5-2017

Implusive Decision Making and Behavioral Health Variables: Review and Original Research

Madeline Sherrill
University of Southern Maine

UNIVERSITY OF SOUTHERN MAINE

Portland, Maine

IMPULSIVE DECISION MAKING AND BEHAVIORAL HEALTH VARIABLES:

REVIEW AND ORIGINAL RESEARCH

A Thesis

Submitted in Partial Fulfillment of the

Honors Program Requirements

Madeline Sherrill
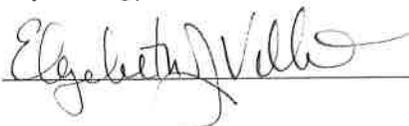
May 2017

Thesis Submitted by   Madeline Sherrill

Major   Psychology

Approved by

Principal Thesis Advisor   Elizabeth Vella, Ph.D.

Department   Psychology

_____

Thesis Advisor   R. Bruce Thompson, Ph.D.

Department   Psychology

_____

Honors Director   Rebecca Nisetich, Ph.D.

_____

Received by the University Honors Program on   May 5, 2017

ii

Abstract

This thesis covers a variety of topics associated with impulsivity. The first two chapters serve to provide context for an original study. The literature reviewed in this study shows impulsivity to be a multi-faceted construct associated with a number of health compromising behaviors. However, basic variables of depression, anxiety, and stress may not predict impulsive decision making. The final section of this thesis, and the main motivation for this research, was an original research study. Forty-five undergraduate psychology majors (39 women, 6 men; M = 25.09, SD = 8.91 yrs) participated in a lab study measuring impulsivity, depression, stress, and anxiety symptoms as they relate to performance on a gambling task. Participants completed computerized versions of the Depression, Anxiety and Stress Scale (DASS) and the Baratt Impulsiveness Scale (BIS) using SNAP survey administration software. They also completed the Cambridge Gambling Task, a computerized gambling task in which participants gamble points on the location of a hidden circle. Positive correlations were found between the DASS variables and the attentional subscale of the BIS. BIS predicted both shorter mean reaction times (RT) to the gambling task and shorter RT to more favorable odds. DASS variables predicted lower proportional bets on the ascending segment of the gambling task. Additionally, DASS also predicted lower proportional bets when participants were presented with the most favorable odds on the gambling task. These findings suggest that while DASS variables are related to attentional impulsivity, they are not predictive of impulsive behavior on the gambling task as indicated by shorter RT. Rather, individuals with higher DASS scores were more likely to perform poorly on the gambling task as a function of proportional bets.

TABLE OF CONTENTS

Introduction

Impulsivity is present in a wide range of human behaviors. While we might think of impulsive decisions as dramatic or perhaps dangerous, impulsivity plays a role in even the most mundane daily decisions. If you have ever grabbed a tube of lip balm in the check out line of a grocery store or decided on the way to a class that the day would be better spent outside, you have made an impulsive decision. However, the ubiquity of impulsive decisions also means that impulsivity can play a role in more serious scenarios. Impulsivity has been oft-studied as a factor in more harmful behaviors, from substance abuse to suicide attempts. While a spur of the moment purchase may seem incomparable to these more serious scenarios, it is important to consider the breadth of impulsivity as a construct. Impulsivity is not just one set of behaviors. Rather, the term comprises a number of various personality and behavioral characteristics.

This thesis will explore aspects of impulsivity relating to both personality traits and behavioral patterns. In the first chapter, common measures of impulsivity will be explored. The role of impulsivity in health compromising behaviors will also be explored in the first chapter. In the second chapter, behavioral health will be addressed more broadly through a review of the relationship between depression, anxiety, stress in regards to impulsive decision making. The third and final chapter will be dedicated to the original findings of this study.

Chapter 1: Behavioral Health

Impulsivity appears in multiple DSM 5 diagnoses, ranging from Attention Hyperactivity Disorder to Borderline Personality Disorder (American Psychiatric Association, 2013). While numerous disorders share impulsivity in their diagnostic criteria, they often have little else in common. If these disorders are so drastically different, how can impulsivity be a defining feature for many of them?

Impulsivity is not just a single pattern of behavior. While impulsivity can broadly be defined as acting rashly without regard for future consequences, impulsivity is a multi-dimensional construct. Due to the breadth of the impulsivity construct, this definition can be further sub-divided in many directions. Two broad categories emerge when measuring impulsivity: trait impulsivity and choice impulsivity. Depending on the study, these categories can be operationalized in a number of ways. Among the most popular of trait impulsivity measures are the Barratt Impulsiveness Scale (BIS-11) and the UPPS-P model of impulsivity. The BIS-11 is a 30 item survey that divides impulsivity into 3 factors: Attentional Impulsiveness ("I 'squirm' at plays or lectures"), Motor Impulsiveness ("I act on the spur of the moment"), and Non-Planning Impulsiveness ("I am a careful thinker") (Patton, Stanford, & Barratt, 1995). The factors of the UPPS-P are somewhat similar, with the most notable difference being measures to account the effect of emotions on decision making (Whiteside & Lyman, 2000; Cyders et al, 2007). The UPPS-P is divided into five subscales: Premeditation (e.g. "My thinking is usually careful and purposeful), Negative Urgency (e.g. "When I am upset, I often act without thinking"), Positive Urgency (e.g. "When I am very happy, I can't seem to stop myself from doing things that have bad consequences"), Sensation Seeking (e.g. "I quite enjoy taking risks"),

and Perseverance (e.g. "Unfinished tasks really bother me"). Although other trait impulsivity measures are used, both the BIS-11 and the UPPS-P are the most represented measures in this review.

In addition to self-report measures of impulsivity, behavioral tasks are often used to attain a more robust understanding of impulsivity that is unattainable by self-report alone. Behavioral tasks can be used to assess features like response inhibition that cannot be captured using self report. Tasks can also be used to expand upon the concepts put forth in the self-report measure. A variety of gambling tasks are often used to help measure both risk taking and delay-discounting (a preference for smaller rewards sooner over greater rewards later on). While some studies will rely on only trait measures, incorporating behavioral measures can help clarify the specific impulsive mechanisms at play.

Impulsivity is marked by a lack of regard for future consequences and a lowered ability to control urges. As such, it is little surprise that impulsivity is associated with a number of health compromising behaviors. Through the course of this review, research regarding impulsivity and health compromising behavior will be covered.

Sexual Behavior

The varying dimensions of impulsivity can lead to risky sexual behavior. Engagement in this behavior puts individuals at risk for sexually transmitted infections (STIs) (World Health Organization, 2002). Due to the potentially serious consequences of contracting an STI, understanding how various personality traits relate to risky sexual behavior is important (Birthrong & Latzman, 2014). The authors of this study employed the Sexual Risk Survey (SRS) to measure risky sexual behavior (Turchik & Garske, 2009). The SRS consists of five subscales: Sexual Risk Taking with Uncommitted Partners, Risky Sex Acts, Impulsive Sexual Behaviors,

Intent to Engage in Risky Sexual Behaviors, and Risky Anal Sex Acts. While the whole construct of impulsivity, as defined by the UPPS-P model of impulsivity, is predictive of risky sexual behavior, individual aspects of the UPPS-P model may prove more predictive than others. A study of university age students found that a lack of premeditation was a unique predictor for all forms of risky sexual behavior; negative urgency was found to have a unique association with risky sex acts and total risky sexual behavior (Birthrong & Latzman, 2014). This study supports earlier findings that negative urgency is a unique predictor for risky sexual behavior (Deckman & DeWall, 2011). Although certain facets of impulsivity may be more predictive of risky sexual behavior, impulsive sexual behavior itself may be associated with other risky behavior. In a broad survey study using a representative sample of adults in the United States, it was found that individuals who engaged in impulsive sexual behavior were more likely to have psychiatric disorders and engage in other impulsive behavior (Behnken, Vaughn, Salas-Wright, & DeLisi, 2016).

Starting in the adolescent years, risky sexual behavior is a topic of concern. Adolescents and young adults in the 15-24 age group account for nearly half of all cases of STIs, despite making up only 25% of sexually active individuals in the United States (Centers for Disease Control and Prevention, 2008; as cited in Dir, Coskunpinar, & Cyders, 2014). A 2014 meta-analysis of studies on impulsive traits and risky sexual behavior in adolescents found a weak but significant positive correlation between impulsivity and risky sexual behavior (Dir et al). This result was not moderated by race or age; however, studies that included a larger number of female participants did show a stronger relationship between impulsivity and risky sexual behavior. This increased relationship between risky sex and impulsivity in young women may be due to the greater consequences young women face for sexual behavior, both in terms of social

acceptance and health outcomes. A large survey study supports this correlation between impulsivity and risky sexual behavior in young adults (Charnigo et al, 2013). This study looks at both the individual and synergistic effects of sensation seeking and impulsive decision making on risky sexual behavior. Both impulsive decision making and sensation seeking were positively correlated with risky sexual behavior; while individuals who expressed both traits were not drastically more likely to behave in risky behavior than those who expressed only one trait, they were significantly more likely to engage in this behavior than those who exhibited neither trait. This outcome may speak to some nuanced differences between these traits; while sensation seekers more often put themselves in high-risk situations, impulsive decision makers make worse choices when they do find themselves in these risky situations. Addressing these personality traits in young adults may aid professionals in their efforts to teach adolescents and young adults how to make safer sexual decisions.

While impulsivity relates to a broad spectrum of risky sexual behaviors, certain facets of impulsivity may be related to sexual assault perpetration. Impulsive individuals are more likely to engage in a broad variety of aggressive behavior; those high in impulsivity may be less able to resist the urge to respond aggressively to provocation (Mousilo, Calhoun, & Rosenbloom, 2013). There is a substantial body of research on impulsivity in individuals convicted of more severe forms of sexual assault. Lately, there has been an increase of research on impulsivity as a mitigating factor of the forms of sexual assault more commonly found on college and high school campuses. A study into male college students found that both positive and negative urgency were significantly higher in perpetrators than non-perpetrators (Mouilso et al, 2013). This finding speaks to a lessened capacity for affect regulation in those who engage in sexual violence; in the presence of strong emotion, positive or negative, these individuals are more

likely to engage in rash behavior. Men in this study who scored higher on lack of premeditation were also more likely to perpetrate sexual violence and engage in sexual behavior without thinking through the consequences for oneself or one's partner. An earlier study on college aged perpetrators differentiated between those who committed sexual assault in the presence of alcohol and those who did not (Zawacki, Abbey, Buck, Mcauslan, & Clinton-Sherrod, 2003). Both groups of perpetrators shared a number of similarities regarding aggressive behavior and attitudes towards sex. However, the groups differed significantly in terms of impulsivity. Perpetrators who used alcohol during sexual assault were significantly more impulsive than those who did not. This result speaks to a potential interaction between impulsive nature and exposure to alcohol; an impulsive individual may be more strongly affected by alcohol and thus more likely to engage in harmful behavior. A later study into adolescent sexual assault did not support this distinction between perpetrators who used alcohol and those who did not (Young, King, Abbey, & Boyd, 2009). While this study does show significantly higher impulsivity among adolescents who commit sexual assault, there was not a significant difference in impulsivity between perpetrators who used alcohol and those who did not although this null finding may be due to the small sample of perpetrators who used alcohol. Although there are numerous traits that are predictive of sexual assault, impulsivity is a common feature of those who perpetrate sexual assault. Impulsivity, particularly when combined with aggression and alcohol use, may help to identify those more likely to perpetrate sexual assault and allow for early intervention.

Eating Behavior

Feelings of impulsivity around food are not uncommon. Many health-promoting behaviors require us to not engage in delay discounting. A high level of delay discounting when it comes to food choices would lead one to favor more immediately satisfying food choices over

healthy choices that would benefit one's wellbeing in the long run. Eating less processed, more

nutrient dense foods may not be rewarding in the short term; however, over the long term, this

behavior leads to desirable health outcomes. A deficit in forethought and planning for the future

may play a key role in predictive eating disorder pathology. While little compelling evidence has

been found to suggest that impulsivity plays a role in restrictive behaviors, there is a wealth of

research into impulsivity's role on bingeing and purging behaviors. Examining the various facets

of impulsivity can help to clarify the differing relationships between impulsivity and different

forms of maladaptive eating.

Binge eating is the most common eating disorder symptom, affecting not only those with

binge eating disorder but individuals with a spectrum of eating related psychopathologies. Binge

eating disorder specifically shares a number of impulsive characteristics such as loss of control,

and acting in response to emotion (American Psychiatric Association, 2013). Research into

impulsivity and binge eating had helped isolate the most predictive facets of impulsivity for

binge eating. A study of women with eating disorder behavior found that all individuals with

eating disorder symptomatology struggled with attentional impulsivity, while those in the

bingeing subtypes specifically struggled with motor impulsivity (Rosval et al, 2006). In addition

to personality measures, this study examined behavioral impulsivity using a go/no go task. Go/no

go tasks are designed to measure one's ability to inhibit an inappropriate response. In such tasks,

one stimulus will be the 'go' condition while another will be the 'no go' condition. The measure of one's response inhibition capability is whether or not the participant can refrain from submitting a response when numerous 'go' stimuli are interrupted with the 'no go' stimulus'. In response to a go/no go task, it was found that those individuals who engaged in bingeing behaviors struggled with response inhibition more than those who did not. A later study supported that relationship between attention and motor impulsivity and binge behavior (Meule & Platte, 2015). These findings regarding motor impulsivity and binge behavior may explain the lack of control individuals with binge eating disorder (BED) and bulimia feel during a binge.

Emotional facets of impulsivity may interact with depressive symptoms to predict earlier engagement of binge eating behavior in a pre-adolescent population (Pearson, Zapolski, & Smith, 2015). Using a longitudinal design, the authors modeled a pathway between negative urgency, participants' expectation of their eating behavior's emotional impact, and binge eating outcomes; additional pathways were found between depression, negative affect, and binge eating. Where other studies focus on impulse control as a predictor of binge eating, this study presents affect regulation as a vital part of the process. Negative urgency may similarly play a significant role in recovery from binge eating disorder (Manasse et al, 2016). Despite using numerous behavioral tasks and the full UPPS survey, only negative urgency emerged as a predictor for recovery success in a pilot study of binge eating treatment. Though this result is somewhat unusual in light of other research regarding impulsivity as a predictor of disordered eating behavior, the lack of significance of other facets of impulsivity may be attributed to small sample size. While reduced statistical power may be at play, the sole significance of negative urgency is worth considering in treatment outcomes. Developing skills to cope with strong

negative emotions may be a worthwhile treatment goal of individuals struggling with binge eating.

Though research has revealed a number of correlations between binge eating behavior and impulsivity, there may be an even stronger case to be made regarding the relationship between impulsivity and engagement in compensatory eating behaviors. Binge eating with a perceived loss of control followed by a compensatory behavior such as purging, laxative use, or exercise, is the hallmark of Bulimia Nervosa (American Psychiatric Association, 2013). Negative Urgency's relationship with binge eating may also extend to bulimic behaviors. When controlling for all other subscales of the UPPS-P and numerous emotional state sensitivities, negative urgency remained the sole specific predictor of bulimic behavior in a clinical sample not limited to eating disorder behavior (Anestis, Smith, Fink, & Joiner, 2009). It has been proposed that purging may reduce further negative affect brought about by the binge (Pearson, Wonderlich, & Smith, 2015). However, this interaction between affect and purging behavior is not exclusive to those diagnosed with bulimia nervosa. Rather, the binge purge cycle is what distinguishes certain eating disorder subtypes from others. Among anorexic subtypes, those who engage in purging behavior consistently rate higher in impulsivity than those who do not. Further examination into eating disorder subtypes found that bulimia nervosa and anorexia-binge/purge (AN-BP) subtype groups rated significantly higher than both controls and restrictive anorexic (AN-R) individuals on motor impulsiveness, while bulimic individuals rated higher on nonplanning impulsivity (Rosval et al, 2006).

Individuals who engage in purging behaviors may struggle with decision making when compared to those who only restrict. While a study on negative affect and decision making found

9

no impact of affect on decision making, it did reveal a distinct difference in decision making between the AN-R subtype and the AN-BP subtype (Danner et al, 2016). On a gambling task, both healthy controls and AN-R participants improved task performance over numerous trials while AN-BP participants' performance began to decrease after 40 trials. This result is curious, as it cannot be specifically attributed to negative affect. Rather, these results may be appropriately considered within the concept of self-control depletion among bulimic patients (Pearson et al, 2015). It is hypothesized that numerous acts of self control deplete one's ability to make a more controlled choice in the future (Muraven & Baumeister, 2000). Furthermore, in those of the AN-BP subtype, self control exhaustion may play a part in the timing of binges. Future research into bulimia and impulsivity may want to integrate this concept of self control exhaustion in their research in order to identify more specific causes of behavior.

Addiction

Impulsivity is a natural avenue of research when looking into addiction behaviors. Because engaging in addictive behaviors is often harmful in the long term, impulsivity may explain why people go back to such behaviors after they have seen negative effects. Two particular domains where impulsivity research has flourished are alcoholism and gambling - both addictions with profound and clear negative effects.

Impulsivity may play a role in alcohol consumption before any physical addiction has taken place. As colleges are often rife with problematic alcohol use, a study into impulsivity and binge drinking among college students provides insight into the impulsive behaviors of non addicted drinkers. However, as a 2014 study showed, these interactions may not be entirely negative (Park, Kim, Gellis, Zaso, & Maisto). In this study of university students, it was found

that those individuals who rated high in sensation seeking were more likely to have positive outcomes from their drinking. These same subjects were then more likely to engage in future binge drinking. Conversely, those who expressed negative urgency were more likely to have negative consequences to their drinking. Nonetheless, these individuals who faced negative consequences were not any less likely to engage in further binge drinking. While outcome may have some effect on future drinking behavior, the results regarding expected outcome remain unclear (Dunne, Freedlander, Coleman, & Katz, 2013). In this study of college students, it was found that, while total UPPS score was predictive of drinking, neither positive nor negative expectancy predicted drinking behavior. The social drinking culture of college may encourage students to drink, even in light of poor experiences.

Even in non-drinking environments, impulsivity may be at play in those who abuse alcohol. A study into heavy social drinkers and light social drinkers found no statistically significant difference between groups with alcohol cravings when presented with their drink of choice; however, heavy drinkers did display greater trait impulsivity, as measured by the BIS (Papachristou, Nederkoorn, Havermans, van der Horst, & Jansen, 2012). While response inhibition was not significantly different between light and heavy drinkers, heavy drinkers with lower response inhibition experienced a higher craving for alcohol than other heavy drinkers with high response inhibition. While the design of this study does not allow one to presume causation, it is possible that the lower motor impulsiveness and higher non-planning impulsiveness may play a role in heavier drinking by decreasing the perceived consequences of alcohol consumption. Another study using patients in an alcohol recovery program reported similar findings, showing that individuals rating higher on impulsivity on the BIS had stronger

urges to drink (Joos et al, 2013) However, sub-categories of the BIS were not found to be related to emotional craving. The behavioral measures of impulsivity also showed no correlation with alcohol cravings. A longitudinal study of men participating in inpatient treatment for alcoholism showed that impulsivity as measured by the BIS predicted who relapsed after one year (Evren, Durkaya, Evren, Dalbudak, & Cetin, 2012). These three studies, when taken together, suggest that individuals who engage in greater than average drinking may be prone to more impulsive decision making.

Gambling provides an opportunity to study addictive behavior that is not related to substance use. While the word gambling brings to mind racetracks, casinos, and scratchcards, there is a substantial population of gamblers who do no have access to any of these betting methods: adolescents. Although adolescents cannot engage in the forms of gambling favored by adults, they can make bets among themselves and gamble on card games privately. Adolescents engage in gambling behaviors at a higher rate than adults and may very well continue this behavior into their adult years (Estevez, Herrero-Fernández, Sarabia, & Jauregui, 2015). A large study on adolescent gamblers and non-gamblers found that gamblers rated significantly higher on sensation seeking than those who did not gamble. Furthermore, impulsivity mediated the relationship between gambling and general mental health symptomatology (anxiety, depression, etc). This study used an unusual method to measure impulsivity; thus, no subscales beyond sensation seeking are available. Nonetheless, another study on gambling in young adults does provide a more nuanced look at impulsivity's role in gambling (Canale, Vieno, Griffiths, Rubaltelli, & Santinello, 2015). In this study of high school and university students, it was found that both sensation seeking and positive urgency predicted a larger number of gambling problems. Notably absent from these findings is a correlation between negative emotional states

12

and gambling behavior; the mediation of mood enhancement between positive urgency and gambling problems suggests that individuals engage in gambling behavior to elevate an already positive emotional state. While this study shows gambling as an impulsive behavior under emotional criteria (positive urgency and sensation seeking), it does not provide evidence for attentional and cognitive criteria such as lack of premeditation and lack of perseverance. Yet another study utilizing large, college aged samples found similar results while also using only self-report measures of impulsivity (Ginley, Whelan, Meyers, Relya, & Pearlson, 2014).

Although these results of these studies indicate a broader trend towards stimulation seeking behavior and impulsive action, particularly in response to strong positive emotions, they lack support for a behavioral conceptualization of impulsivity. Particularly in the case of gambling, researchers have the opportunity to closely mimic that behavior under study while in a lab setting. In a 2014 study of problem gamblers, researchers used both numerous self-report and behavioral measures to help specify the relationship between gambling and impulsivity (MacKillop et al). The results of this study showcase the importance of including behavioral tasks to measure tendency towards risky and impulsive behavior; although this study found the behavioral impulsivity measures to be associated with problematic gambling, these measures had little correlation with the self-report measures used. By utilizing a large number of measures, this study is able to devise a sub-categories fusing subscales from the personality measures and the behavioral tasks. By expanding on the extant research using behavioral tasks, future research may be able to find relationships between the emotional impetus to gambling and the manifestation of gambling itself. While the research so far seems to have determined a frequent correlation between sensation seeking, positive urgency, and gambling behavior, further exploration of behavioral tasks may help provide nuance to these findings.

Self Harm

Self harm may seem like a radically different set of behaviors than those discussed thus far. Unlike previous categories of behavior reviewed, self harm behavior has a much less obvious reward structure. While individuals may have casual sex, or drink, or sometimes eat too much without much curiosity from others, self harm is more perplexing from an outside perspective. In order to properly discuss self harm and compare it to other behaviors, it is important to distinguish between non-suicidal and suicidal self harm behavior. The common definition for non suicidal self injury (NSSI), is any behavior that causes wounds to one's body without the intent to end one's life (Glenn & Klonsky, 2010). While both NSSI and suicide attempts are both associated with impulsivity, they are distinctly different behaviors. Personality and behavioral measures may be used to better understand the motivations behind these behaviors. Response to a negative emotional state remains a common theme among self harmers (Di Perro, Sarno, Galluci, & Madeddu, 2014; Glenn & Klonsky, 2010). However, as one study shows, this attempt to regulate affect is not always successful and may not result in feelings of relief (Di Perro et al, 2014). This effect may be moderated by the impulsivity of the individual engaging in the self-harm behavior; participants in this study who conceptualized the consequences of their behavior were more likely to find relief after engaging in self harm behaviors. A study of American college students supported this elevated sense of Urgency in self harmers and, to a lesser degree, a lack of premeditation and a greater level of sensation seeking (Glenn & Klonsky, 2010). Despite a commonality of self-harm behaviors, there may be division within those who engage in such behaviors. A study of Australian adolescents and college students attempted to find more specific categories among individuals who engaged in self harm behavior (Stanford & Jones, 2009). Using a variety of that self report measures that assessed depression and anxiety,

14

coping, self esteem, and impulsivity, it was determined that there were three clusters of self

harming individuals: those that display psychological pathology and poor coping skills, a normal

cluster, and an impulsive cluster. The pathological group had the highest rate of self harm, as

well as reporting relationship difficulties. While this study concluded that impulsivity only

affected a portion of those who engaged in self harm, it is worth noting that their measure of

impulsivity was a single 7 item scale that may not capture certain nuances of impulsive behavior.

Although NSSI is defined by its lack of suicidal intent, there may be common risk factors

between NSSI and suicide attempts. Negative Urgency, a trait commonly associated with NSSI,

is also predictive of of suicidal behavior, although a study shows that this relationship may be

mediated by premeditation (Lynam, Miller, Miller, Bornovalova, & Lejeuz, 2011). In a

population of drug abusers in residential treatment, high premeditation emerged as a protective

factor against Negative Urgency. When individuals were both high in Negative Urgency and low

in Lack of Premeditation, Negative Urgency became less predictive of suicide risk and likelihood

to engage in NSSI. In addition to NSSI and suicidal behavior sharing similar risk factors among

impulsive measures, NSSI may itself be associated with suicidal ideation and attempts (Klonsky,

May, & Glenn, 2013). The perception of self-harm has moved away from a classification as a

'para suicidal behavior' and closer to that of a maladaptive coping mechanism. However, it is

possible that there is some truth in both conceptualizations of self-harming behavior. Among a

large sample consisting of adolescent both in and out of psychiatric treatment, undergraduates,

and randomly dialed individuals, the relationship between NSSI and attempted suicide emerged

as second in magnitude to suicidal ideation only. Impulsivity, assessed in this study using the

UPPS-P model, was not a significant predictor of suicide attempts.

Impulsivity is commonly regarded as a risk factor for suicidal behavior yet there has been some question in recent years regarding the relationship between impulsivity and suicide risk. The definition of an impulsive suicide is unclear as researchers have operationalized impulsive suicides based on many attributes (May & Klonsky, 2016). While time since suicidal thinking occurred is a common theme, the amount of time that defines an "impulsive" attempt can vary from hours to days. May and Klonsky's 2016 study uses surveys on suicidal preparation, contemplation, and motivation in addition the UPPS-P to capture a more complete picture of impulsivity as it relates to suicide. Trait impulsivity as captured by the UPPS-P was found to be largely unrelated to preparation and contemplation of suicide, but a small correlation occurred between Negative Urgency and Lack of Premeditation and motivations for suicide. The findings of this study do not support the belief that high trait impulsivity puts one at risk for acting on suicidal thoughts. These findings call into question the effectiveness of trait impulsivity as a clinical screening tool for suicide risk.

Conclusion

Although the behaviors reviewed vary greatly from one to another, a number of common threads emerge regarding impulsivity and behavioral health. Negative urgency seems to be one of most predictive subsets of impulsivity for compromising health behaviors. While impulsivity is most easily conceptualized as rash behavior without forethought, negative urgency attributes an emotional cause to this behavior. Some impulsive behavior is certainly just an impulse (response inhibition tasks help to assess this) but most impulsive behavior occurs in some context. The UPPS-P model for impulsivity helps to contextualize trait-impulsive behavior somewhat more than the BIS-11. While the BIS captures more elements of behavioral impulsivity, the UPPS-P attends more to emotional state. This attention to emotion may be the

16

reason behind its frequent usage in studies of behavioral health. Among the research reviewed, there was a surprising lack of delay discounting tasks. While facets of non-planning impulsivity do somewhat attend to delay discounting, results for behavioral tasks often diverge from self-report measures. When studying individuals who are making immediately rewarding behaviors that have negative long-term consequences, delay discounting seems like a natural avenue of inquiry. However, due to the size and design of some of these studies, a behavioral set of tasks may not have been practical.

Not included in this review are a number dual-diagnosis cases, which were explored in the process of research. Due to the numerous permutations of dual-diagnoses, as well as potential interactions between these diagnoses, teasing apart the role of impulsivity became increasingly unwieldy. However, it does make sense that impulsive individuals may engage in numerous impulsive behaviors. If someone struggles with negative urgency, she may attempt to resolve that emotional state in a number of ways. Likewise, individuals who rank high in sensation seeking may not be discriminating in their sensation seeking behavior.

While some associations between these behaviors can be drawn from reviewing the existing behavioral research, further research into the specific physical mechanisms of impulsivity may help reveal more of the uniting factors of impulsivity. Impulsivity occurs across sex, age, and nationality. It is not only associated with a single personality feature. By further examining the mechanisms of impulsive decision making, we may be better able to understand how and why impulsive behavior occurs.

Chapter 2

Throughout the first chapter, elements of behavioral health were examined as they relate to impulsivity. While this examination speaks to impulsivity's relationship to health

compromising behaviors, further questions remain regarding the specific mechanisms behind impulsivity. In the first chapter, impulsivity was examined in terms of its variable branches. Much of the literature reviewed featured the five factor, UPPS-P model of impulsivity that divides impulsivity into five sub scales: negative urgency, premeditation, perseverance, sensation seeking, and positive urgency. This model allows for a specific examination of the smaller aspects of impulsivity as well as providing an opportunity for researchers to assess impulsivity as it relates to affect. However, behavioral tasks also play an important role in measuring impulsive behavior. At the core of all of these tasks is decision making. While delay discounting tasks can measure one's preference for smaller, sooner rewards over later and bigger rewards, there are other tasks that can measure alternative forms of impulsive decision making, such as risky decision making or decision making under ambiguous circumstances.

This chapter will serve to explore how emotional correlates of impulsivity relate to decision making. As we saw in the first chapter, impulsivity is related to a number of health compromising behaviors. This chapter will focus less on specific health maladaptive behaviors and more on the basic elements of depression, anxiety, and stress and how they relate to decision making as a whole.

Depression

Depression is often associated with an altered perception of rewards and punishment (Martin-Soelch, 2009). Findings suggest that individuals with depression are simultaneously less sensitive to rewarding stimuli and more sensitive to punishing stimuli (Nestler & Carlzon, 2005; Santesso et al, 2008). These studies provide context for further inquiry into how depressed individuals perform on decision making tasks. However, there is a lack of consensus regarding depression's effect on decision making. Some studies show depressed patients performing worse

18

than controls on decision making tasks while others show depressed patients performing better than controls. First, I will examine the studies that showed decreased performance. Then I will examine the studies showing an increase in performance before comparing the studies and examining the similarities and difference between them.

A 2010 study examining depression and decision making hypothesized that patients with major depressive disorder (MDD) would perform poorly on the contingency shifting variant of the Iowa Gambling Task (IGT) (Cella, Dymond, & Cooper). The IGT features 4 decks, 2 advantageous and 2 disadvantageous. In the contingency shifting variant, the advantageous decks change. In this study, the first phase of the IGT did not include contingency shifting and the second phase featured three contingency shifts. As hypothesized, the patients with MDD performed worse on the contingency shifting phase of the IGT than did controls. Patients with MDD also performed poorly compared to controls during the trial period where no contingency shifts took place. While the control group improved performance during the contingency shifts, the patients with MDD performed poorly and did not improve. Rather, depressed participants struggled to move on from previously advantageous decks, even when those decks were no longer providing successful outcomes.

Another study using a modified version of the IGT supports these results to some degree (Must et al, 2009). The authors of this study hypothesized that depressed participants would perform worse than controls on a modified version of the task in which each initial choice results in a loss of money. However, this hypothesis was not supported by the results. Rather, depressed individuals performed worse than controls on the normal version of the task and comparably to controls on the modified version of the task. Previous research suggests that depressed individuals should be more sensitive to negative feedback. However, the fact that all depressed

19

participants in this study were taking anti-depressant medication may be affecting results; some studies have shown that antidepressant medication may correct the altered reward sensitivity seen in depression (Santesso et al, 2008; Nestler & Carlzon, 2005). While these studies suggest that depression may impair decision making, other studies provide evidence to the contrary.

Depression showed itself to be an advantageous trait in a 2008 study on decision-making and risk aversion (Smoski et al). The authors of this study predicted that depressed participants would learn to avoid the risky decks of the IGT more quickly than healthy controls. While this prediction did not come to fruition, participants with depression were both more risk averse overall and more successful on the task than controls. The authors postulate that, as negative feedback plays a greater part in the IGT than positive feedback, depressed individuals with a heightened sensitivity to negative feedback may be at an advantage in this task. A 2015 study further examines the relationship between depression and decision making by incorporating a potential moderating variable, striatal dopamine D_2 receptor density (as measured by spontaneous eye blink rates) (Byrne, Norris, & Worthy). As with the Smoski (2008) study, this study found that depressive symptoms were associated with better decision making on the IGT. Furthermore, participants who were more depressed and had higher striatal dopamine D_2 receptor density picked even more advantageous decks than those who with only depressive symptoms. An elevated striatal dopamine D_2 receptor density may help depressed participants to better track the loss conditions, allowing them to pick more advantageously.

The studies reviewed so far relating to depression and decision making paint a divergent picture. The first two studies reviewed, while both showing a decrease in performance among depressed participants, do not agree entirely. Both studies showed poor performance among depressed individuals in the basic version of the IGT. However, these studies produced varying

results when it came to the altered versions of the test. In the Cella et al (2010) study, the alternate form of the IGT featured contingency shifting, where the advantageous decks changed without warning. However, in the Must et al (2006) study, the decks in the alternate version of the IGT featured large losses up front (as opposed to the usual positive cards up front). These two studies are looking at decision making under different criteria. Whereas the Cella et al (2010) study was measuring an individual's ability to adjust to changing contingencies, the Must et al (2006) study was examining the response to reward and punishment as presented in the gambling task. Though both studies produced similar results regarding depression and decision making as measured by the basic IGT, their secondary goals differed.

Although the results of the Must et al (2006) study did not completely fulfill the hypotheses put forth, these results do relate to Smoski et al's 2008 study. The Smoski study picks up where the Must study left off. The similarities in performance among depressed participants and controls under the modified IGT condition were an unanticipated outcome; Smoski et al take these findings a step further, hypothesizing that depressed participants would perform better under risky scenarios. While depressed participants did not learn to avoid the risky decks any faster, they did ultimately perform better at the task at hand. The more recent research takes these findings even further by exploring potential variables that may moderate the relationship between depression and decision making. As is put forth in Byrne et al's 2016 study, striatal dopamine D_2 receptor density moderates the relationship between depression and decision making. Subsequent research into other moderators may help to further explain the relationship between depression and decision making.

In circumstances where careful decision making is valued, depression seems to be a fairly accurate predictor of successful task performance. In the scenarios reviewed where depression

predicted poor task performance, the task at hand valued one's ability to adapt to changing circumstances over careful decision making (Cella et al, 2010). In tasks where caution is required, depressed individuals tend to perform satisfactorily.

Anxiety

While this chapter is largely focused on decision-making, when it comes to anxiety, it is important to take a moment to examine anxiety's relationship with risk avoidance. Individuals with social phobia (SP) and generalized anxiety disorder (GAD) are significantly more risk avoidant than healthy controls (Lorian & Grisham, 2011). In this 2011 study, risk avoidance factors were found to play a significant role in anxious individuals' likelihood of seeking treatment. Those who endorsed more risk-taking were more likely to overcome avoidant tendencies and seek treatment. A later study by the same authors found that participants with anxiety disorders rated significantly lower than controls on every variable of the Domain-specific risk-taking scale (Lorian, Mahoney, & Grisham, 2012). The one exception to this finding came from those with SP; participants with SP reported higher social risk-taking. However, this finding may be due to a low sample size; other studies report conflicting information regarding social phobia and social risk-taking.

Where the previous studies examined used self-report questionnaires to measure risk aversion, there are lab tasks that can simulate risky decision making. One such lab task is the balloon analog risk task (BART). The BART is a computerized task in which participants inflate virtual balloons, accumulating points for rewards with each pump. However, each pump also brings each balloon closer to its unique explosion threshold. For each pump, participants must measure the potential for gain against the potential for loss. In their 2007 study, Maner et al used the BART as a behavioral test of risky decision making. Among the non-clinical participants,

social anxiety, trait anxiety, and worry were all found to be correlated with less risky behavior on the BART. While the clinical sample did not participate in the BART, they did complete a risk-taking scale. Participants with an anxiety disorder diagnosis scored significantly lower than others on the risk-taking scale, lower even than those with mood disorders. These findings taken together suggest that risk aversion is an integral part of anxiety disorders.

As the relationship between anxiety and risk aversion is quite clear, more recent research has delved into the physiological variables that may moderate this relationship. In a 2015 study, researchers examined high frequency heart rate variance (HF-HRV) and its potential to moderate the relationship between anxiety and risk aversion (Ramirez, Ortega, & Reyes Del Paso). Examined independently, greater HF-HRV is correlated with better attentional control and a decrease in risk aversion. When HF-HRV was greater in individuals with high anxiety, risk aversion decreased and was no different from those with low trait anxiety. When HF-HRV was lower in individuals with high trait anxiety, risk aversion increased. This relationship may be explained by the known benefits of having a higher HF-HRV, such as greater emotional and attentional regulation. Individuals with both high trait anxiety and greater HF-HRV may be able to overcome aspects of their anxiety with the flexibility that a higher HF-HRV provides.

An earlier study on anxiety and decision making examined different physiological responses as potential moderators in the relationship between anxiety and decision making (Miu, Heilman, & Houser, 2008). In this study, unsurprisingly, high trait anxiety was associated with poor performance on the IGT. Furthermore, high trait anxiety was also associated with an increase in skin conductance and a decrease in HR before advantageous trials. However, high TA remained associated with poor decision making on the IGT, despite potentially adaptive physiological responses. The authors put forth a number of explanations for their results. Perhaps

high anxiety works as a blinder, causing participants to attend to a smaller set of data. They also suggest that high TA may bring on other emotions regarding the task, such as stress, that may limit performance.

The manner in which anxiety relates to decision making seems fairly clear: the greater the anxiety levels, the greater the risk aversion. The combination of anxiety and risk aversion leaves these individuals at a distinct disadvantage when it comes to decision based tasks. However, as shown in Maner et al's 2007 study, this risk avoidance is greater than even those with depressive disorders. Interestingly, while the risk aversion experienced by depressed individuals tends to result in better task performance, risk aversion does not seem to assist anxious individuals in the same manner. However, in order to draw any conclusions regarding this, more research on anxiety using the Iowa Gambling Task is necessary.

Physiological data may help explain risk aversion in those with high TA. In Ramirez et al's 2015 study, it was found that high levels of high frequency heart rate variance could counteract the effect TA has on decision making. While Miu et al's 2008 study examined a number of physiological characteristics, none of them seemed to counteract the effect of TA on decision making. While the somatic markers observed in this study could be advantageous in decision making, they were seemingly uncoupled from the decision making process. Further work into anxiety, physiology, and decision making may be helpful in creating strategies to assist anxious individuals in making decisions.

<div align="center">**Stress**</div>

Stress is a frequent companion to decision making in day to day life. Experimental research provides an opportunity to isolate and control both stressful stimuli and decision making tasks in an attempt to identify the specific role stress has on decision making. In a 2016 meta-

analysis, Starcke and Brand examined numerous studies on stress's effect on decision making in ambiguous situations. The authors define ambiguous situations as a circumstance where the decision maker cannot immediately weigh his or her options. Rather, the decision maker must gather information from feedback accumulated over time. A lab task frequently used to emulate decision making under ambiguity is the IGT. In the IGT, the better option is initially unknown. However, by continuing with the task, it is possible for the participant to make increasingly informed choices. In such circumstances, individuals under stress tend to perform worse than non-stressed controls. While this meta-analysis can speak to broader trends of stress and decision making, specific studies will now be examined to put together a more thorough understanding of stress's role in decision making.

A 2007 study examined the effects of anticipatory stress on decision making as measured by the IGT (Preston, Buchanan, Stansfield, & Bechara). The researchers induced stress by informing the experimental group that they would be required to give a speech on "What I dislike about my body and physical appearance" at the end of data collection. Participants then completed the IGT, with trials 1-60 being the learning phase and trials 61-100 being the performance phase. Experimental participants showed physiological signs of stress and reported greater anxiety. While there was no significant difference between groups in the performance phase, the experimental group did display a slower rate of learning in the initial phase. Although these findings do not indicate a decision making deficit in the experimental group, the authors propose that in the learning phase of the IGT, the decision making task and the speech stressor competed for working memory resources, thus slowing down the learning of the participants in the experimental condition. A more recent study employed a similar design to Preston et al's 2007 study. In addition to using a speech based stressor task and the IGT, the authors

incorporated the Cognitive Reflection Test (CRT) (Simonovic, Stupple, Gale, & Sheffield, 2016). The CRT was added to help determine the relationship between reflective thinking and performance on the IGT. Similar to the results of the previous study, individuals in the experimental condition displayed delayed learning on the IGT. Furthermore, the results of the CRT revealed that those in the experimental condition also displayed a lower level of reflective thinking. However, those with higher levels of reflective thinking managed to perform somewhat better under the stress condition.

Due to the numerous hormonal components of stress, research into stress and decision making has explored the potential role stress hormones play in decision making. A 2012 study of women examined how participants' cortisol levels relate to their decision making skills (Santos-Ruiz et al). The authors specifically selected an all female sample due to women's record of better performance on the IGT under stress when compared to men (Preston et al, 2007; van den Bos, Harteveld, & Stoop, 2009). This study used a version of the Trier Social Stress test that required participants to prepare and give a speech about their strengths and flaws while in a virtual reality environment. All participants in this study engaged in the stressor tasks. Results showed that participants who scored poorly on the IGT had greater salivary cortisol levels at every collection time. While the participants who scored higher on the IGT did see an increase in cortisol levels following the stressor task, their levels did not peak as high as the participants with low IGT scores; their cortisol levels also returned to normal more quickly. Beyond cortisol, another hormone, dehydroepiandrosterone (DHEA) may better explain the relationship between stress and decision making skills (Shields, Lam, Trainor, & Yonelinas, 2016). The authors hypothesized that, if their stressor decreased decision making capabilities, cortisol would be more predictive of decision making skill; however, if acute stress increased decision making

capabilities, DHEA would be more predictive of decision making skill. As in the previous study, the Trier Social Stress Test was used to induce stress. Unlike most of the other studies, though, this study did not employ the IGT as a measure of decision making. Rather, the researchers administered the Adult Decision-Making Competence test, a task that required participants to make decisions under four categories: value assessment, belief assessment, integration, and metacognition (Bruine de Bruin et al, 2007). The hypotheses put forth in this study were partially supported; both DHEA and cortisol predicted stronger decision making capabilities, although when both hormones were evaluated together, DHEA did have a significantly stronger predictive value. These results are curious because they contradict much of the existing literature that portrays stress as disadvantageous when it comes to decision making. These contradictory findings could be due to the decision making task administered. However, this finding may be due to the lack of ambiguity present in this study. The IGT, the test used in most of the other studies reviewed, measures decision making under uncertainty. While the Adult Decision-Making Competence task is thorough, it does not attempt to capture decision making while under uncertainty. Thus, this study may not be directly comparable to the others reviewed.

Among most of the studies reviewed, some consensus has emerged regarding decision making under uncertainty. As was revealed by Starcke and Brand's (2016) meta-analysis, stressed individuals struggle when making decisions under ambiguity. However, as specific studies have shown, this deficit may be most pronounced in the learning phase of the IGT (Preston et al., 2007; Simonovic et al., 2016). However, the Simonovic et al. study (2016) shows that stressed individuals are not necessarily destined to make poor decisions. Cognitive reflection may help combat one's stress level when making ambiguous decisions. Sex can also be a

protective characteristic, with females under stress performing better on decision making tasks than their male counterparts (Preston et al., 2007).

It would be easy to say that, for the most part, higher cortisol levels correlate with poor decision making. This statement is true to some degree but, as evidenced by the individual articles examined, this statement requires more nuance. For instance, this statement holds true for the male participants in van den Bos et al's 2009 study. However, among female participants, those with only slightly elevated cortisol levels actually performed better on the IGT while those with the highest cortisol levels did see a decrease in performance. These results suggest that while some stress hormone elevation may be advantageous, high levels of cortisol may interfere with task performance. A later study on only female participants did not replicate this moderate increase in performance from smaller cortisol levels (Santos Ruiz et al., 2012). In this study, women with higher cortisol levels performed worse and those with lower cortisol levels perform better. While these studies together still portray a relationship between cortisol levels and decision making, the Shields et al (2016) study does complicate these previous findings. While the authors initially hypothesized the high cortisol levels would correlate with poor decision making skills and high DHEA levels would correlate with better decision making skills, this hypotheses did not play out exactly as planned. Rather, both hormones predicted increased decision making skill. These findings, however, are not necessarily directly contradictory to previous studies. While almost all of the literature reviewed in this section has used the IGT to measure decision making, this particular study used a different measure of decision making. This task does not change and does not require participants to assess risk and reward in a way that will immediately affect them. Rather, this task provides participants with numerous real life situations and asks them how they would usually respond. From this study, it is possible to conclude that

cortisol and DHEA may enhance certain types of real life decision making while inhibiting decision making under ambiguous circumstances.

Chapter Discussion

When observing depression, anxiety, and stress and how they relate to decision making, examining each variable individually is crucial. Although depression, anxiety, and stress change the way people relate to decision making, each variable does so in a unique manner. Nevertheless, one factor in decision making ties both depression and anxiety together: risk aversion. In decision making tasks that incorporate an element of risk, participants with higher levels of depression and anxiety tend to choose the less risky options. Despite similarities in risk averse behavior, decision making task performance in those with depression and anxiety is not identical. While depression has been shown to be an advantage on the IGT due to higher levels of risk aversion, the same cannot be said for anxiety (Smoski et al, 2008; Miu et al, 2008). While both traits often coincide with risk aversion, the reasons for the risk aversion may be different. It has been hypothesized that depressed individuals have an altered reward sensitivity, leaving them less sensitive to positive feedback and more sensitive to negative feedback (Must et al, 2009). Due to this heightened sensitivity to negative feedback, it makes sense that those with depression would avoid risky options with potential negative outcomes. In contrast to depression's altered reward sensitivity, anxiety seems to have risk avoidance as a core feature. Every study reviewed showed anxious individuals as more risk averse than healthy controls. While risk aversion was advantageous in some circumstances for depressed individuals, risk aversion did not prove advantageous for those with anxiety. As proposed by Miu et al, (2008) anxiety may work as a sort of blinder that inhibits one's ability to fully examine options.

Although stressed individuals do not display the risk aversion seen in depression and anxiety, they do struggle with decision making. The argument for reduced decision making capabilities of stress is somewhat similar to the argument for anxiety's impact on decision making: the stress competes for memory resources and delays learning (Preston et al, 2007). Stress hormones may also play a role in impeding decision making under stress, as seen in van den Bos et al's 2009 study where cortisol levels correlated with a decreased level of performance. However, this finding may only apply to decisions made under uncertainty as a later study found cortisol and DHEA to predict an increase in decision making skills as measured by a self-report task (Shields et al, 2016). As with depression and anxiety, stress may impair decision making in some, but not all situations. While depression, anxiety, and stress can reduce decision making capability, it is important to account for all the specific variables of the experiment before drawing any conclusions. Even though depression, anxiety, and stress variables may often present together in the same individual, each variable can exert a distinct influence on that individual's behavior.

Chapter 3

Throughout the last two chapters, both the behavioral health conditions associated with impulsivity and the mood states that can affect decision making have been discussed. While these subjects seem somewhat exclusive, they are fundamentally entangled. Although 'impulsivity' and 'decision making' seem like two separate subjects, in reality, one is simply a part of the other. At the core of all impulsive action is some level of decision making. Whether that decision is for a smaller reward sooner instead of a larger reward later or that decision is to give up on a frustrating puzzle, all of these 'impulsive' actions require some form of decision making

This chapter will incorporate a distillation of both preceding chapters in order to examine the findings of the current study. While neither disordered behavior nor decision making mechanisms will be discussed at length, the material from these previous chapters will inform the discussion of these research findings.

The study at hand sought to examine the relationship between variables of depression, anxiety, stress, and impulsivity. To help capture different facets of impulsivity as a construct, this study included both a self report measure of impulsivity and a task-based measure of impulsivity. Based on impulsivity's frequent appearances in psychiatric disorders, it was anticipated that individuals with higher levels of depression, anxiety, and stress would endorse more impulsive behaviors on a self report questionnaire. We also predicted that participants with higher levels of depression, anxiety, and stress would perform in a more impulsive manner on a gambling task.

Methods

Participants

46 undergraduate psychology students participated in the current study. Participants were recruited through the undergraduate psychology subject pool and extra course credit was offered as compensation for participation. The sample included 39 women and 6 men (M = 25.09, SD = 8.91 yrs).

Materials

Impulsivity. Participants completed the Baratt Impulsiveness Scale (BIS) to measure their impulsiveness (Patton et al, 1995). The BIS is a 30-item inventory on which participants rate their responses on a 4 pt Likert-Type scale (1=Rarely/Never; 4=Almost/Always). The BIS measures impulsivity along 3 factors: attentional impulsivity, motor impulsivity, and nonplanning impulsivity. Sample items include, 'I often have extraneous thoughts when

thinking', for attentional impulsivity; 'I change hobbies', for motor impulsivity; and 'I am more interested in the present than the future' for nonplanning impulsivity. (See Appendix A).

Depression, Anxiety, and Stress. The Depression, Anxiety, and Stress scales (DASS) is a 21-item self-report questionnaire that was administered to measure the severity of symptoms pertaining to both depression and anxiety. Participants select their responses based on their experiences from the last week; participants endorsed responses along a 4 pt Likert-Type scale (0=Never; 3=Almost Always). Sample items include 'I felt that I had nothing to look forward to', for depression; 'I felt a was close to panic', for anxiety; and 'I found it difficult to relax', for stress. (See Appendix B).

Gambling Task Participants completed the Cambridge Gambling Task (CGT), a computerized gambling task that requires participants to place bets on the location of a hidden circle (Manes et al., 2002). The goal of the CGT is to earn as many points as possible; however, in order to do so, participants must wait patiently for their preferred bet value to appear. The task features a trial period where no points are won or lost. There is also an ascending period, when the participant's betting options start low and increase, and a descending period, where the participant's betting options start high and decrease.

Procedure

Participants took part in the study over the course of the fall 2016 study at the University of Southern Maine (USM). Participants were made aware of this study as an opportunity for extra credit both through their instructors and the Psychology Subject Pool cork board. Data collection took place in the Cognition, Affect, and Behavior lab of the Psychology Department at USM.

Before beginning data collection, participants completed an informed consent form. They then completed a general health questionnaire, as well as the DASS and the BIS. These surveys were completed on a computer and were hosted on the USM Snap server. The participants then completed the CGT on a computer running Inquisit Lab v. 5.0. Correlational analyses were run using SPSS, v. 21.0.

Results

Descriptive statistics for the DASS variables and the BIS variables are featured in Table 1.

DASS and BIS

Our hypothesis that DASS variables would predict a impulsivity as measured by the BIS was partially supported. Significant correlations were found between DASS variables and the Attention factor of the BIS: $r = .378$, $p = .01$ for Depression; $r = .434$, $p = .003$ for Anxiety; $r = .525$, $p < .001$ for Stress. Correlations for other factors did not achieve the threshold of significance.

BIS and CGT Reaction Time

Impulsivity as measured by the BIS was predictive of impulsivity on the CGT as a measure of mean reaction time, $r = -.304$, $p = .045$. BIS score was also predictive of mean reaction time when participants were presented with the most advantageous odds, 2/8 and 1/9, $r = -.295$, $p = .049$; $r = -.328$, $p = .028$.

DASS and CGT Proportional Bets

DASS scores did not predict impulsive behavior as measured by the CGT. However, DASS scores were predictive of CGT performance as measured by the proportion of total points used in a bet. Participants with higher DASS scores bet a lower proportion of their total points on

the ascending series of the CGT: r = -.417, p = .004 for Depression; r = -.444, p = .002 for Anxiety; and r = -.454, p = .002 for Stress. Participants with higher DASS scores also placed lower proportional bets in the 1/9 condition, when the odds were most favorable: r = -.417, p = .004 for Depression; r = -.444, p = .002 for Anxiety; r = -.454, p =.002 for Stress.

Discussion

At the outset, this study sought to examine the relationship between variables of depression, anxiety, stress and different measures of impulsivity. While it was hypothesized that higher DASS scores would predict higher levels of impulsivity as measured by the BIS and the CGT, this prediction was not supported by the results. Although higher DASS levels were associated with greater attentional impulsivity, DASS scores were not predictive of the other factors of the BIS. Regarding the CGT, there was a relationship between DASS scores and task performance; however, higher DASS scores did not predict more impulsive behavior on the task. Rather, higher DASS scores predicted poorer task performance as measured by proportional bets. These results indicate a decision making deficit among participants with higher levels of depression, anxiety, and stress.

While the CGT results speak more toward the relationship between DASS variables and decision making, the results did show a correlation between DASS scores and attentional impulsivity. Despite the hypothesis regarding DASS and BIS not specifying a particular factor of impulsivity, in retrospect, it seems logical that higher DASS scores would correlate with higher levels of attentional impulsivity. Difficulty maintaining focus is among the diagnostic criteria for both Major Depressive Disorder and Generalized Anxiety Disorder in the DSM 5 (American Psychiatric Association, 2013). In a study of ADHD and DASS variables, it was found that depression, anxiety, and stress explained some of the variance in ADHD symptom severity

(Alexander & Harrison, 2013). These associations between DASS variables and attention problems, as well as the definitions of the BIS factors help explain why depression, anxiety, and stress variables are associated with one impulsive behavior but not others. The items on the BIS associated with attentional impulsivity do not measure an individual's tendency to make risky or thoughtless decisions; rather, these items measure one's ability to maintain focus on tasks and one's ability to maintain a train of thought (Patton et al, 1995). Though motor and nonplanning impulsivity are both individual second order factors on the BIS, they both measure some form of decision making. For motor impulsivity, the BIS measures spontaneous decisions. For nonplanning impulsivity, the BIS measures future-oriented decisions. The differences in these factors may help explain why attentional impulsivity predicted DASS variables while other types of impulsivity did not.

The importance of examining a how a study operationalizes impulsivity extends to the analysis of our findings regarding DASS variables and CGT performance. While the studies discussed in the second chapter point towards general trends for each DASS variable, the decision making task used in each study must be taken into consideration in order to compare the findings with our own. As with many other behavioral tasks reviewed, the CGT can be used to assess impulsivity or decision-making skill. However, unlike many tasks, the CGT clearly divides the way in which the task measures these traits (Manes et al., 2002). Impulsivity on the CGT is operationalized by one's reaction time to a bet while risky decision making is operationalized by how large one's bet is. In order to make a large bet on the ascending portion of the task, the participant is required to wait several seconds for his or her preferred bet to appear. This task differs in a number of ways from the other decision making tasks covered in the literature review. The most frequently used behavioral measure among those reviewed, The

IGT, is designed to measure decision making under ambiguity (Starcke & Brand, 2016). The best deck choice in the IGT can only be achieved through trial and error. At the outset of the task, all choices appear identical. Such is not the case for the CGT. Participants in the CGT are presented with varying odds; while the odds are not always heavily slanted, such as in a 9/1 or 8/2 contingency, they provide some sort of information about what the best bet could be. Participants then take that information and use it to decide how many points they are willing to gamble based on the odds in front of them. Though both tasks instruct participants to attempt to win as many points as possible, in order to achieve this, participants must employ differing strategies.

Having taken into account the methodological differences between this study and others, this study's findings can now be compared to the existing literature. As was reported in the results section, we found that DASS variables predict poor CGT performance as a function of proportional bets. These correlations were found in the ascending series of bets as well as in the most advantageous circumstance with 9:1 odds. These results indicate a decision-making deficit in participants with higher levels of depression, anxiety, and stress. They also suggest that individuals with higher levels of depression, anxiety, and stress are more risk averse, as even when presented with the best odds, participants with higher DASS levels did not bet a large proportion of their point total. It is worth noting that DASS variables did not predict proportional bets on the descending series of the CGT. This null finding, when taken in consideration with the correlation between DASS variables and Attentional Impulsivity, may suggest that impatience was have been a factor in the ascending series of bets; when the bets are increasing, participants must wait several seconds in order to place a more risky bet. However, without further analyses, the potential role of impatience on these results is purely speculation. The data from this study, in its current form, both compares and contrasts with the existing literature in a number of ways. As

was mentioned in Chapter 2, depression has been shown to be both advantageous and disadvantageous in decision making tasks. When participants rating higher in depression were tasked with adjusting to new contingencies on the IGT, they struggled to move on from previously advantageous decks (Cella et al., 2010). Out of all of the literature reviewed regarding depression and decision making, this study may be the most similar to the study at hand. Participants in both studies were required to adjust to changing odds. In the Cella et al study, this meant adjusting to new advantageous decks and in our own study, this means changing one's betting strategy based on new odds. While the details of these tasks are not identical, depressed participants struggled with both tasks. Our finding that depressed participants in our study performed worse than non-depressed participants even in the most advantageous setting is what makes these studies comparable. Both groups of depressed participants did not adopt a new strategy when it became advantageous to do so. Perhaps the altered reward sensitivity found in depressed individuals was a factor in these results (Martin-Soelch, 2009). Due to a lessened sensitivity to rewarding stimuli, the 9:1 odds may not have seemed as advantageous for depressed participants.

Our findings regarding anxiety and CGT performance are congruous with the majority of results from the literature reviewed. The existing literature on anxiety and risk avoidance shows a repeated pattern of higher anxiety levels predicting higher risk avoidance, both with self report questionnaires and behavioral tasks (Lorian & Grisham, 2011; Lorian et al., 2012; Maner et al., 2007). As the CGT is a task that measures risky decision making to some degree, it makes sense that we would see risk avoidant behavior among participants with higher anxiety levels. That participants high in anxiety made low bets, even when the odds made higher bets low risk,

illustrates this concept of risk avoidance. Even when the odds are very favorable, for an individual with high anxiety levels, making a high bet is still too risky.

Contextualizing our findings regarding stress and decision making is more difficult than contextualizing our findings for the other DASS variables. Most of the studies examining stress and decision making employ some form of social stressor task that requires public speaking. Whereas the stress measured by DASS could have occurred any time in the past week, the stress from these tasks is occurring specifically while the participant is in the lab. Although it is possible that the participants in our study were experiencing high stress levels in the moment, there is no way to know that for sure. Accounting for these differences in evaluating stress may help explain some of the differences between our results and the results from other studies. In our study, stress was predictive of poor CGT performance as a function of proportional bets. A 2016 meta-analysis revealed that, while participants under acute stress they also took more risks (Starcke & Brand, 2016). This finding directly contradicts our results, as the participants with higher stress levels in our study behaved in a risk averse manner. However this divergence in results may be explained by the design of the study; while our measured more chronic stress, the studies in this meta-analysis induced acute stress. Furthermore, the differences in gambling tasks may also explain some of these differences. In this meta-analysis, the studies largely used the IGT, a task that favors careful consideration over risk taking. Thus, it is unsurprising, that participants could both perform poorly and engage in more risky decision making. The CGT, on the other hand, does reward risky decisions when the odds of success are good. While the findings that stress predicts poor task performance do support our findings at first glance, the difference in stress measures makes contextualizing our findings rather difficult. Due to an unusual choice of gambling task, it is difficult to fully compare the study at hand to other studies.

Despite this difficulty, the results of this study are not totally unsupported. While DASS

variables did not predict impulsivity, as we initially hypothesized, the finding that DASS

variables predict poor performance on a gambling task makes sense within the broader realm of

literature on depression, anxiety, stress and decision making.

Although, in a number of ways, the current study differs from the existing literature, the

results at hand are valuable findings within the context of the current literature. The results of

this study showed not only an increase in attentional impulsivity among individuals with higher

DASS levels but a decrease in decision making task performance among these same individuals.

While each DASS variable has a different impact on task performance, this relationship may also

be mitigated by attentional control. Further research using additional attentional tasks may help

elaborate on the present findings.

Limitations and Future Directions

While we were able to achieve significant findings between the DASS variables and CGT

performance, there are some limitations that prevent us from generalizing these results further.

The obvious first limitation is the gender balance of our sample. While a mostly female sample is

to be expected based on the demographics of our subject pool, sex differences in decision

making may mean that these findings are not generalizable to a male population. In a study of

anxiety's effect on decision making, it was found that both men at low and high anxiety levels

performed poorly on a decision making task while women only saw a performance decrease at

the highest anxiety level (de Visser et al., 2010). Another study on stress found that males under

acute stress saw an increase in performance on a risky decision making task while females saw a

decrease in performance on a risky decision making task (Lighthall et al, 2012). This gender

difference may explain why our results on stress and decision making differed from many other

studies. If women make decisions differently than men while under stress, our results would be difficult to compare to a study with a more balanced sample.

In addition to the gender bias of our sample, our task selection may limit the generalizability of our results. While the CGT does a sufficient job of capturing both risky decision making and impulsive decision making, it is not a commonly used task. While comparisons can be made between the CGT and the IGT, they are quite different tasks. Because the CGT is not used as frequently, it is difficult to find studies with directly comparable results. Thus, any comparisons made between gambling task performance must be approached with caution

While we were able to explore the roles of depression, anxiety, and stress with the data currently available to us, it is my hope that we will be able to add nuance to these findings with the data from the spring semester. In addition to administering the DASS, BIS, and CGT in the lab, we also included a response inhibition task, a stressor task, and gathered physiological data on all of our participants. While no significant correlations with these variables were found in the first round of data collection, the data collection that occurred over the spring may allow for new analyses to occur. I look forward to working with Dr. Vella to reach further understanding of these findings.

References

Alexander, S.J. & Harrison, A.G. (2013). Cognitive responses to stress, depression, and anxiety
and their relationship to ADHD symptoms in first year psychology students. *Journal of
Attention Disorders, 17*(1), 29-37.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders
(5th ed.). Arlington, VA: American Psychiatric Publishing.

Anestis, M.D., Smith, A.R., Fink, E.L., & Joiner, T.E. (2009). Dysregulated eating and distress:
Examining the specific role of negative urgency in a clinical sample. *Cognitive Theory
Research, 33,* 390-397.

Bankston, S.M., Carroll, D.D., Cron, S.G., Granmayeh, L.K., Marcus, M.T., Moeller, F.G.,
Schmitz, J.M., Swank, P., & Liehr, P.R.. (2009). Substance abuser impulsivity decreases
with a nine-month stay in a therapeutic community. *The American Journal of Drug and
Alcohol Abuse, 35,* 417-420.

Behnken, M., Vaughn, M.G., Salas-Wright, C.P. & DeLisi, M. (2016). Risky business:
Behavioral profiles of sexually-impulsive adults in the United States. *American Journal
of Criminal Justice, 41,* 185-201.

Birthrong, A. & Latzman, R.D. (2014). Aspects of impulsivity are differentially associated with
risky sexual behaviors. *Personality and Individual Differences, 57,* 8-13.

Bruine de Bruin, W., Parker, A.M., Fischhoff, B., 2007. Individual differences in adult decision-
making competence. *J. Personal. Soc. Psychol. 92,* 938–956.

Byrne, K.A., Norris, D.D., & Worthy, D.A. (2016). Dopamine, depressive symptoms, and
decision-making: the relationship between spontaneous eye blink rate and depressive

symptoms predict Iowa Gambling Task performance. *Cognitive Affect and Behavioral Neuroscience, 16,* 23-36.

Canale, N., Vieno, A., Griffiths, M.D., Rubaltelli, E., & Santinello, M. (2015). How do impulsivity traits influence problem gambling through gambling motives? The role of perceived gambling risk/benefits. *Psychology of Addictive Behaviors, 29*(3), 813-823.

Cella, M., Dymond, S., & Cooper, A. (2010). Impaired flexible decision-making in major depressive disorder. *Journal of Affective Disorders, 124,* 207-210.

Charnigo, R., Noar, S.M., Garnett, C., Crosby, R., Palmgreen, P., & Zimmerman, R. (2013). Sensation seeking and impulsivity: Combined associations with risky sexual behavior in a large sample of young adults. *Journal of Sex Research, 50*(5), 480-488.

Cyders, M.A., Smith, G.T., Spillane, N.S., Fischer, S., Annus, A.M., & Peterson, C. (2007). Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment, 19*(1), 107-118.

Danner, U.N., Sternheim, L., Bijsterbosch, J.M., Dingemans, A.E., Evers, C., & van Elburg, A.A. (2016). Influence of negative affect on decision making in women with restrictive and binge-purge type anorexia nervosa. *Psychiatry Research, 239,* 39-46.

de Visser, L., van der Knaap, L.J., van de Loo, A.J.A.E., van der Weerd, C.M.M., Ohl, F., & van den Bos, R. (2010). Trait anxiety affects decision-making differently in healthy men and women: Towards gender-specific endophenotypes of anxiety. *Neuropsychologia, 48,* 1598-1606.

Dir, A.L., Coskunpinar, A., Cyders, M.A. (2014). A meta-analytic review of the relationship between adolescent risky sexual behavior and impulsivity across gender, age, and race. *Clinical Psychology Review, 34,* 551-562.

DiPierro, R., Sarno, I., Gallucci, M., & Madeddu, F. (2014). Nonsuicidal self-injury as an affect-regulation strategy and the moderating role of impulsivity. *Child and Adolescent Mental Health, 19*(4), 259-264.

Dunne, E.M., Freedlander, J., Coleman, K., & Katz, E. (2013). Impulsivity, expectancies, and evaluations of expected outcomes as predictors of alcohol use and related problems. *The American Journal of Drug and Alcohol Abuse, 39*(3), 204-210.

Eichen, D. M., Chen, E. Y., Schmitz, M. F., Arlt, J., & McCloskey, M. S. (2016). Addiction vulnerability and binge eating in women: Exploring reward sensitivity, affect regulation, impulsivity & weight/shape concerns. *Personality and Individual Differences, 100,* 16-22.

Estevez, A., Herrero-Fernandez, D., Sarbia, I., Jauregui, P. (2015). The impulsivity and sensation-seeking mediators of the psychological consequences of pathological gambling in adolescence. *Journal of Gambling Studies, 31,* 91-103.

Evren, C., Durkaya, M., Evren, B., Dalbudak, E., & Cetin, R. (2012). Relationship of relapse with impulsivity, novelty seeking and craving in male alcohol-dependent inpatients. *Drug and Alcohol Review, 31,* 81-90.

Ginley, M.K., Whelan, J.P., Meyers, A.W., Relyea, G.E., & Pearlson, G.D. (2014). Exploring a

    multidimensional approach to impulsivity in predicting college student gambling. *Journal*

    of Gambling Studies, 30, 521-536.

Glenn, C.R. & Klonsky, E.D. (2010). A multimethod analysis of impulsivity in nonsuicidal self-

    injury. *Personality Disorders: Theory, Research, and Treatment, 1*(1), 67-75.

Hoffman, E.R., Gagne, D.A., Thornton, L.M., Klump, K.L., Brandt, H., Crawford, S., Fichter,

    M.M., Halmi, K.A., Johnson, C., Jones, I., Kaplan, A.S., Mitchell, J., Strober, M.,

    Treasure, J., Woodside, D.B., Berrettini, W.H., Kaye, W.H., & Bulik, C.M. (2012).

    Understanding the association of impulsivity, obsessions, and compulsions with binge

    eating and purging behaviours in anorexia nervosa. *European Eating Disorders Review,*

    20, 129-136.

Joos, L., Goudriaan, A.E., Schmaal, L., De Witte, N.A.J., Van den Brink, W., Sabbe, B.G.C.,

    Dom, G. (2012). The relationship between impulsivity and craving in alcohol dependent

    patients. *Psychopharmacology, 226,* 273-283.

Klonsky, E.D., May, A.M., & Glenn, C.R. (2013). The relationship between nonsuicidal self-

    injury and attempted suicide: Converging evidence from four samples. *Journal of*

    Abnormal Psychology, 122(1), 231-237.

Lee-Winn, A.E., Townsend, L., Reinblatt, S., & Mendelson, T. (2016). Associations of

    neuroticism-impulsivity and coping with binge eating in a nationally representative

    sample of adolescents in the United States. *Eating Behaviors, 22,* 133-140.

Lighthall, N.R., Sakaki, M., Vasunilashorn, S., Nga, L., Somayajula, S., Chen, E.Y., Samii, N.,

& Mather, M. (2012). Gender differences in reward-related decision processing under

stress. *Social Cognitive and Affective Neuroscience, 2012*(7), 476-484.

Loree, A.M., Lundahl, L.H., & Ledgerwood, D.M. (2015). Impulsivity as a predictor of

treatment outcome in substance use disorders: Review and synthesis. *Drug and*

Alcohol Review, 34, 119-134.

Lorian, C.N. & Grisham, J.R. (2011). Clinical implications of risk aversion: An online study of

risk-avoidance and treatment utilization in pathological anxiety. *Journal of Anxiety*

Disorders, 25, 840-848.

Lorian, C.N., Mahoney, A., & Grisham, J.R. (2012). Playing it safe: An examination of risk-

avoidance in an anxious treatment-seeking sample. *Journal of Affective Disorders, 141*,

63-71.

Lynam, D.R., Miller, J.D., Miller, D.J., Bornovalova, M.A., & Lejuez, C.W. (2011). Testing the

relations between impulsivity-related traits, suicidality, and nonsuicidal self-injury: A test

of the incremental validity of the UPPS model. *Personality Disorders: Theory,*

Research, and Treatment, 2(2), 151-160.

MacKillop, J., Miller, J.D., Fortune, E., Maples, J., Lance, C.E., Campbell, W.K., & Goodie,

A.S. (2014). Multidimension examination of impulsivity in relation to disorder gambling.

Psychopharmacology, 22(2), 176-185.

Maner, J.K., Richey, J.A., Cromer, K., Mallott, M., Lejuez, C.W., Joiner, T.E., & Schmidt, N.B.

(2007). Dispositional anxiety and risk-avoidant decision-making. *Personality and*

Individual Differences, 42, 665-675.

Manasse, S. M., Espel, H. M., Schumacher, L.M., Kerrigan, S. G., Zhang, F., Forman. E. M., & Jurascio, A. S. (2016). Does impulsivity predict outcome in treatment for binge eating disorder? A multimodal investigation. *Appetite, 105,* 172-179.

Martin-Soelch, M. (2009). Is depression associated with dysfunction of the central reward system? *Biochemical Society Transactions, 37*(1), 313-317.

May, A.M. & Klonsky, E.D. (2016). "Impulsive" suicide attempts: What do we really mean? *Personality Disorders: Theory, Research, and Treatment, 7*(3), 293-302.

Meule, A. & Platte, P. (2015). Facets of impulsivity interactively predict body fat and binge eating in young women. *Appetite*, *87*, 352-357.

Miu, A.C., Heilman, R.M., & Houser, D. (2008). Anxiety impairs decision-making: Psychophysiological evidence from an Iowa Gambling Task. *Biological Psychology, 77,* 353-358.

Mouilso, E.R., Calhoun, K.S., & Rosenbloom, T.G. (2013). Impulsivity and sexual assault in college men. *Violence and Victims, 28(3),* 429-442.

Muraven, M. & Baumeister, R.F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle?, *Psychological Bulletin, 126*(2), 247-259.

Must, A., Szabó, Z., Bódi, N., Száz, A., Janka, Z., & Kéri, S. (2006). Sensitivity to reward and punishment and the prefrontal cortex in major depression. *Journal of Affective Disorder, 90,* 209-215.

Nestler, E.J. & Carlezon, W.A., (2006). The mesolimbic dopamine reward circuit in depression. *Society of Biological Psychiatry, 59,* 1151-1159.

Papachristou, H., Nederkoorn, C., Havermans, R., van der Horst, M., Jansen, A. (2012). *Psychopharamcology, 219,* 511-518.

Park, A., Kim, J., Gellis, L.A., Zaso, M.J., & Maisto, S.A. (2014). Short-term prospective effects of impulsivity on binge drinking: Mediation by positive and negative drinking consequences. *Journal of American College Health, 62*(8), 517-525.

Patton, J., Stanford, M.S., & Baratt, E.S. (1995). Factor structure of the Baratt Impulsiveness Scale. *Journal of Clinical Psychology, 51*(6), 768-774.

Pearson, C., Wonderlich, S.A., Smith, G.T. (2015). A risk and maintenance model for bulimia nervosa: From impulsive action to compulsive behavior. *Psychological Review, 122(3),* 516-535.

Pearson, C. M., Zapolski, T. C. B., & Smith, G. (2015). Longitudinal test of impulsivity and depression pathways to early binge eating onset. *International Journal of Eating Disorders, 48(2)*, 230-237.

Preston, S.D., Buchanan, T.W., Stansfield, R.B., & Bechara, A. (2007). Effects of anticipatory stress on decision making in a gambling task. *Behavioral Neuroscience, 121*(2), 257-263.

Ramírez, E., Ortega, A.R., & Reyes Del Paso, G.A. (2015). Anxiety, attention, and decision making: The moderating role of heart rate variability. *International Journal of Psychophysiology, 490,* 490-496.

Rosval, L., Steiger, H., Bruce, K., Israël, M., Richardson, J., & Aubut, M. (2006). Impulsivity in women with eating disorders: Problem of response inhibition, planning, or attention? *International Journal of Eating Disorders, 39(7),* 590-593.

Santesso, D.L., Steele, K.T., Bodgan, R., Holmes, A.J., Deveney, C.M, Meites, T.M., &

Pizzagalli, D.A.(2008). Enhanced negative feedback responses in remitted depression.

Neuroreport, 19(10), 1045-1048.

Santos-Ruiz, A., Garcia-Rios, M.C., Fernandez-Sanchez, J.C., Perez-Garcia, M., Muñoz-García,

M.A., & Peralta-Ramirez, M.I. (2012). Can decision-making skills affect responses to

psychological stress in healthy women? *Psychoneuroendocrinology, 37,* 1912-1921.

Shields, G.S., Lam, J.C.W., Trainor, B.C., Yonelinas, A.P. (2016). Exposure to acute stress

enhances decision-making competence: Evidence for the role of DHEA.

Psychoneuroendocrinology, 67, 51-60.

Shin, S.H. & Montalto, C.P. (2014). The role of impulsivity, cognitive bias, and reasoned action

in understanding college student gambling. *Journal of Youth Studies, 18*(3), 376-395.

Simonovic, B., Stupple, E.J.N., Gale, M., & Sheffield, D., (2016). Stress and risky decision

making: Cognitive reflection, emotional learning or both. *Journal of Behavioral Decision

Making.* doi:10.1002/bdm

Smoski, M.J., Lynch, T.R., Rosenthal, M.Z., Cheavens, J.S., Chapman, A.L., & Krishnan, R.R.

(2008). Decision-making and risk aversion among depressive adults. *Journal of Behavior

Therapy and Experimental Psychology, 39,* 567-576.

Starcke, K. & Brand, M. (2016). Effects of stress on decisions under uncertainty: A meta-

analysis. *Psychological Bulletin, 142*(9), 909-933.

Stranger, C., Ryan, S.R., Hongyun, F., Landes, R.D., Jones, B.A., Bickel, W.K., & Budney, A.J.

(2012. Delay discounting predicts alcohol substance abuse treatment outcomes.

Experimental Clinical Psychopharmacology, 20(3), 205-212.

Stanford, S. & Jones, M.P. (2009). Psychological subtyping finds pathological, impulsive, and

    'normal' groups among adolescents who self harm. *Child Psychology and Psychiatry,*

    50(7), 807-815.

van den Bos, R., Harteveld, M., & Stoop, H. (2009). Stress and decision-making in humans:

    Performance is related to cortisol reactivity, albeit differently in men and women.

    Psychoneuroendocrinology, 34, 1449-1458.

Whiteside, S.P. & Lynam, D.R. (2001). The Five Factor Model and impulsivity: Using a

    structural model of personality to understand impulsivity. *Personality and Individual*

    Differences, 30, 669-689.

World Health Organization (2002). Estimation of the incidence and prevalence of sexually

    transmitted infections. Geneva: WHO.

Young, A.M., King, L., Abbey, A., & Boyd, C. (2009). Adolescent peer-on-peer sexual

    aggression: Characteristics of aggressors of alcohol and non-alcohol related assault.

    Journal of Studies on Alcohol and Drugs, 70, 700-703.

Zawacki, T., Abbey, A., Buck, P., McAuslan, P., & Clinton-Sherrod, A.M. (2003). Perpetrators

of   alcohol-involved sexual assaults: How do they differ from other sexual assault

    perpetrators and nonperpetrators? *Aggressive Behavior, 29,* 366-380.

Zinzow, H. & Thompson, M. (2015). Factors associated with use of verbally coercive,

    incapacitated, and forcible sexual assault tactics in a longitudinal study of college men,

    Aggressive Behavior, 41, 34-43.

Table 1. Means and Standard Deviations for BIS and DASS

	Mean	Standard Deviation
Depression	8.28	.74
Anxiety	8.37	6.42
Stress	14.57	7.37
BIS Total	62.54	7.23
ATTN	18.12	3.37
Motor	21.16	3.37
NonPlan	23.26	7.23

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.

	①	②	③	④				
	Rarely/Never	Occasionally	Often	Almost Always/Always				
1	I plan tasks carefully.			①	②	③	④	
2	I do things without thinking.			①	②	③	④	
3	I make-up my mind quickly.			①	②	③	④	
4	I am happy-go-lucky.			①	②	③	④	
5	I don't "pay attention."			①	②	③	④	
6	I have "racing" thoughts.			①	②	③	④	
7	I plan trips well ahead of time.			①	②	③	④	
8	I am self controlled.			①	②	③	④	
9	I concentrate easily.			①	②	③	④	
10	I save regularly.			①	②	③	④	
11	I "squirm" at plays or lectures.			①	②	③	④	
12	I am a careful thinker.			①	②	③	④	
13	I plan for job security.			①	②	③	④	
14	I say things without thinking.			①	②	③	④	
15	I like to think about complex problems.			①	②	③	④	
16	I change jobs.			①	②	③	④	
17	I act "on impulse."			①	②	③	④	
18	I get easily bored when solving thought problems.			①	②	③	④	
19	I act on the spur of the moment.			①	②	③	④	
20	I am a steady thinker.			①	②	③	④	
21	I change residences.			①	②	③	④	
22	I buy things on impulse.			①	②	③	④	
23	I can only think about one thing at a time.			①	②	③	④	
24	I change hobbies.			①	②	③	④	
25	I spend or charge more than I earn.			①	②	③	④	
26	I often have extraneous thoughts when thinking.			①	②	③	④	
27	I am more interested in the present than the future.			①	②	③	④	
28	I am restless at the theater or lectures.			①	②	③	④	
29	I like puzzles.			①	②	③	④	
30	I am future oriented.			①	②	③	④	

DASS 21   NAME _____ DATE _____

BLACK DOG INSTITUTE

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.
The rating scale is as follows:

0 Did not apply to me at all - NEVER
1 Applied to me to some degree, or some of the time - SOMETIMES
2 Applied to me to a considerable degree, or a good part of time - OFTEN
3 Applied to me very much, or most of the time - ALMOST ALWAYS

FOR OFFICE USE

		N	S	O	AA	D	A	S
1	I found it hard to wind down	0	1	2	3	■	■	
2	I was aware of dryness of my mouth	0	1	2	3	■		■
3	I couldn't seem to experience any positive feeling at all	0	1	2	3		■	■
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3	■		■
5	I found it difficult to work up the initiative to do things	0	1	2	3		■	■
6	I tended to over-react to situations	0	1	2	3	■	■	
7	I experienced trembling (eg, in the hands)	0	1	2	3	■	■	
8	I felt that I was using a lot of nervous energy	0	1	2	3	■	■	
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3	■		■
10	I felt that I had nothing to look forward to	0	1	2	3		■	■
11	I found myself getting agitated	0	1	2	3	■	■	
12	I found it difficult to relax	0	1	2	3	■	■	
13	I felt down-hearted and blue	0	1	2	3		■	■
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3	■	■	
15	I felt I was close to panic	0	1	2	3	■		■
16	I was unable to become enthusiastic about anything	0	1	2	3		■	■
17	I felt I wasn't worth much as a person	0	1	2	3		■	■
18	I felt that I was rather touchy	0	1	2	3	■	■	
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3	■		■
20	I felt scared without any good reason	0	1	2	3	■		■
21	I felt that life was meaningless	0	1	2	3		■	■
					TOTALS			

52