(127) = 2.27$, $\beta = .20$, $p = .03$). AS and reward responsiveness were added simultaneously into step two of the model, and the amount of additional variance in PA commission errors accounted for by these variables approached significance, $\Delta R^2 = .040$, $\Delta F(2, 125) = 2.70$, $p = .07$. The interaction between AS and reward responsiveness was entered into step three of the model. The interaction between AS and reward responsiveness did not account for additional variance in PA commission errors, $\Delta R^2 = .009$, $\Delta F(1, 124) = 1.18$, $p = .28$.

A hierarchical multiple regression was conducted to examine the interaction between AS and reward responsiveness for PA sum score. AS and reward responsiveness were added simultaneously into step one of the model which accounted for 2.0% of additional variance in PA sum score, $\Delta R^2 = .020$, $\Delta F(2, 136) = 1.38$, $p = .26$. The interaction between AS and reward responsiveness was entered into step two of the

model. The interaction between AS and reward responsiveness did not account for additional variance in PA sum score, $\Delta R^2 = .005$, $\Delta F(1, 135) = .69$, $p = .41$.

BAS Total by AS. Assumptions for moderated regression were assessed in a similar manner as described for Hypothesis One- A. There was no indication of multicollinearity (all tolerance values > .95). A multivariate outliers were identified for PA omission errors ($n = 1$). Analyses were conducted with and without this outlier, and the outcome did not change; therefore, the outlier was included in final analyses. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test was significant for PA omission errors ($p = .04$) and commission errors ($p < .01$), indicating that studentized residuals were not normally distributed. Visual inspection of the histograms showed that the residuals of PA omission errors had a platykurtic shape and the residuals of PA commission errors were positively skewed. The studentized residuals for PA sum score were normally distributed, as assessed by Shapiro-Wilk's test.

A hierarchical multiple regression was conducted to examine the interaction between AS and BAS total score for PA omission errors. AS and BAS total score were added simultaneously into step one of the model which accounted for 2.2% of the total variance in PA omission errors, $R^2 = .022$, $F(2, 134) = 1.53$, $p = .22$. The interaction between AS and BAS total score was entered into step two of the model. The interaction between AS and BAS total score did not account for additional variance in PA omission errors, $\Delta R^2 = .002$, $\Delta F(1, 133) = .21$, $p = .65$.

A hierarchical multiple regression was conducted to examine the interaction between AS and BAS total score for PA commission errors. As stated previously, impulsivity was significantly associated with both AS and PA commission errors and, therefore, was controlled for. Impulsivity was entered into step one of the model, which accounted for 3.8% of the total variance in commission errors, $R^2 = .038$, $F(2, 126) = 5.03$, $p = .03$. As reported above, impulsivity was associated with a higher rate of commission errors ($t(126) = 2.24$, $\beta = .20$, $p = .03$). AS and BAS total score were added simultaneously into step two of the model which accounted for 2.4% of the change in variance in PA commission errors, $\Delta R^2 = .043$, $\Delta F(2, 124) = 2.87$, $p = .06$. The interaction between AS and BAS total score was entered into step two of the model. The interaction between AS and BAS total score did not account for additional variance in PA commission errors, $\Delta R^2 = .008$, $\Delta F(1, 123) = 1.04$, $p = .31$.

A hierarchical multiple regression was conducted to examine the interaction between AS and BAS total score for PA sum score. AS and BAS total score were added simultaneously into step one of the model which accounted for 3.1% of the total variance in PA sum score, $R^2 = .031$, $F(2, 134) = 2.15$, $p = .12$. The interaction between AS and BAS total score was entered into step two of the model. The interaction between AS and BAS total score did not account for additional variance in PA sum score, $\Delta R^2 = .007$, $\Delta F(1, 133) = .98$, $p = .33$.

Interaction between AS and Avoidance Motivation. Assumptions for moderated regression were assessed in a similar manner as described for Hypothesis One- A. There was no indication of multicollinearity (all tolerance values > .81). No multivariate outliers were identified. There were no points exceeding both leverage and Cook's

distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test was significant for PA commission errors ($p < .01$), indicating that studentized residuals were not normally distributed. Visual inspection of the histogram showed that PA commission error residuals had a positive skew. The studentized residuals for PA omission errors and PA sum score were normally distributed, as assessed by Shapiro-Wilk's test.

A hierarchical multiple regression was conducted to examine the interaction between AS and BIS score for PA omission errors. AS and BIS score were added simultaneously into step one of the model which accounted for 1.2% of the total variance in PA omission errors, $R^2 = .012$, $F(2, 137) = .82$, $p = .42$. The interaction between AS and BIS score was entered into step two of the model. The interaction between AS and BIS score did not account for additional variance in PA omission errors, $\Delta R^2 = .005$, $\Delta F(1, 136) = .64$, $p = .43$.

A hierarchical multiple regression was also conducted to examine the interaction between AS and BIS score for PA commission errors. As stated previously, impulsivity was significantly associated with both ASI and PA commission errors and, therefore, was controlled for. Impulsivity was entered into step one of the model, which accounted for 3.9% of the total variance in commission errors, $R^2 = .039$, $F(2, 127) = 5.13$, $p = .03$. Higher levels of impulsivity were associated with a higher rate of commission errors ($t(127)$, $\beta = .20$, $p = .03$). AS and BIS score were added simultaneously into step two of the model which accounted for 3.9% of additional variance in PA commission errors, $\Delta R^2 = .039$, $\Delta F(2, 125) = 2.64$, $p = .08$. The interaction between AS and BIS score was entered into step three of the model. The interaction between AS and BIS score d did not

account for additional variance in PA commission errors, $\Delta R^2 = .004$, $\Delta F(1, 124) = .55$, $p = .46$.

A hierarchical multiple regression was conducted to examine the interaction between AS and BIS score for PA sum score. AS and BIS score were added simultaneously into step one of the model which accounted for 2.0% of the total variance in PA sum score, $R^2 = .020$, $F(2, 137) = 1.41$, $p = .25$. The interaction between AS and BIS score was entered into step two of the model. The interaction between AS and BIS score did not account for additional variance in PA sum score, $\Delta R^2 = .001$, $\Delta F(1, 136) = .13$, $p = .72$.

Contrary to the hypotheses, the interaction between motivation and AS did not significantly account for the variance explained in PA outcome measures. Specifically, the interaction between approach motivation (i.e., BAS subscales and total score) and AS did not account for further variance in any of the PA outcome measures. In addition, the interaction between avoidance motivation (i.e., BIS score) and AS did not account for further variance in any of the PA outcome measures. In sum, AS and motivation were not associated with outcome measures on the PA task. However, impulsivity was significantly associated with the amount of commission errors made, which is consistent with prior literature (Trommer, Hoeppner, Lorber, & Armstrong, 1988).

Hypothesis Two

Hypothesis two concerned the daily decision diary portion of the study.

Hypothesis Two- A. It was hypothesized that ASI scores would be negatively related to positive risk taking in the real world. In addition, it was predicted that higher

levels of AS would be associated with more negative expectancies of engaging in positive risk taking.

Correlations between AS and positive risk taking were examined (Table 10). Contrary to the predictions, AS was not significantly associated with any positive risk taking dimensions. Positive risk taking dimensions were moderately to strongly correlated with one another. Correlations between AS and negative expectancies of positive risk taking were also examined (Table 11). Findings were not in line with the predictions: AS was not significantly correlated with negative expectancies within any of the positive risk taking domains. Negative expectancies of each positive risk taking domain were moderately to strongly correlated with one another. Correlations between AS and positive expectancies were also examined (Table 12). AS was not associated with positive expectancies of any positive risk taking dimension.

Table 10. Correlations between AS and Positive Risk Taking Behavior

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
1. ASI-3	--						
2. Positive Risk	.10	---					
3. Nat. Assert.	.10	.85***	---				
4. Non-avoidance	.14	.93***	.69***	---			
5. Openness	.10	.86***	.61***	.77***	---		
6. Sport Risk	-.09	.49***	.15	.38***	.43***	---	
7. Social Risk	.08	.92***	.94***	.84***	.70***	.25***	---

Note. ASI = Anxiety Sensitivity Inventory- 3; Positive Risk = Positive Risk Taking Composite; Nat. Assert. = Assertiveness Subscale of Positive Risk Taking Scale; Non-avoidance = Non-avoidance of Negative Emotions Subscale of Positive Risk Taking Scale; Openness = Openness to New Activities Subscale of Positive Risk Taking Scale; Sport Risk = High Risk Sport Subscale of Positive Risk Taking Scale; Social Risk = Social Risk Taking Subscale of Positive Risk Taking Scale.
*** $p < .001$

Table 11. Correlations between AS and Negative Expectancies of Positive Risk Taking

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
1. ASI-3	---						
2. Risk- Pos Risk	.09	---					
3. Risk- Assertiveness	.12	.92***	---				
4. Risk- Non-avoidance	.06	.95***	.88***	---			
5. Risk - Openness	.12	.87***	.83***	.76***	---		
6. Risk- Sport risk	.06	.80***	.57***	.66***	.65***	---	
7. Risk -Social risk	.12	.94***	.98***	.94***	.82***	.59***	---

Note. ASI = Anxiety Sensitivity Inventory- 3; Risk- Pos Risk = Negative Expectancies of Positive Risk Taking; Risk- Assertiveness = Negative Expectancies of Assertiveness; Risk- Non-avoidance = Negative Expectancies of Non-avoidance of Negative Emotions; Risk- Openness = Negative Expectancies of Positive Risk Taking Openness to New Activities; Risk- Sport Risk = Negative Expectancies of High Risk Sports; Risk- Social Risk = Negative Expectancies of Social Risk Taking.
*** $p < .001$

Table 12. Correlations between AS and Positive Expectancies of Positive Risk Taking

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**
1. ASI-3	---						
2. Ben- Pos Risk	.02	---					
3. Ben- Assertiveness	.01	.93***	---				
4. Ben- Non-avoidance	.03	.93***	.86***	---			
5. Ben - Openness	.01	.85***	.77***	.69***	---		
6. Ben- Sport risk	.00	.75***	.56***	.54***	.66***	---	
7. Ben -Social risk	.01	.95***	.97***	.93***	.77***	.54***	---

Note. ASI-3 = Anxiety Sensitivity Inventory- 3; Ben- Pos Risk = Positive Expectancies of Positive Risk Taking; Ben- Assertiveness = Positive Expectancies of Assertiveness; Ben- Non-avoidance = Positive Expectancies of Non-avoidance of Negative Emotions; Ben- Openness = Positive Expectancies of Positive Risk Taking Openness to New Activities; Ben- Sport Risk = Positive Expectancies of High Risk Sports; Ben- Social Risk = Positive Expectancies of Social Risk Taking.
*** $p < .001$

Hypothesis Two- B. In terms of negative risk taking, it was predicted that several variables including positive expectancies, expressive suppression, and impulsivity would moderate the relationship between negative risk taking and AS. Specifically, higher AS individuals who had more positive expectancies, were higher in expressive suppression, and/or who had higher impulsivity would take more negative risks than their counterparts.

Correlations were first assessed between variables. Table 13 presents correlations between negative risk taking behavior and variables predicted to be associated with negative risk taking behavior. Positive expectancies of negative risk taking and impulsivity were moderately, positively correlated with negative risk taking behavior. AS and expressive suppression were not significantly associated with negative risk taking

behavior or positive expectancies of negative risk taking. AS and expressive suppression were weakly, positively correlated with one another. Impulsivity (i.e., BIS-11-Total) was weakly, positively correlated with positive expectancies of negative risk taking and AS.

Table 13. Correlations between Negative Risk Taking, Positive Expectancies of Negative Risk Taking, AS, Expressive Suppression and Impulsivity

	1.	**2.**	**3.**	**4.**	**5.**
1. Negative Risk	--				
2. Benefit- Neg Risk	.47***	---			
3. ASI-3	.13	.15	---		
4.ERQ-Suppression	.10	.04	.23**	---	
5. BIS-11- Total	.35***	.23*	.27***	.13	---

Note. Negative Risk = Negative Risk Taking Composite; Benefit- Neg Risk = Positive Expectancies of Negative Risk Taking; ASI-3 = Anxiety Sensitivity Index- 3; ERQ- Suppression = Emotion Regulation Questionnaire, Suppression Scale; BIS-11-Total; Barratt Impulsiveness Scale -11- Total Score.
* p < .05; **p < .01; *** p < .001

Assumptions for moderated regression were assessed in a similar manner as described for Hypothesis One. There was no indication of multicollinearity (no tolerance values > .91). Multivariate outliers were found for the interaction between AS and positive expectancies (n = 1), AS and expressive suppression (n = 3), and AS and impulsivity (n = 4). Analyses were conducted with and without outliers, and the outcomes were unchanged; therefore, outliers were left in final analyses[3]. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity for AS and positive expectancies and AS and impulsivity. The plot of studentized residuals against

[3] The interaction between AS and impulsivity predicting negative risk taking behavior was marginally significant (p = .08) when outliers were removed.

unstandardized predicted values for AS and expressive suppression showed heteroscedasticity, with the residual plot showing a decreasing funnel shape. Shapiro-Wilk's test was significant for AS and positive expectancies, and AS and expressive suppression ($p < .01$), indicating that studentized residuals were not normally distributed. Visual inspection of the histogram showed that the residuals for AS and positive expectancies had a positive skew and were playtokurtotic. The residuals for AS and expressive suppression and AS and impulsivity were both positively skewed.

A hierarchical multiple regression analysis was conducted to examine the interaction between AS and positive expectancies of negative risk taking. AS and positive expectancies were added simultaneously into step one of the model which accounted for 20.1% of the total variance in negative risk taking, $R^2 = .201$, $F(2, 129) = 16.21$, $p < .01$. Higher positive expectancies of negative risk taking were associated with more negative risk taking behavior ($t(129)=33$, $\beta = .44$, $p < .01$). AS was not associated with negative risk taking behavior ($t(129)=33$, $\beta = .06$, $p = .44$). The interaction between AS and positive expectancies was entered into step two of the model. The interaction between AS and positive expectancies did not account for significant change in the variance explained in negative risk taking, $\Delta R^2 = .004$, $\Delta F(1, 128) = .65$, $p = .42$.

A hierarchical multiple regression examining the interaction between AS and expressive suppression for negative risk taking was run. AS and expressive suppression were added simultaneously into step one of the model which accounted for 2.1% of the total variance in negative risk taking, $R^2 = .021$, $F(2, 128) = 1.34$, $p = .27$. The interaction between AS and expressive suppression was entered into step two of the model. The

interaction between AS and expressive suppression did not account for significant change in the variance explained in negative risk taking, $\Delta R^2 = .004$, $\Delta F(1, 127) = .54$, $p = .47$.

A hierarchical multiple regression examining the interaction between AS and impulsivity for negative risk taking was also run. AS and BIS total score were added simultaneously into step one of the model which accounted for 12.3% of the total variance in negative risk taking, $R^2 = .123$, $F(2, 118) = 8.31$, $p < .001$. Higher levels of impulsivity were associated with greater negative risk taking behavior ($t(118)=33$, $\beta = .32$, $p < .01$), but AS was not significantly associated with negative risk taking behavior ($t(118) =33$, $\beta = .07$, $p = .43$). The interaction between AS and impulsivity was entered into step two of the model. The interaction between AS and impulsivity did not account for significant change in the variance explained in negative risk taking, $\Delta R^2 = .013$, $\Delta F(1, 117) = 1.78$, $p = .19$.

Hypothesis Three

Hypothesis Three examined the relations between laboratory decision making and naturalistic decision making.

Hypothesis Three- A. It was predicted that there would be positive correlations between BART outcome measures, BART adjusted pumps in particular, and positive risk taking in the real world. These findings could corroborate the notion that risk taking on the BART is advantageous, and therefore, can be considered a form of positive risk taking. In contrast to predictions, none of the BART outcome measures were significantly correlated with any of the naturalistic positive risk taking domains (Table 14).

Table 14. Correlations between BART Performance and Positive Risk Taking

	1.	**2.**	**3.**	**4.**	**5.**
1. BART- Adj	--				
2. BART- Bursts	.55***	---			
3. Positive Risk	-.03	.00	---		
4. Social Risk	-.02	-.03		---	
5. Non-avoidance	-.04	.03	.92***	.93***	---

Note. Bart- Adj = Average balloon pumps on the BART adjusted for balloon bursts; Bart- Bursts = Total sum of balloon bursts on the BART; Positive Risk = Positive Risk Taking Composite; Social Risk = Social Risk Taking Subscale of Positive Risk Taking Scale; Non-avoidance = Non-avoidance of Negative Emotions Subscale of Positive Risk Taking Scale.
*** $p < .001$

Hypothesis Three- B. It was predicted that the relations between risk taking on the BART and positive risk taking in the real-world would be moderated by AS. Assumptions for moderated regression were assessed in a similar manner as described for Hypotheses One and Two. There was no indication of multicollinearity (tolerance values > .98). No multivariate outliers were identified. There were no points exceeding both leverage and Cook's distance cut-offs. Plots of studentized residuals against unstandardized predicted values showed homoscedasticity. Shapiro-Wilk's test indicated that the studentized residuals were normally distributed.

A hierarchical multiple regression examining the interaction between AS and positive risk taking for BART adjusted pumps was run. AS and positive risk taking were added simultaneously into step one of the model which accounted for .2% of the total variance in BART adjusted pumps, $R^2 = .002$, $F(2, 124) = .15$, $p = .86$. The interaction between AS and positive risk taking was entered into step two of the model. The interaction between AS and positive risk taking did not account for significant change in the variance explained in BART adjusted pumps, $\Delta R^2 = .002$, $\Delta F(1, 123) = .22$, $p = .64$.

Contrary to predictions, AS did not interact with naturalistic positive risk taking to predict laboratory risk taking behavior on the BART task.

Hypothesis Three- C. Specific predictions between negative risk taking in naturalistic settings and laboratory behavior were not made. Correlations between negative risk taking behavior and participants' performance on each laboratory task were assessed to explore the relations between negative risk taking in naturalistic and laboratory settings (Table 15-17). Negative risk taking behavior in the real-world was not significantly correlated with risk taking behavior on any of the laboratory tasks.

Table 15. Correlations between BART Outcome Measures and Negative Risk Taking

	1.	**2.**	**3.**	**4.**
1. BART- Adj	----			
2. BART- Bursts	.55***	----		
3. Negative Risk	-.01	-.03	----	
4. Work Risk	.04	-.03	.86***	----

Note. BART- Adj = Average balloon pumps on the BART adjusted for balloon bursts; Bart-Bursts = Total sum of balloon bursts on the BART; Negative Risk = Negative Risk Taking Composite; Work Risk = Work/School-Related Risk Taking Subscale of Negative Risk Taking Scale.
*** $p < .001$

Table 16. Correlations between IGT Outcome Measures and Negative Risk Taking

	1.	2.	3.	4.
1. IGT- choice	----			
2. IGT- sum	-.78***	----		
3. Negative Risk	.12	-.13	----	
4. Work Risk	.12	-.10	.86***	----

Note. IGT- choice = Number of choices from good decks subtracted from number of choices on bad decks on the IGT task; IGT- Sum = Total sum collected on the IGT task; Negative Risk = Negative Risk Taking Composite; Work Risk = Work/School-Related Risk Taking Subscale of Negative Risk Taking Scale.
*** $p < .001$

Table 17. Correlations between PA Outcome Measures and Negative Risk Taking

	1.	2.	3.	4.	5.
1. PA- Om. Err.	----				
2. PA- Com. Err.	-.43***	----			
3. PA- sum	-.08	-.75***	----		
4. Negative Risk	.04	.04	-.04	----	
5. Work Risk	-.11	.07	-.06	.86***	---

Note. PA- Om. Err. = Errors of omission on the Passive Avoidance Task; PA- Com. Err. = Errors of commission on the Passive Avoidance Task; PA- sum = Total sum collected on the Passive Avoidance Task; Negative Risk = Negative Risk Taking Composite; Work Risk = Work/School-Related Risk Taking Subscale of Negative Risk Taking Scale.

*** $p < .001$

CHAPTER 4

DISCUSSION

Most previous research on anxiety and decision making using laboratory computer tasks did not connect findings to behavior in the real-world, leaving a large gap in our knowledge of how laboratory findings translate to real-life behavior. The current study filled this gap by assessing decision making in the laboratory with computer tasks and in real-world settings with the use of a daily diary. To this end, the current study addressed three aims.

A first aim of this study was to assess the relations between AS and naturalistic and laboratory risk taking behavior. In contrast to predictions, AS was not associated with risk taking on laboratory tasks or in naturalistic settings. In addition, predicted moderators did not interact with AS to explain significant variance in laboratory or naturalistic risk taking. These results suggest that, at least in the current sample of college students, other variables (e.g., impulsivity) may play a larger role in risk taking than anxiety sensitivity.

A second aim was to establish a measure assessing real-world positive risk taking. The currently available measure that assesses naturalistic risk taking (i.e., the CARE questionnaire) is largely made up of negative risk taking behaviors. Inclusion of positive risk taking behaviors can be beneficial as assessment of different types of risk taking could aid in understanding whether certain factors are involved in the propensity to take risks in general or only in taking particular types of risks.

A final aim of this study was to examine the relations between risk taking in the laboratory and naturalistic settings. Overall, risk taking in the laboratory was not

associated with real-world risk taking. These findings suggest that findings using laboratory risk taking paradigms may not be generalized to real-world behavior. On the other hand, these results may imply that the current laboratory tasks assessed a particular type of risk taking that was not captured by the daily decision dairy.

AS and Risk Taking on Laboratory Tasks

According to the original hypotheses, performance on the BART would be predicted by approach and avoidance motivation as measured by the promotion and prevention scales, respectively, of the RFQ. However, the promotion scale of the RFQ had low internal consistency in the current sample, and, thus, the RFQ scales were not used in the analyses. Instead another measure of approach and avoidance motivation, the BIS/BAS, was used for all analyses involving motivation. BAS subscales, including BAS Drive, Fun Seeking, and Reward Responsiveness, and the BAS total score were used as measures of approach motivation. The unitary BIS scale was utilized as a measure of avoidance motivation. These measures were all found to have high reliability. Based on Gray's theory of motivation (Gray, 1982), subscales of the BIS/BAS assess approach and avoidance motivation. Predictions regarding the interaction between anxiety and motivation remained unchanged with the use of the BIS/BAS. Consistent with prior research (Pickett, Lodis, Parkhill, & Orcutt, 2012), higher AS levels were associated with higher BIS levels. Similarly, prior research has found that the BIS scale is associated with higher levels of neuroticism and associated traits such as depression and anxiety (Campbell-Sills, Liverant, & Brown, 2004). Higher AS levels were also associated with lower levels of BAS- Fun Seeking. AS was not related to any other BAS subscales. The current findings are also consistent with previous research which found that an

underactive BAS was more characteristic of depression while not being related to anxiety (Campbell-Sills et al., 2004).

Based on findings from prior research, laboratory tasks with different risk/reward ratios were selected to assess different types of risk taking. More specifically, risk taking is beneficial up until a particular point on the BART (Maner et al., 2007), whereas risk taking on the IGT is generally not beneficial (e.g., Upton, Bishara, Ahn, & Stout, 2011). Consistent with this notion, risk taking on the BART (as assessed by adjusted balloon pumps) was associated with higher sum scores on the IGT and PA tasks, both of which are associated with task success. On the IGT, in particular, task success is associated with less risk taking. BART risk taking was also associated with more advantageous deck selections on the IGT (i.e., advantageous decks offer lower rewards and punishments on individual trials) and less commission errors on the PA task. Risky, disadvantageous decks selections on the IGT and commission errors on the PA task are both indicators of negative risk taking. These results provided evidence that risk taking on the BART differed from risk taking on the IGT and PA tasks. Specifically, risk taking on the BART was associated with less risk taking on the IGT and PA tasks. These results provide further evidence that risk taking on the BART is beneficial, unlike risk taking on the IGT and the PA task.

As expected, advantageous deck selections on the IGT were associated with a higher overall sum earned on the IGT, suggesting that less risk taking on the IGT was associated with greater task success. Advantageous deck selections on the IGT were also associated with less commission errors on the PA task and higher overall earnings on the PA task. Commission errors are indicative of negative risk taking, while greater overall

earnings on the PA task are indicative of task success. These results suggest that the tendency to engage in negative risk taking was consistent across tasks. More omission errors on the PA task were also associated with less commission errors on the PA task; however, omission errors were not related to overall earnings on the PA task. Therefore, while omission errors do not appear to be detrimental or beneficial to overall task success, they may be related to heightened avoidance of both negative and positive risk taking.

Overall, results examining the relations between and within laboratory task measures are consistent with the idea that the tasks with different risk-reward ratios assess different forms of risk taking. Specifically, risk taking on the BART may be considered beneficial or positive risk taking, while risk taking on the IGT is not considered beneficial. Within the PA task, commission errors were identified as a measure of negative risk taking due to their association with other negative risk taking behaviors (i.e., IGT "bad deck" selections) and worse PA task success.

AS and BART Risk Taking. Contrary to predictions, neither AS nor motivation was associated with risk taking on the BART. In addition, the interaction between AS and motivation was not associated with risk taking on the BART. This is in contrast to prior studies demonstrating that BART risk taking is associated with level of anxiety (Maner et al., 2007). Previous studies have also shown that factors such as impulsivity and inattentiveness, characteristics of ADHD, influence BART risk taking. The current study did not find an association between impulsivity and BART risk taking; however, it is possible that other similar, unmeasured factors, such as ADHD symptoms, are more strongly associated with risk taking on the BART than AS. As discussed in the Methods

section, there are three different reward levels in the BART (i.e., 1 cent, 5 cents, and 25 cents). The current study used a moderate reward (i.e., 5 cents). Prior research has shown impulsivity to influence risk taking only at the highest reward level (White et al., 2008). Research has also shown that monetary compensation for participation also increases risk taking (Ferrey & Mishra, 2014). These findings potentially explains why impulsivity was not associated with BART risk taking in the current study.

Importantly, higher AS levels were significantly associated with greater levels of impulsivity in the current study, which was unexpected. According to Gray's model of appetitive and aversive motivational drives (Gray, 1982), anxiety is posited to be associated with aversive motivational drives whereas impulsivity is expected to be associated with appetitive motivational drives. Appetitive and aversive motivational drives are supposed to be orthogonal and are therefore not expected to be associated with one another. Furthermore, anxiety and impulsivity would lead to opposite predictions regarding risk taking. While it would be predicted that heightened anxiety would be associated with avoidance of risk taking, it would be expected that impulsivity would be associated with heightened risk taking. It is possible that the significant association between anxiety and impulsivity in the current sample suppressed any potential association between approach and avoidance motivation on BART risk taking. Individuals with higher AS levels in the current study might behave differently than higher AS individuals in other studies, who may exhibit lower impulsivity levels. Different combinations of traits may have resulted in alterations in behavior through their differential impact on factors like motivation.

Lastly, levels of risk taking on the BART in the current study were lower than in previous studies, which could have contributed to results that are inconsistent with predictions. Specifically, both BART sum scores and BART adjusted pumps were lower than prior studies (e.g., White et al., 2008). The lower than typical levels of risk taking in the current sample may have dampened relations between anxiety and BART performance.

AS and IGT Risk Taking. Following up on prior research examining anxiety and risk taking on the IGT (Miu et al., 2008), it was predicted that AS and rumination would interact to influence maladaptive risk taking on the IGT. This hypothesis was not supported. Neither AS nor rumination was significantly associated with IGT risk taking. The interaction between AS and rumination also did not account for significant variance in the degree of risk taking behavior. Similar to risk taking on the BART, it is likely that other factors have a greater influence over risk taking on the IGT than AS in the current sample.

Differences in analytical strategy and sample characteristics might explain why current results contrast with prior finding. Many studies using the IGT analyzed performance across blocks (i.e., 5 blocks of 20 trials for the 100 total trials). However, the only study examining the relations between anxiety and IGT performance examined overall performance (Miu et al., 2008). Following Mui and colleagues, I examined overall performance on the IGT. The differences in analytical technique could alter the sensitivity of the IGT to find differences. However, post-hoc analyses of performance across blocks did not change interpretations of the null findings based on overall performance (see results section for further information). While methods and analytical

techniques were modeled after Mui and colleagues study (2008), other differences existed. Mui and colleagues (2008) used a small sample size (n = 20) with an extreme group design (i.e., high and low anxiety groups) as opposed to a continuous sample used in the current study.

AS and PA Risk Taking. According to the hypotheses, the interaction between AS and motivation state would predict risk taking on the PA task. Results did not support the hypotheses as neither the interaction between AS and approach motivation nor AS and avoidance motivation were associated with PA risk taking.

Impulsivity was significantly associated with commission errors. Specifically, participants with higher levels of impulsivity made more commission errors. When participants make commission errors on the PA task, they are given immediate punishment feedback in the form of losing points. Thus, these findings may reflect a reduced sensitivity to punishment in impulsive individuals. Indeed, impulsivity has been found to be related to reduced sensitivity to punishing stimuli in prior studies (e.g., Potts, George, Martin, & Barratt, 2006).

Given that impulsivity was associated with AS, impulsivity was controlled for in analyses examining relations between AS and PA risk taking. Controlling for impulsivity did not change the relation between AS, motivation, and risk taking on the PA task. Similar to the IGT, differences in risk taking due to anxiety may be more pronounced when using extreme groups rather than assessing anxiety on a continuum. In the current study, individuals tended to make more commission errors and less omission errors overall. These findings suggest that this sample of individuals was more likely to take risks on the PA task. However, due to a lack of normative data for the PA task, it is not

possible to determine if participants in the current sample were particularly risk averse or risk taking. Alternatively, results may also be due to participants' lack of effort or attentiveness to the task, which may have suppressed any anxiety related differences in risk taking.

AS and Naturalistic Risk Taking

AS and Positive Risk Taking. According to the hypotheses, AS was predicted to be associated with lower positive risk taking and higher levels of negative expectancies of positive risk taking. Results did not show any significant relations between AS and positive risk taking or AS and negative or positive expectancies of positive risk taking.

As stated above, it is possible that characteristics of the current sample such as a lowered propensity to take positive risks and higher levels of impulsivity may have contributed to heterogeneity in positive risk taking in individuals with varying levels of anxiety. In addition, it is possible that individuals with higher AS levels avoid particular types of positive risk (e.g., taking a pay-cut to take a more rewarding job) that were not represented in the current study. Many of the naturalistic positive risk items assessed risk taking in social settings.

Interestingly, anxious individuals in the current sample also did not expect more negative consequences from engaging in positive risk taking, another factor which likely played a role in the lack of differences in risk taking attributable to anxiety. These findings highlight the importance of assessing individuals' perception of risk in understanding individuals' engagement in risk taking behavior.

AS and Negative Risk Taking. It was predicted that the relations between AS and negative risk taking in naturalistic settings would be moderated by several variables

including impulsivity, expressive suppression, and positive expectancies. Prior studies have shown that the interaction between anxiety and positive expectancies of negative risk taking predicted significantly higher levels of negative risk taking behavior (Kashdan et al., 2006). In the current study, AS did not interact with any of the predicted moderator variables to account for negative risk taking behavior. However, there were main effects of positive expectancies and impulsivity for negative risk taking behavior. In particular, higher levels of positive expectancies and higher levels of impulsivity predicted more negative risk taking behavior, which is in line with prior research (Kashdan et al., 2006). Higher impulsivity levels also correlated with higher positive expectancies of negative risk taking. Thus, impulsive individuals may take more risks because they expect more benefits from taking negative risks and have a lower sensitivity to the punishments associated with negative risk taking. Again, the significant relation between positive expectancies of negative risk taking and involvement in negative risk taking behaviors suggests a significant role of individuals' perception of risk in engagement in risky behavior.

Laboratory and Naturalistic Risk Taking

Positive Risk Taking. It was predicted that risk taking on the BART would be associated with positive risk taking in the real world. It was also predicted that AS would moderate the relation between BART risk taking and naturalistic positive risk taking. Results did not support this hypothesis: Positive risk taking and BART risk taking were not significantly correlated with one another. In addition, the relation between BART risk taking and naturalistic positive risk taking was not moderated by AS. Considering significant correlations between laboratory tasks, these results suggest that BART risk

taking and naturalistic positive risk taking assessed different types of positive risk taking. Many of the naturalistic positive risk taking items assessed assertiveness, social risk taking, and non-avoidance of negative emotional states. In contrast, the BART captures financial or economic risk taking. In addition, environmental context might play an important role in influencing positive risk taking behavior. That is, risk taking in a laboratory situation may be fundamentally different from risk taking in a real-world setting. Regardless, the findings suggest that risk taking as assessed by BART performance should not be automatically extrapolated to real world positive risk taking behavior and vice-versa.

Negative Risk Taking. Specific hypotheses were not made regarding relations between risk taking on laboratory tasks and negative risk taking in real world settings. Thus, all analyses examining relations between laboratory risk taking behavior and naturalistic negative risk taking were exploratory in nature. Correlations were examined between laboratory risk taking and naturalistic negative risk taking. In general, laboratory risk taking behavior was not significantly associated with negative risk taking behavior in the real world. It is possible that, similar to explanations of null findings between BART risk taking and naturalistic positive risk taking, the CARE questionnaire did not capture the particular form of negative risk taking assessed by the IGT and PA task. Alternatively, as stated above, the context of laboratory and naturalistic risk taking may be fundamentally different such that behavior is not consistent from one setting to the other.

Implications

In the current sample of undergraduate students, anxiety was not significantly associated with any form of risk taking. These results were in contrast to predictions and much of the literature examining the association between anxiety and risky decision making. Given that impulsivity was significantly associated with AS, higher AS individuals in the current sample may represent a particular subtype of high AS individuals, exhibiting a pattern of risk taking behavior not represented in other studies. Higher levels of impulsivity in the current sample could be due to the sample being made up of young, primarily first-year female college students. While most research focuses on inhibited, anxious individuals, recent research recognizes that predominately inhibited anxiety is just one subtype of anxiety. In a study on naturalistic risk taking, Kashdan and colleagues (2008) identified a group of anxious individuals who took more risks than non-anxious individuals. Indeed, impulsivity and anxiety may be associated due to the involvement of overlapping brain regions. Specifically, studies have shown abnormal frontal lobe functioning in individuals with high levels of impulsivity and individuals with high levels of anxiety (Eysenck et al., 2007; Crews & Boettiger, 2009). Consequently, it is advised to, at a minimum, assess and control for impulsivity levels when examining relations between anxiety and risk taking.

In spite of the potential role of the heightened impulsivity observed in the current sample, the fact that AS was not related to any measures of negative or positive risk taking in the current study remains puzzling. Prior studies have demonstrated a relatively consistent relation between anxiety and risk taking behavior. In addition, most theories regarding anxious behavior suggest that anxious individuals most likely will withdraw

from risk (e.g., Gray's biopsychosocial theory of personality). Indeed clinical presentations of anxiety disorders often involve a high degree of risk aversion. The use of a normative sample rather than a clinical sample may have resulted in the lack of risk aversion in the current study. Perhaps risk aversion emerges further into the course of anxiety disorders, born out of fear conditioning, persistent avoidant behavior and negative interpretations of the consequences of risk taking behavior. The current study and Kashdan's and colleagues (2006) study suggest that a new theory is necessary to fully describe how anxiety in normal samples influences risk taking. A new, more comprehensive theory may help to understand the conditions in which anxious individuals are more prone to take risks. For instance, demographic characteristics such as age, sex, and education level may play a role in levels and forms of risk taking behavior. Further investigations of co-occurring traits (e.g., impulsivity, which is discussed below) that influence risk taking may also clarify the instances in which risk taking is most and least likely to occur. Longitudinal studies may also help us understand when risk taking is most likely to occur as anxiety symptoms fluctuate over time.

In the current study, impulsivity was a significant predictor of negative risk taking behavior in the real world and in the laboratory. These findings suggest that in a college sample, impulsivity is a good predictor of risk taking behavior. In addition, the current study only found associations between impulsivity and negative risk taking behavior and not positive risk taking behavior. It is not surprising that impulsivity predicts higher levels of risk taking; however, few studies examined the associations between impulsivity and risk taking in both naturalistic and laboratory settings within the same study. Further, the unique association between impulsivity and negative risk taking behavior, both in

naturalistic and laboratory settings, helps to further delineate negative and positive risk taking as distinct risk taking dimensions. Impulsivity is related to a reduction in sensitivity to punishment stimuli (e.g., Potts et al., 2006). In the current study, impulsive individuals did not withhold responses to punishing stimuli in the PA task, which might be due to their reduced sensitivity to punishment. In addition, the current study demonstrated a relation between impulsivity and positive expectancies of negative risk taking. Thus, interventions for impulsive individuals may benefit from focusing on altering their positive expectations of negative risk to decrease negative risk taking behaviors.

The current study was successful in differentiating positive and negative risk taking in the laboratory. Specifically, risk taking on the BART can be considered positive risk taking, whereas risk taking on the IGT can be considered negative risk taking. Clear distinctions between positive and negative risk taking in real world decision making were not found as many naturalistic positive and negative risk taking behaviors were correlated with one another. Perhaps negative and positive risk taking are not divergent in the real-world for many individuals. A distinction between negative and positive risk taking in the laboratory, but not in naturalistic settings, point to the role environmental context may play in risk taking behavior. However, clear delineations of negative and positive risk taking do not exist in the literature. Providing clear distinctions between positive and negative may clarify the nature of avoidance in anxiety disorders and other mental health conditions. Avoidance plays such a significant role in the maintenance of anxiety and, thus, understanding the types of avoided and approached activities is clinically valuable. For example, knowing which activities are avoided could aid in informing assessment

and cognitive-behavioral interventions for anxiety disorders. Additionally, understanding the impact of interventions for anxiety on risk taking behavior could have great clinical relevance for emotional and physical health. Distinguishing between positive and negative risk taking while also highlighting the role of environmental context may also offer important information to inform further research in understanding how trait characteristics influence different types of risk taking.

Limitations and Future Directions

There were several limitations to the current research. First, the sample used in the current study consisted entirely of undergraduate students. The age of the sample may have contributed to the association between anxiety and impulsivity in the current study, considering that frontal lobe development is not complete until the late 20s or even 30s (Sowell, Thompson, Holmes, Jernigan, & Toga, 1999). In addition, using a clinical sample could clarify the role of pathological anxiety in laboratory and naturalistic risk-taking behavior given that risk aversion may not be manifested until an individual has developed or begins to develop an anxiety disorder.

Participants' AS levels were assessed solely by a self-report measure. However, self-evaluation of various traits tends to have low validity and high variability (Mabe & West, 1982). Physiological measures of anxiety, such as galvanic skin conduction could be used in conjunction with self-report measures to increase validity of trait characterization of anxiety. Although better characterization of anxiety may be beneficial, reliability of AS in the current study was high and related to other relevant measures of anxiety (i.e., trait anxiety scale, social anxiety scale). Therefore, it is reasonable to conclude that measurement of anxiety was adequate in the current study.

Self-report was also utilized to assess all other trait characteristics and behavior in real world settings, which could introduce reporting biases. Regarding the assessment of risk taking behavior in real world settings, there was an additional limitation. Prompts to complete risk taking questionnaires were sent at a specified time point (i.e., 4 pm each day) over the course of a seven-day time period. That is, risk taking behavior was not assessed as it occurred but was reported retrospectively. Unfortunately retrospective reports of behavior may be inaccurate and subject to attention and memory biases. Obtaining reports of behavior at a specified time point could result in missed opportunities to observe behavior in real-time. Assessing behavior more frequently, such as through ecological momentary analyses or over a longer period of time (e.g., 30 days), may provide a more accurate and detailed representation of naturalistic behavior. At the same time, however, having a standardized time point of collecting data and a relatively short monitoring period might have increased compliance in collecting diary data.

Another limitation of this study was the use of computer-based decision making paradigms that concerned mainly economic/financial decision making. Both the BART and the IGT involved gaining and losing money, while the passive avoidance task involved gaining and losing points. Although computer tasks were economical in nature, prior research has provided evidence that these tasks are appropriate proxies of real world risk taking behavior in a variety of domains (e.g., Lejuez et al., 2002; Xu, Korczykowski, Zhu, & Rao, 2013). Specifically, Lejuez and colleagues (2002) found that self-reported engagement in addictive behaviors (e.g., smoking status, alcohol consumption) and general risk taking behaviors (e.g., amount of times stealing) was positively correlated with performance on the BART. Even so, many of the items used in the decision making

diary in the current study, especially positive risk items, were social and emotional in nature. Thus, a future avenue for assessing risk taking in anxiety would be to incorporate computer tasks with more social-based risk taking and/or to include more economic or financial risk taking items to real-world risk taking measures.

Another limitation of the computer-based decision making paradigms was that participants did not earn actual monetary compensation from the points earned on the tasks. Thus, the points earned may not have provided salient enough incentive to influence effort on the tasks. To address this limitation and to ensure adequate level of motivation, I informed participants that individuals who performed better than average would be entered into a lottery to win a gift card. In reality, all participants were entered into this drawing).

Understanding the role of anxiety in risk taking behavior is highly important in better understanding the clinical presentation of anxiety and its treatment. Avoidance plays a critical role in the etiology and maintenance of anxiety disorders; however, avoidance is not always straightforward, such as in simple phobias. This was demonstrated in the current study. Contrary to prior findings, anxiety-related alterations in risk taking behavior were not found in either laboratory or naturalistic settings. While results did not support hypotheses, valuable information was obtained that demonstrated circumstances in which anxiety may not be associated with risk taking. The findings from the current study also provided support for the distinction between negative and positive risk taking which can be utilized to inform future research on risk taking. Lastly, the current findings suggest that impulsivity plays an important role in risk taking with long-term negative consequences demonstrating insensitivity to punishing ramifications in

favor of short-term benefits. Clearly, more research is needed to better understand the effects of anxiety on negative and positive risk taking while considering levels of impulsivity.

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APPENDIX A: CONSENT FORM

Laboratory-Based and Naturalistic Decision Making

Informed Consent Form

You are invited to participate in a research project being conducted by Amanda Kutz, a graduate student in the Department of Psychology at the University of Maine (Faculty Sponsor: Dr. Lira Yoon). The purpose of the research is to investigate the decision making in different settings. You must be at least 18 years of age to participate without parental permission.

What Will You Be Asked to Do?

If you decide to participate, you will be asked to complete a laboratory session and a daily diary involving logging emotions and engagement in certain activities for 7 days.

- **Laboratory Session**
  - For this session, you will complete computer tasks and questionnaires (e.g., "*Indicate how often you feel lonely*," "*It scares me when my heart beats rapidly*,") in a laboratory in Little Hall. Computer tasks involve making decisions based on task goals. Each computer task will take between 10-15 minutes to complete. Following the computer tasks, you will be asked to complete questionnaires on a computer. The laboratory session will last approximately one hour.
- **Daily Diary Monitoring**
  - Following the laboratory session, you will be asked to complete questionnaires assessing emotions (e.g., "*Distressed*," *Upset*") and daily activities including substance use (e.g. *"Tried drugs other than alcohol or marijuana"*) and participation in certain activities (e.g., *"Played non-contact team sports"*). You will be asked to complete these questionnaires each day for 7 days beginning on the nearest Monday. You will receive emails each day at 4pm with a link to complete the daily survey. Questionnaires will take approximately 10-15 minutes each day to complete.

Risks

- There is the possibility that you may become uncomfortable answering some of the questions. You have the right to skip questions you do not want to answer.

Benefits

- While there are no direct benefits to you from participating, we hope this study will help us to better understand the ways individuals make decisions.

Compensation

- You will receive 2 hours of research credit for participating in this study (Laboratory session =1 credit, Daily Diary Monitoring = 1 credit). In addition, if you complete all 7 days of the daily diary monitoring by 11:59pm each day, you will receive $5 cash.

Confidentiality

Your name will not be on any of the documents. Your name and email address will be needed if you wish to participate in daily diary monitoring portion of the study so that the experimenter (i.e., Amanda Kutz) can contact you with survey links each day of the study. This information will not be shared with anyone other than the individuals named above. A code number will be used on all study files to protect your identity. Study files will be labeled with an ID number in place of a name and will be maintained in a locked office. All electronic files will be maintained with password protection. Your name or other identifying information will not be reported in any publications. The key linking your name to the data will be destroyed after data analysis is complete (approximately in one year), but the investigator will keep the data, which only contains an ID number instead of your name, indefinitely. The key and the data files will be stored on separate computers. In addition, the file containing the key will be stored using software that provides additional protection.

Voluntary

Participation is entirely voluntary. You are free to refuse to participate in the study or withdraw your consent at any time during the study without giving reason. You may skip any questions you do not wish to answer. If you decide to withdraw, your credit compensation will be prorated.

Contact information:

If you have questions about this screening, please contact Amanda Kutz (email: Amanda.Kutz@umit.maine.edu). You may also reach the faculty advisor on this study, Dr. Lira Yoon at lira.k.yoon@umit.maine.edu. If you have any questions about your rights as a research participant, please contact Gayle Jones, Assistant to the University of Maine's Protection of Human Subjects Review Board at 581-1498 (or e-mail: gayle.jones@umit.maine.edu).

Your signature below indicates that you have read and understand the above information and agree to participate. You will receive a copy of this form.

_____ _____

Signature of Participant Date

APPENDIX B: LABORATORY QUESTIONNAIRES

ASI-3

Enter the number from the scale below that best describes how typical or characteristic each of the 16 items is of ***you***, putting the number next to the item. You should make your ratings in terms of how much you agree or disagree with the statement as a ***general*** description of yourself.

0	1	2	3	4
very little	a little	some	much	very much

1. It is important for me not to appear nervous.
2. When I cannot keep my mind on a task, I worry that I might be going crazy.
3. It scares me when my heart beats rapidly.
4. When my stomach is upset, I worry that I might be seriously ill.
5. It scares me when I am unable to keep my mind on a task.
6. When I tremble in the presence of others, I fear what people might think of me.
7. When my chest feels tight, I get scared that I won't be able to breathe properly.
8. When I feel pain in my chest, I worry that I'm going to have a heart attack.
9. I worry that other people will notice my anxiety.
10. When I feel "spacey" or spaced out I worry that I may be mentally ill.
11. It scares me when I blush in front of people.
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.
13. When I begin to sweat in a social situation, I fear people will think negatively of me.
14. When my thoughts seem to speed up, I worry that I might be going crazy.
15. When my throat feels tight, I worry that I could choke to death.
16. When I have trouble thinking clearly, I worry that there is something wrong with me.
17. I think it would be horrible for me to faint in public.
18. When my mind goes blank, I worry there is something terribly wrong with me.

STAI

Directions				
A number if statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate you *generally* feel.	**Almost Never**	**Sometimes**	**Often**	**Almost Always**
1. I feel pleasant	1	2	3	4
2. I feel nervous and restless.	1	2	3	4
3. I feel satisfied with myself.	1	2	3	4
4. I wish I could be as happy as other seem to be.	1	2	3	4
5. I feel like a failure.	1	2	3	4
6. I feel rested.	1	2	3	4
7. I am "calm, cool, and collected".	1	2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them.	1	2	3	4
9. I worry too much over something that really doesn't matter.	1	2	3	4
10. I am unhappy.	1	2	3	4
11. I have disturbing thoughts.	1	2	3	4
12. I lack self-confidence.	1	2	3	4
13. I feel secure.	1	2	3	4

14. I make decisions easily.	1	2	3	4
15. I feel inadequate.	1	2	3	4
16. I am content.	1	2	3	4
17. Some unimportant thought runs through my mind and bothers me.	1	2	3	4
18. I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
19. I am a steady person.	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests.	1	2	3	4

SPS

For each of the following statements, mark the appropriate answer in the space next to that statement. Indicate, using the 0 to 4 scale below, the degree to which the statement is typical or true of you **IN GENERAL**.

0----------1----------2----------3----------4

Not at all typical of me | Slightly | Moderately | Very | Extremely typical of me

_____ 1. I became anxious if I have to write in front of other people.

_____ 2. I become self-conscious when using public toilets.

_____ 3. I can suddenly become aware of my own voice and of others listening to me.

_____ 4. I get nervous that people are staring at me as I walk down the street.

_____ 5. I fear I may blush when I am with others.

_____ 6. I feel self-conscious if I have to enter a room where others are already seated.

_____ 7. I worry about shaking or trembling when I'm watched by other people.

_____ 8. I would get tense if I had to sit facing other people on a bus or a train.

_____ 9. I get panicky that others might see me faint, sick, or ill.

_____ 10. I would find it difficult to drink something if in a group of people.

_____ 11. It would make me feel self-conscious to eat in front a stranger at a restaurant.

_____ 12. I am worried people will think my behavior odd.

_____ 13. I worry I'll lose control of myself in front of other people.

_____ 14. I worry I might do something to attract the attention of others.

_____ 15. I would get tense if I had to carry a tray across a crowded cafeteria.

_____ 16. When in an elevator I am tense if people look at me.

_____ 17. I can feel conspicuous standing in a line.

_____ 18. I can get tense when I speak in front of other people.

_____ 19. I worry my head will shake or nod in front of others.

_____ 20. I feel awkward and tense if I know people are watching me.

BIS/BAS

Read each statement carefully and decide whether it is a "true" or and "untrue" description of your **usual reaction** in that particular situation. Then decide "how true" or "how untrue" the statement is, and use the following scale to indicate how the statement describes your reaction:

1 = quite untrue of you
2 = slightly untrue of you
3 = slightly true of you
4 = quite true of you

____ 1. If I think something unpleasant is going to happen I usually get pretty "worked up."

____ 2. When I get something I want, I feel excited and energized.

____ 3. When I want something I usually go all-out and get it.

____ 4. I worry about making mistakes.

____ 5. When I'm doing well at something, I love to keep at it.

____ 6. I go out of my way to get things I want.

____ 7. Criticism or scolding hurts me quite a bit.

____ 8. When good things happen to me, it affects me strongly.

____ 9. If I see a chance to get something I want, I move on it right away.

____ 10. I feel pretty worried or upset when I think or know somebody is angry at me.

____ 11. It would excite me to win a contest.

____ 12. When I go after something I use a "no holds barred" approach.

____ 13. Even if something bad is about to happen to me, I rarely experience fear or nervousness.

____ 14. When I see an opportunity for something I like, I get excited right away.

____ 15. I feel worried when I think I have done poorly at something.

____ 16. I have very few fears compared to my friends.

CES-D

Instructions: Below is a list of ways people sometimes feel or behave. For each item, please think and indicate how often or how consistently you have felt or behaved this way during THE PAST TWO MONTHS by circling the appropriate response number.

During the past two months:
0 = RARELY (less than 3 days over the past two months)
1 = SOMETIMES (a total of 3- 7 days spread out over the past two months)
2 = OFTEN (a total of 1- 4 weeks over the past two months)
3 = MOST OF THE TIME (4 weeks or more)

1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.				
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get "going".	0	1	2	3

Rumination Scale

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

1 almost never 2 sometimes 3 often 4 almost always

1. think about how alone you feel
2. think "I won't be able to do my job if I don't snap out of this"
3. think about your feelings of fatigue and achiness
4. think about how hard it is to concentrate
5. think "What am I doing to deserve this?"
6. think about how passive and unmotivated you feel.
7. analyze recent events to try to understand why you are depressed 8. think about how you don't seem to feel anything anymore
9. think "Why can't I get going?"
10. think "Why do I always react this way?"
11. go away by yourself and think about why you feel this way
12. write down what you are thinking about and analyze it
13. think about a recent situation, wishing it had gone better
14. think "I won't be able to concentrate if I keep feeling this way."
15. think "Why do I have problems other people don't have?"
16. think "Why can't I handle things better?"
17. think about how sad you feel.
18. think about all your shortcomings, failings, faults, mistakes
19. think about how you don't feel up to doing anything
20. analyze your personality to try to understand why you are depressed
21. go someplace alone to think about your feelings
22. think about how angry you are with yourself

Emotion Regulation Questionnaire (ERQ)

Instructions and Items

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1----------2----------3----------4----------5----------6----------7
strongly disagree **neutral** **strongly agree**

1 ____ When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*.

2 ____ I keep my emotions to myself.

3. ____ When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*.

4. ____ When I am feeling *positive* emotions, I am careful not to express them.

5. ____ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.

6. ____ I control my emotions by *not expressing them*.

7. ____ When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation.

8. ____ I control my emotions by *changing the way I think* about the situation I'm in.

9. ____ When I am feeling *negative* emotions, I make sure not to express them.

10. ____ When I want to feel less *negative* emotion, I *change the way I'm thinking* about the

Regulatory Focus Pride (RFQ)

This set of questions asks you HOW FREQUENTLY specific events actually occur or have occurred in your life. Please indicate your answer to each question by circling the appropriate number below it.

1. Compared to most people, are you typically unable to get what you want out of life?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

2. Growing up, would you ever "cross the line" by doing things that your parents would not tolerate?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

3. How often have you accomplished things that got you "psyched" to work even harder?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

4. Did you get on your parents' nerves often when you were growing up?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

5. How often did you obey rules and regulations that were established by your parents?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

6. Growing up, did you ever act in ways that your parents thought were objectionable?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

7. Do you often do well at different things that you try?

1	2	3	4	5
Never or seldom		Sometimes		Very Often

8. Not being careful enough has gotten me into trouble at times.

1	2	3	4	5
Never or seldom		Sometimes		Very Often

9. When it comes to achieving things that are important to me, I find that I don't perform as well as I ideally would like to.

1	2	3	4	5
Never or seldom		Sometimes		Very Often

10. I feel like I have made progress toward being successful in my life.

1	2	3	4	5
Certainly false				Certainly true

11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

1	2	3	4	5
Certainly false				Certainly true

Intolerance of Uncertainty Scale – Short Form

Please indicate the number that best corresponds to how much you agree with each item.

	Not at all characteristic of me	A little characteristic of me	Somewhat characteristic of me	Very characteristic of me	Entirely characteristic of me
1. Unforeseen events upset me greatly.	1	2	3	4	5
2. It frustrates me not having all the information I need.	1	2	3	4	5
3. Uncertainty keeps me from living a full life.	1	2	3	4	5
4. One should always look ahead so as to avoid surprises.	1	2	3	4	5
5. A small unforeseen event can spoil everything, even with the best of planning.	1	2	3	4	5
6. When it's time to act, uncertainty paralyses me.	1	2	3	4	5
7. When I am uncertain I can't function very well.	1	2	3	4	5
8. I always want to know what the future has in store for me.	1	2	3	4	5
9. I can't stand being taken by surprise.	1	2	3	4	5
10. The smallest doubt can stop me from acting.	1	2	3	4	5
11. I should be able to organize everything in advance.	1	2	3	4	5
12. I must get away from all uncertain situations.	1	2	3	4	5

BIS-11

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly. Answer questions on the following scale:

1= Rarely/Never, 2= Occasionally, 3= Often, 4= Almost Always/Always

1. I plan tasks carefully.
2. I do things without thinking.
3. I make-up my mind quickly.
4. I am happy-go-lucky.
5. I don't "pay attention."
6. I have "racing" thoughts.
7. I plan trips well ahead of time.
8. I am self controlled.
9. I concentrate easily.
10. I save regularly.
11. I "squirm" at plays or lectures.
12. I am a careful thinker.
13. I plan for job security.
14. I say things without thinking.
15. I like to think about complex problems.
16. I change jobs.
17. I act "on impulse."
18. I get easily bored when solving thought problems.
19. I act on the spur of the moment.
20. I am a steady thinker.
21. I change residences.
22. I buy things on impulse.
23. I can only think about one thing at a time.
24. I change hobbies.
25. I spend or charge more than I earn.
26. I often have extraneous thoughts when thinking.
27. I am more interested in the present than the future.
28. I am restless at the theater or lectures.
29. I like puzzles.
30. I am future oriented.

The College Self-Expression Scale

The following inventory is designed to provide information about the way in which you express yourself. Please answer the questions by checking the appropriate box from 0-4 (Almost Always or Always, 0; Usually, 1; Sometimes, 2; Seldom, 3; Never or Rarely, 4) on the computer answer sheet. Your answer should reflect how you generally express yourself in the situation.

1. Do you ignore it when someone pushes in front of you in line?
2. When you decide that you no longer wish to date someone, do you have marked difficulty telling the person of your decision?
3. Would you exchange a purchase you discover to be faulty?
4. If you decided to change your major to a field which your parents will not approve, would you have difficulty telling them?
5. Are you inclined to be over-apologetic?
6. If you were studying and if your roommate were making too much noise, would you ask him to stop?
7. Is it difficult for you to compliment and praise others?
8. If you are angry at your parents, can you tell them?
9. Do you insist that your roommate does his fair share of the cleaning?
10. If you find yourself becoming fond of someone you are dating, would you have difficulty expressing these feelings to that person?
11. If a friend who has borrowed $5.00 from you seems to have forgotten about it, would you remind this person?
12. Are you overly careful to avoid hurting other people's feelings?
13. If you have a close friend whom your parents dislike and constantly criticize, would you inform your parents that you disagree with them and tell them of your friend's assets?
14. Do you find it difficult to ask a friend to do a favor for you?
15. If food which is not to your satisfaction is served in a restaurant, would you complain about it to the waiter?
16. If your roommate without your permission eats food that he knows you have been saving, can you express your displeasure to him?
17. If a salesman/woman has gone to considerable trouble to show you some merchandise which is not quite suitable, do you have difficulty in saying no?
18. Do you keep your opinions to yourself?
19. If friends visit when you want to study, do you ask them to return at a more convenient time?
20. Are you able to express love and affection to people for whom you care?
21. If you were in a small seminar and the professor made a statement that you considered untrue, would you question it?
22. If a person of the opposite sex whom you have been wanting to meet smiles or directs attention to you at a party, would you take the initiative in beginning a conversation?

23. If someone you respect expresses opinions with which you strongly disagree, would you venture to state your own point of view?
24. Do you go out of your way to avoid trouble with other people?
25. If a friend is wearing a new outfit which you like, do you tell that person so?
26. If after leaving a store you realize that you have been "short-changed," do you go back and request the correct amount?
27. If a friend makes what you consider to be an unreasonable request, are you able to refuse?
28. If a close and respected relative were annoying you, would you hide your feelings rather than express your annoyance'?
29. If your parents want you to come home for a weekend but you have made important plans, would you tell them of your preference?
30. Do you express anger or annoyance toward the opposite sex when it is justified?
31. If a friend does an errand for you, do you tell that person how much you appreciate it?
32. When a person is blatantly unfair, do you fail to say something about it to him?
33. Do you avoid social contacts for fear of doing or saying the wrong thing?
34. If a friend betrays your confidence, would you hesitate to express annoyance to that person?
35. When a clerk in a store waits on someone who has come in after you, do you call his attention to the matter?
36. If you are particularly happy about someone's good fortune, can you express this to that person?
37. Would you be hesitant about asking a good friend to lend you a few dollars?
38. If a person teases you to the point that it is no longer fun, do you have difficulty expressing your displeasure?
39. If you arrive late for a meeting, would you rather stand than go to a front seat which could only be secured with a fair degree of conspicuousness?
40. If your date calls on Saturday night 15 minutes before you are supposed to meet and says that he/she has to study for an important exam and cannot make it, would you express your annoyance?
41. If someone keeps kicking the back of your chair in a movie, would you ask him to stop?
42. If someone interrupts you in the middle of an important conversation, do you request that the person wait until you have finished?
43. Do you freely volunteer information or opinions in class discussions?
44. Are you reluctant to speak to an attractive acquaintance of the opposite sex?
45. If you lived in an apartment and the landlord failed to make certain necessary repairs after promising to do so, would you insist on it?
46. If your parents want you home by a certain time which you feel is much too early and unreasonable, do you attempt to discuss or negotiate this with them?47. Do you find it difficult to stand up for your rights?
47. If a friend unjustifiably criticizes you, do you express your resentment there and then?
48. Do you express your feelings to others?
49. Do you avoid asking questions in class for fear of feeling self-conscious.

APPENDIX C: DAILY DIARY MONITORING INSTRUCTIONS

Diary Monitoring Instructions

Thank you for completing the laboratory portion of the study. You have earned 1 credit for you participation so far. For the next part of the study, we will ask you to fill out questionnaires daily for 7 days at home on your computer. These questionnaires will ask you to report on daily activities and current emotions you may be experiencing. Questionnaires take approximately 10-15 minutes to complete per day.

You will begin filling out questionnaires on the nearest Monday. You will receive prompts to complete each daily questionnaire via email address you provide to us (thus you should provide an email where you can be easily reached). Prompts will be sent at 4pm daily. If you do not complete the questionnaires by 10pm, another reminder prompt will be sent. Questionnaires should be completed by 11:59pm. If you are not able to do this, please alert Amanda Kutz on FirstClass (Amanda.Kutz@umit.maine.edu).

You will earn 1 more credit for completion of the diary portion of the study. Thus, you will earn 2 credits for your participation in all study procedures. In addition, you will earn $5 in cash if you complete all 7 days of the diary portion of the study. To earn the $5, you must complete all 7 days of before 11:59pm each day.

The purpose of this study is to examine the relationship between behavior in the laboratory and real-world behavior. Few studies examine these relationships, thus results of this study may help fill that gap in knowledge. Your participation is important and highly valued.

If you have any questions about study procedures or run into any difficulties, you may contact Amanda Kutz (Amanda.Kutz@umit.maine.edu) at any time. Thank you again for your participation!

APPENDIX D: DIARY QUESTIONNAIRES

CARE QUESTIONNAIRE

EVENTS

For each of the activities listed below, please indicate if you have participated in this activity **in the past 24 hours**.

Indicate Yes/No

1. Tried/used drugs other than alcohol or marijuana _____
2. Missed class or work _____
3. Grabbed, pushed, or shoved someone _____
4. Left a social event with someone I have just met _____
5. Drove after drinking alcohol _____
6. Made a scene in public _____
7. Drank more than 5 alcoholic beverages _____
8. Not studied for exam or quiz _____
9. Drank alcohol too quickly _____
10. Disturbed the peace _____
11. Damaged/destroyed public property _____
12. Sex without protection against pregnancy _____
13. Left tasks or assignments until the last minute _____
14. Hit someone with a weapon or object _____
15. Rock or mountain climbed _____
16. Sex without protection against sexually transmitted disease _____
17. Played non-contact team sports _____
18. Failed to do assignments _____
19. Slapped someone _____

20. Not studied or worked hard enough _____

21. Punched or hit someone with fist _____

22. Smoked marijuana _____

23. Snow or water skied _____

24. Mixed drugs and alcohol _____

25. Got into a fight or argument _____

26. Involved in sexual activities without my consent _____

27. Played drinking games _____

28. Sex with someone I have just met or don't know well _____

29. Played individual sports _____

30. Volunteered to help someone [4] _____

31. Dealt (i.e., did not leave the situation) with a feared individual _____

32. Dealt (i.e., did not leave the situation) with a fear animal _____

33. Endured pain or physical discomfort without the use of medicine (excluding over the counter medications) _____

34. Stood up to someone _____

35. Performed in public (e.g., public speaking) _____

36. Performed a difficult task _____

37. Expressed love/affection/gratitude to a friend/family member _____

38. Expressed annoyance/frustration with a friend/family member _____

39. Asked/answered a question in class _____

40. Attempted to clear up a misunderstanding with someone _____

[4] Items 30-43 are additional items, which are not in the original CARE questionnaire, included to assess positive risk taking.

41. Made small talk with a stranger _____

42. Tried a new activity _____

43. Asked someone I liked out on a date _____

EXPECTED BENEFITS

On a scale of 1 (not at all likely) to 7 (extremely likely), HOW LIKELY IS IT THAT YOU WOULD EXPERIENCE SOME POSITIVE CONSEQUENCE (e.g., pleasure, win money, feel good about yourself, etc.) if you were to engage in these activities?

		Positive Consequences						
		Not at all Likely			**Moderately Likely**			**Extremely Likely**
1.	Tried/used drugs other than alcohol or marijuana	1	2	3	4	5	6	7
2.	Missing class or work	1	2	3	4	5	6	7
3.	Grabbing, pushing, or shoving someone	1	2	3	4	5	6	7
4.	Leaving a social event with someone I have just met	1	2	3	4	5	6	7
5.	Driving after drinking alcohol	1	2	3	4	5	6	7
6.	Making a scene in public	1	2	3	4	5	6	7
7.	Drinking more than 5 alcoholic beverages	1	2	3	4	5	6	7
8.	Not studying for exam or quiz	1	2	3	4	5	6	7
9.	Drinking alcohol too quickly	1	2	3	4	5	6	7
10.	Disturbing the peace	1	2	3	4	5	6	7
11.	Damaging/destroying public property	1	2	3	4	5	6	7
12.	Sex without protection against pregnancy	1	2	3	4	5	6	7
13.	Leaving tasks or assignments for the last minute	1	2	3	4	5	6	7

14. Hitting someone with a weapon or object	1	2	3	4	5	6	7
15. Rock or mountain climbing	1	2	3	4	5	6	7
16. Sex without protection against sexually transmitted diseases	1	2	3	4	5	6	7
17. Playing non-contact team sports	1	2	3	4	5	6	7
18. Failing to do assignments	1	2	3	4	5	6	7
19. Slapping someone	1	2	3	4	5	6	7
20. Not studying or working hard enough	1	2	3	4	5	6	7
21. Punching or hitting someone with fist	1	2	3	4	5	6	7
22. Smoking marijuana	1	2	3	4	5	6	7
23. Sex with multiple partners	1	2	3	4	5	6	7
24. Snow or water skiing	1	2	3	4	5	6	7
25. Mixing drugs and alcohol	1	2	3	4	5	6	7
26. Getting into a fight or argument	1	2	3	4	5	6	7
27. Involvement in sexual activities without my consent	1	2	3	4	5	6	7
28. Playing drinking games	1	2	3	4	5	6	7
29. Sex with someone I have just met or don't know well	1	2	3	4	5	6	7
30. Playing individual sports	1	2	3	4	5	6	7

31. Volunteered to help someone	1	2	3	4	5	6	7
32. Dealt (i.e., did not leave the situation) with a feared individual	1	2	3	4	5	6	7
33. Dealt (i.e., did not leave the situation) with a fear animal	1	2	3	4	5	6	7
34. Endured pain or physical discomfort without the use of medicine (excluding over the counter medications)	1	2	3	4	5	6	7
35. Stood up to someone	1	2	3	4	5	6	7
36. Performed in public (e.g., public speaking)	1	2	3	4	5	6	7
37. Performed a difficult task	1	2	3	4	5	6	7
38. Expressed love/affection/gratitude to a friend/family member	1	2	3	4	5	6	7
39. Expressed annoyance/frustration with a friend/family member	1	2	3	4	5	6	7
40. Asked/answered a question in class	1	2	3	4	5	6	7
41. Attempted to clear up a misunderstanding with someone	1	2	3	4	5	6	7
42. Made small talk with a stranger	1	2	3	4	5	6	7
43. Tried new activity	1	2	3	4	5	6	7
44. Asked someone I liked out on a date	1	2	3	4	5	6	7

EXPECTED RISKS

On a scale of 1 (not at all likely) to 7 (extremely likely), HOW LIKELY IS IT THAT YOU WOULD EXPERIENCE SOME NEGATIVE CONSEQUENCE (e.g., become sick, be injured, embarrassed, lose money, suffer legal consequences, fail a class, or feel bad about yourself) if you engaged in these activities?

	Negative Consequences						
	Not at all Likely			**Moderately Likely**			**Extremely Likely**
45. Tried/used drugs other than alcohol or marijuana	1	2	3	4	5	6	7
46. Missing class or work	1	2	3	4	5	6	7
47. Grabbing, pushing, or shoving someone	1	2	3	4	5	6	7
48. Leaving a social event with someone I have just met	1	2	3	4	5	6	7
49. Driving after drinking alcohol	1	2	3	4	5	6	7
50. Making a scene in public	1	2	3	4	5	6	7
51. Drinking more than 5 alcoholic beverages	1	2	3	4	5	6	7
52. Not studying for exam or quiz	1	2	3	4	5	6	7
53. Drinking alcohol too quickly	1	2	3	4	5	6	7
54. Disturbing the peace	1	2	3	4	5	6	7
55. Damaging/destroying public property	1	2	3	4	5	6	7
56. Sex without protection against pregnancy	1	2	3	4	5	6	7
57. Leaving tasks or assignments for the last minute	1	2	3	4	5	6	7

58. Hitting someone with a weapon or object	1	2	3	4	5	6	7
59. Rock or mountain climbing	1	2	3	4	5	6	7
60. Sex without protection against sexually transmitted diseases	1	2	3	4	5	6	7
61. Playing non-contact team sports	1	2	3	4	5	6	7
62. Failing to do assignments	1	2	3	4	5	6	7
63. Slapping someone	1	2	3	4	5	6	7
64. Not studying or working hard enough	1	2	3	4	5	6	7
65. Punching or hitting someone with fist	1	2	3	4	5	6	7
66. Smoking marijuana	1	2	3	4	5	6	7
67. Sex with multiple partners	1	2	3	4	5	6	7
68. Snow or water skiing	1	2	3	4	5	6	7
69. Mixing drugs and alcohol	1	2	3	4	5	6	7
70. Getting into a fight or argument	1	2	3	4	5	6	7
71. Involvement in sexual activities without my consent	1	2	3	4	5	6	7
72. Playing drinking games	1	2	3	4	5	6	7
73. Sex with someone I have just met or don’t know well	1	2	3	4	5	6	7
74. Playing individual sports	1	2	3	4	5	6	7

75. Volunteered to help someone	1	2	3	4	5	6	7
76. Dealt (i.e., did not leave the situation) with a feared individual	1	2	3	4	5	6	7
77. Dealt (i.e., did not leave the situation) with a fear animal	1	2	3	4	5	6	7
78. Endured pain or physical discomfort without the use of medicine (excluding over the counter medications)	1	2	3	4	5	6	7
79. Stood up to someone	1	2	3	4	5	6	7
80. Performed in public (e.g., public speaking)	1	2	3	4	5	6	7
81. Performed a difficult task	1	2	3	4	5	6	7
82. Expressed love/affection/gratitude to a friend/family member	1	2	3	4	5	6	7
83. Expressed annoyance/frustration with a friend/family member	1	2	3	4	5	6	7
84. Asked/answered a question in class	1	2	3	4	5	6	7
85. Attempted to clear up a misunderstanding with someone	1	2	3	4	5	6	7
86. Made small talk with a stranger	1	2	3	4	5	6	7
87. Tried new activity	1	2	3	4	5	6	7
88. Asked someone I liked out on a date	1	2	3	4	5	6	7

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment.**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested _____ 11. Irritable

_____ 2. Distressed _____ 12. Alert

_____ 3. Excited _____ 13. Ashamed

_____ 4. Upset _____ 14. Inspired

_____ 5. Strong _____ 15. Nervous

_____ 6. Guilty _____ 16. Determined

_____ 7. Scared _____ 17. Attentive

_____ 8. Hostile _____ 18. Jittery

_____ 9. Enthusiastic _____ 19. Active

_____ 10. Proud _____ 20. Afraid

APPENDIX E: DEBRIEFING STATEMENT

In this study, you were told that participants who performed better than average on the computer task would be entered into a drawing for one of two $20 gift card to Amazon.com. The purpose of this was to increase motivation to perform well on tasks. In actuality, all participants will be entered into this drawing regardless of their performance on the task. You will be notified via email if you have won the drawing when the study is completed.

If you have any further questions about this study, please feel free to contact Amanda Kutz on FirstClass (Amanda.Kutz@umit.maine.edu).

Thank you again for your participation!

BIOGRAPHY OF AUTHOR

Amanda M. Kutz was born in Lawrence, MA on December 2, 1986. She was raised in Windham, NH and graduated from the Derryfield High School in 2005. Her undergraduate work was completed at the University of Vermont, where she received her Bachelor of Science degree in Psychology. Amanda entered the Clinical Psychology Doctoral Program at the University of Maine in 2011, with K. Lira Yoon, Ph.D. as her advisor. She was awarded a Master's degree in Clinical Psychology in 2013, and moved on to doctoral candidacy. During her time at the University of Maine, Amanda conducted three independent research projects (including her dissertation study). While working with Dr. Yoon, she was first- or co-author on 12 research presentations at local and national conferences. She is first author on three manuscripts currently in progress and second author on another manuscript in progress. Amanda is a student member of the Association for Behavioral and Cognitive Therapies (ABCT), Anxiety and Depression Association of America (ADAA), Society of Clinical Psychology and Society for Health Psychology.

Amanda is completing her predoctoral clinical training internship at WellSpan Health in York, PA. She is a candidate for the Doctor of Philosophy degree in Psychology, with a concentration in Clinical Psychology, from the University of Maine in August 2016.