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PTSD AND HIGH-RISK BEHAVIORS IN TRAUMA SURVIVORS

RICHARD JASON LAWRENCE

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Cleveland State University

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This thesis has been approved
for the Department of PSYCHOLOGY
and the College of Graduate Studies by:

Thesis Chairperson, Lisa Stines Doane, Ph. D.

Department & Date

Methodologist, Conor McLennan, Ph. D.

Department & Date

Committee Member, Michael Wisniewski, Ph. D.

Department & Date

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ABSTRACT

Many previous studies have shown that trauma survivors, with and without Posttraumatic Stress Disorder (PTSD), engage in more high-risk behaviors (e.g., Smith, Davis, & Fricker-Elhai, 2004). It is unclear whether the trauma exposure itself, or PTSD, is actually associated with the high-risk behaviors. The current study will be one of the first to examine differences in risk-taking between trauma survivors with and without PTSD, and will utilize the Balloon Analogue Risk Task (BART) to test risk-taking propensity in trauma survivors. We expect that trauma survivors with PTSD will engage in more high-risk behaviors, report greater perceived benefits, and demonstrate greater risk-taking propensity than trauma survivors without PTSD. The results of this study were not in support of our hypotheses that those with PTSD would report more overall risk-taking, have higher risk-propensity, or report relatively more expected benefits from high-risk behaviors.

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CHAPTER I

INTRODUCTION

Approximately 70% of the U.S. population will experience a traumatic event (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Such events include natural disasters, motor-vehicle accidents, sexual assaults, physical assaults, and combat. In the aftermath of a traumatic experience, survivors are at risk for developing posttraumatic stress disorder (PTSD), an anxiety disorder classified by the *Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision* (DSM-IV-TR; American Psychiatric Association [APA], 2000). Those survivors who develop PTSD present with symptoms in the three core clusters of PTSD symptoms: reexperiencing, avoidance, and increased arousal and/or hypervigilance.

There is a growing body of literature examining the relationship between experiencing a trauma, having PTSD, and engaging in subjectively high-risk behaviors (Davis, DeMaio, & Fricker-Elhai, 2004; Randolph, & Mosack, 2006; Tull, Trotman, Duplinsky, Reynolds, Daughters, Potenza, & Lejuez, 2009). High-risk behaviors are shown to be associated with experiencing another traumatic event, or even

revictimization, in those who have experienced a traumatic event and in those who may have PTSD (e.g., Smith, Davis, & Fricker-Elhai, 2004; Risser, Hetzel-Riggin, Thomsen, & McCane, 2006). High-risk behaviors that can expose these already vulnerable populations to further trauma include alcohol abuse, illicit drug use, and high-risk sexual behaviors (Smith, Davis, & Fricker-Elhai, 2004).

In the current study, we aim to expand previous risk-taking literature on trauma and PTSD. Specifically, to our knowledge, this study is the first to date to assess differences in risk-taking propensity between traumatic event survivors with and without PTSD. This study hypothesizes that those with PTSD will demonstrate more risk-taking propensity compared to both trauma survivors without PTSD and the No-Trauma group. The PTSD core symptom of arousal, specifically hypervigilance, is one potential explanation for the increase in risk-taking in those that present with PTSD symptomatology (Risser, Hetzel-Riggin, Thomsen, & McCane, 2006). This symptom cluster may lead to risk perception that has high sensitivity to risk, but low specificity of what is actually risky (Orcutt, Erikson, & Wolfe, 2002). This increased arousal and vigilance may affect the person's sense of what is risky in certain situations (Risser et al., 2006).

The current study had four hypothesized outcomes. The primary hypothesis of this study was that those with PTSD symptomatology would demonstrate an elevated risk-taking propensity compared to the trauma survivors without PTSD, while the Trauma without PTSD group would demonstrate an elevated risk-taking propensity when compared to the control group with no trauma history. This was assessed through utilization of the Balloon Analogue Risk Task (BART; Lejuez et al., 2002). The second

hypothesis was that those with PTSD symptomatology would report that they will likely engage in subjectively high-risk behaviors at a higher level compared to the Trauma without PTSD group, while the Trauma without PTSD would report more than the control group. The third hypothesis of this study was that those with PTSD would report greater perceived benefits from the high-risk behaviors than the trauma without PTSD group, while the Trauma without PTSD group would report more than the control. The final hypothesis was that risk-taking propensity would mediate the relationship between PTSD symptom severity and overall risk-taking behaviors.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

2.1 Trauma Prevalence

In the National Comorbidity Survey (NCS), Kessler and colleagues (1995) found that over 60% of men and 50% of women reported exposure to at least one lifetime traumatic event according to the DSM-III-R (APA, 1987) definition of a traumatic event, which has a less sensitive definition of a traumatic event than the current DSM-IV-TR (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Most NCS respondents who reported exposure to a traumatic event experienced more than one type of trauma. The most commonly occurring types of trauma in the NCS were witnessing a traumatic event, personally having a life-threatening accident, and being involved in a natural disaster (Kessler et al., 1995).

Based on findings of the 1996 Detroit area survey of trauma, Breslau and colleagues (1998) found that almost 90% of the respondents reported exposure to at least one DSM-IV traumatic event in their lifetime, while participants on average were exposed to nearly five lifetime traumas (Breslau, Kessler, Chilcoat, Schultz, Davis, & Andreski, 1998). This study revealed that 38% of respondents experienced traumatic

assaultive violence (e.g., sexual assault/rape, physical assault, or military combat), 60% experienced some other traumatic personal injury or shocking experience (such as a life-threatening accident, natural disaster, or life threatening illness), 60% experienced a sudden/unexpected death of a loved one, and 62.4% lived through a nonfatal traumatic experience that occurred to a loved one (e.g., family member raped or seriously injured in an accident) (Breslau et al., 1998).

2.2 PTSD

PTSD, as classified by the DSM-IV-TR (APA, 2000), is an anxiety disorder that develops after the experience of a traumatic event, such as a physical or sexual assault, combat, or severe accident. The DSM-IV-TR defines a traumatic event as experiencing, witnessing, or being confronted with an event that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The person experiencing the traumatic event must respond to the event with feelings of intense fear, helplessness, or horror.

In the wake of the event, the survivors who develop PTSD will present with symptoms within the three core clusters of symptoms including: 1. reexperiencing the event (e.g., flashbacks and nightmares); 2. avoidance of thoughts and reminding stimuli of the traumatic event as well as numbing of emotional responsiveness in a persistent and effortful manner; and 3. increased arousal (e.g., trouble sleeping and anger) and hypervigilance (e.g., being overly threatened). Duration of symptoms varies, but generally the symptoms start within three months after a traumatic experience. Approximately 26% of PTSD cases are in remission within 6 months after developing

PTSD, 40% have persistent symptoms in excess of 12 months, with more than 33% of cases having persistent PTSD for over 60 months (Breslau, 2009).

2.3 PTSD Prevalence and Risk Factors

Kessler et al. (1995) reported from the National Comorbidity Survey (NCS) that 8% of the US population develops PTSD in their lifetime. The NCS reports gender prevalence rates, with 10% of American women and 5% of American men developing PTSD in the course of their lifetime.

Breslau and colleagues (1998) found from the Detroit area survey of trauma that the probability of developing PTSD from the trauma reported as the most upsetting to respondents was 14%, while the probability of developing PTSD from another experienced trauma was 9%. They report that 12% of the population has, or had developed, PTSD. Furthermore, approximately 40 episodes of PTSD were reported in every 100 people in the sample, indicating that this 12% of the population averages 3.3 episodes of PTSD during their life (Breslau et al., 1998). Though world-wide prevalence is not known, one study suggests that more than 10% of the world population suffers from PTSD (Frans, Rimmo, Aberg, & Fredrikson, 2005).

According to the DSM-IV-TR (APA, 2000), those with PTSD report symptoms for more than a year. Breslau et al. (1998) found the average duration of each episode of PTSD reported by participants of their study to be more than seven years. Breslau and colleagues' results suggest that the typical person with PTSD in their study had active symptoms lasting for more than two decades.

Breslau (2009) reports in an epidemiological study of trauma and PTSD that PTSD persists longer in those who experienced direct trauma (rape, assault, injury) compared to witnessing a traumatic event of another person or living through a natural disaster. Breslau also states that PTSD persists longer in females (48 months) than in males (12 months), and that females are at higher risk of developing PTSD due to higher rates of sexual assault than men. Preexisting disorders (i.e., substance abuse and depression) increase the likelihood of PTSD development (Breslau, 2009), which are not causal but may be due to shared environmental or genetic factors. Breslau also found that children who have externalizing problems (as identified by teachers) at age six are at an increased risk of exposure to assaultive trauma and that children with IQs higher than 115 were less likely to experience a trauma (assaultive or other), thus suggesting that externalizing and lower IQs are associated with increased likelihood of PTSD.

Acierno and colleagues (1999) investigated possible risk factors of physical assault and rape in a female population. They found that previous victimization, younger age, and having PTSD significantly increased the risk of being victimized by rape in the future. They also found that the risk of developing PTSD is increased by alcohol abuse. Prior victimization, being a minority, being actively depressed, and being a drug user increased the likelihood of being physically assaulted. Rape and assault victims with a history of depression were more likely to develop PTSD (Acierno, Resnick, Kilpatrick, Saunders, & Best, 1999). Those who have been raped and injured or who had a history of substance abuse were more than three times as likely to develop PTSD (Acierno et al., 1999). Davis and colleagues (2004) found in a sample of college women that the women who had experienced childhood sexual abuse were more than six times as likely to have a

sexual assault as an adult, possibly due to the risky alcohol and sexual behaviors serving as a function of coping exposing them to higher risk situations (Davis, DeMaio, & Fricker-Elhai, 2004) .

2.4 Risk-Taking and Risky Behaviors

Risk-taking has been defined as decisions and subsequent behaviors that involve a high potential for punishment and a high opportunity for reward simultaneously (Leigh, 1999). These behaviors can have considerably severe medical, legal, and interpersonal consequences (Hunt, Hopko, Bare, Lejuez, & Robinson, 2005).

Buelow and Suhr (2009), propose that risky-decision making is a process that is influenced by “cold” cognitive reasoning and “hot” affective processing. The cold decision making process is described as an association that requires the knowledge of the risk-to-benefit ratio, and the ability to compare and contrast the risks and benefits in working memory. Hot decision making involves emotional and affective responses to the options of risk or benefit in association to similar decisions made in the past (Buelow & Suhr, 2009). Underlying dispositional qualities (i.e., individual differences) are believed to account the most for seeking or avoiding risky choices (Maner, Richey, Cromer, Mallott, Lejuez, Joiner, & Schmidt, 2007). Maner et al. (2007), suggest that emotional experiences, such as fear, disgust, and anger have been shown to shape decision making tendencies.

Thus, emotions serve as important forms of information used to distinguish between possible threats or rewards. Anger has been shown to promote decision-making

biases that increase tolerance for risk, whereas emotions like disgust promote decision-making associated with risk-avoidance (Fessler, Pillsworth, & Flamson, 2004).

Assessing risk-decision making in those with anxiety, Maner et al. (2007) found that individuals with relatively high levels of social anxiety, trait anxiety, and worry demonstrate risk-avoidant decision-making in a behavioral decision-making task, and those with trait anxiety are much more risk-averse than those with other mood disorder, such as depression. Maner et al.'s findings also suggest that negative affect was not the cause of the risk-avoidant behaviors, given that to the other mood disorder groups did not show the risk-avoidant tendencies. Maner et al. propose that using anxiety to make decisions, in turn, promotes further anxiety and risk-avoidance.

2.5 Trauma, PTSD, and Risk-Taking

Risky behaviors have become a recent topic of concern in trauma and PTSD research, especially in the realm of behaviors associated with risky sexual practices, illicit drug use, and alcohol abuse due to possible risk of revictimization (e.g., Saladin, Brady, Dansky, & Kilpatrick, 1995; Acierno, Resnick, Kilpatrick, Saunders, & Best, 1999; Davis, DeMaio, & Fricker-Elhai, 2004). Saladin and colleagues (1995), compared those with substance use disorders (SUD) and PTSD and those with just PTSD, and found that those with SUD/PTSD reported more victimization experiences. Saladin et al. suggest that this is due to greater exposure of traumatic events increasing coping via self-medicating which could lead to an SUD. Saladin and colleagues propose the inverse as well: that a pre-existing SUD could impair judgment which in turn increases the exposure to risky situations that could lead to possible victimization. Their findings indicated that

those with PTSD and SUD experience more arousal (in the form of sleep disturbances) and avoidance symptoms than those with PTSD alone (Saladin, Brady, Dansky, & Kilpatrick, 1995).

Research has shown that those who have experienced a traumatic event and that those trauma survivors who develop PTSD engage in more high-risk behaviors than those who have not experienced a trauma (e.g., Danielson, Amstadter, Dangelmaier, Resnick, Saunders, & Kilpatrick, 2009). In a sample of crack/cocaine users in treatment, patients with PTSD exhibited overall greater levels of risk-taking propensity than the non-PTSD group, even after controlling for other psychiatric disorders and psychotropic medication (Tull et al., 2009).

With data from the National Survey of Adolescents (NSA), Kilpatrick and colleagues (2003) examined substance use behavior in a national sample of adolescents. They found that 26% of adolescents with PTSD met diagnostic criteria for substance abuse/dependence (Kilpatrick, Ruggiero, Acierno, Saunders, Resnick, & Best, 2003). In a follow-up telephone survey seven to eight years later, the same sample of participants were utilized to identify risk factors for long-term substance abuse (Danielson, Amstadter, Dangelmaier, Resnick, Saunders, & Kilpatrick, 2009). Danielson et al. (2009) indicated that lifetime exposure to traumatic events and developing PTSD, as well as certain demographic dimensions (i.e., being a white young-adult male) increases the likelihood of involvement of substance abuse among this sample of young adults (Danielson, Amstadter, Dangelmaier, Resnick, Saunders, & Kilpatrick, 2009).

These findings suggest that substance abuse, an objectively high-risk behavior, is common among those who experienced trauma and may also be influenced by the

presence of PTSD. Davis et al. (2004) found that participants who were victimized reported significantly more alcohol use in both quantity per occurrence and frequency than the non-victims (Davis, DeMaio, & Fricker-Elhai, 2004). These studies suggest that developing PTSD at an early age can predict substance abuse in adulthood.

Buckley and colleagues (2004) found that individuals with chronic PTSD engage in more risky health-related behaviors, such as smoking twice the amount than the general population, engaging in less physical exercise, and they were less likely to seek preventive medical care (Buckley, Mozley, Bedard, Dewulf, & Grief, 2004). Of the veterans with PTSD, one third indicated the abuse of alcohol and 10% showed signs of illicit drug abuse. Kessler (2000) suggests that those with PTSD are substantially more likely to develop substance abuse, mood, and other anxiety disorders than those without PTSD.

Researchers have indicated that trauma survivors engage in objectively high-risk sexual practices as well as substance abuse. Randolph and Mosack (2006) investigated multiple types of risky sexual behaviors in conjunction with sexual traumas in a predominantly female undergraduate student sample and found that greater severity and frequency of childhood sexual abuse (CSA) predicted a higher rate of risky sexual behaviors in adulthood, such as greater number of sexual partners, more positive reactions to first intercourse, more permissive sexual attitudes, and higher use of drugs and alcohol in sexual experiences. Hutton et al. (2001) found in a group of female prisoners that those with PTSD had higher incidences of risky sexual behaviors, including prostitution, five years before incarceration. Approximately 15% of their sample had a current PTSD diagnosis and 33% reported having PTSD in their lifetime

(Hutton, Treisman, Hunt, Fishman, Kendig, Swetz, & Lyketsos, 2001). They postulated that early sexual abuse may predispose women to these risky sexual behaviors.

In a sample of college women, Risser and colleagues (2006) found that PTSD was a significant mediator between experiencing childhood sexual abuse (CSA) and adult sexual assault (ASA). The severity of the childhood sexual abuse and PTSD severity from the CSA greatly affects the severity of the adult sexual assault. The hyperarousal symptoms of PTSD can be used to predict adult revictimization and may play a primary role in explaining the association between the severity of the CSA and ASA (Risser, Hetzel-Riggin, Thomsen, & McCane, 2006). Risser and colleagues suggest that the arousal in PTSD differs from the arousal of other anxiety in that it is strongly linked to specific situational cues. The symptom cluster of hyperarousal may influence cognition, affect, and behavior in ways that increase likelihood of sexual victimization.

2.6 Perceptual Changes as a Function of Trauma and PTSD

There is a growing body of literature examining the role of perceptions of high-risk behaviors subsequent to experiencing a traumatic event and/or developing PTSD (e.g., Smith, Davis, & Fricker-Elhai, 2004; Davis, DeMaio, & Fricker-Elhai, 2004). Smith et al. (2004) assessed risk-taking in victims of traumatic events compared to non-victims in a sample of college-aged women. They found differences in risk perception between the groups which mediated victimization status and risk-taking involvement. Those who experienced ASA and CSA perceived less risk than the non-victimized group for drug use and risky sex behaviors, while showing no difference in perceptions than the non-victimized group in perceptions of aggressive/illegal activities or heavy drinking

(Smith, Davis, & Fricker-Elhai, 2004). Those who experienced childhood sexual abuse, adult sexual assault, and/or aggravated assault reported more benefits from illicit drug use and sexual behaviors, while those who only experienced ASA reported greater benefits of heavy drinking than the non-victim group. This study found that judgments of risks and benefits were relatively distinct in the victim groups suggesting that these constructs were evaluated separately by the victims. These risk evaluations lead to more expected involvement (Smith, Davis, & Fricker-Elhai, 2004).

Smith and colleagues found that PTSD symptoms, which differentiated between the trauma groups, contributes to more expected involvement of risky sexual behaviors in the group who demonstrated the core symptoms. This suggests that the resulting anxiety may play a greater role in risky sex behaviors than any other factor. Smith and colleagues concluded that the altered perceptions of risk that lead to risk-taking increase the risk of future victimization (Smith, Davis, & Fricker-Elhai, 2004). These findings were further expanded upon by Davis et al. (2004), whose study suggests that the risky alcohol and sexual behaviors, while possibly acting as maladaptive coping mechanism, results in future victimization in a sample of college women (Davis, DeMaio, & Fricker-Elhai, 2004).

Randolf and Mosack (2006) found that the greater the severity of childhood sexual abuse (CSA) may lead to a greater chance of revictimization in adolescence and adulthood. Those who experienced CSA also showed more passive resistance and withdrawal from intimidating situations, use of alcohol and drugs in sexual experiences, and more permissive attitudes which may increase the chance of experiencing sexual assault (Randolf & Mosack, 2006). They also found that participants who experienced an

adult sexual assault (ASA) showed lower levels of assertiveness in defense against unwanted sexual advances that could lead to an assault, possibly due to the misinterpreted perceptions of the risky situation. This misinterpretation may be due to significantly diminished perceptions of risks as a result of alcohol/drug intoxication and abuse.

Looking at combat veterans, Orcutt and colleagues (2002) found that trauma exposure prospectively predicted increased risk for exposure to subsequent trauma. Orcutt and colleagues suggest that PTSD may result in an increase in risky behavior (e.g., substance use) which greatly increases the risk for another traumatic event. Secondly, Orcutt and colleagues propose that PTSD may impair information processing that result in inaccurately recognizing potential risk due to cognitive disturbances, for instance the difficulty maintaining concentration which is a common cognitive symptom of PTSD (Orcutt, Erikson, & Wolfe, 2002). Orcutt et al. further expands that the arousal symptoms of PTSD, especially that of hypervigilance, may lead to risk perception that has high sensitivity but low specificity. Those with PTSD may over-perceive risk and danger that result in false alarms of potential threats. Orcutt and colleagues conclude that despite the increased attention to threat and danger (demonstrated by those with PTSD) that the deficits in risk disengagement or active avoidance are due to impaired information processing and a disconnection between emotional arousal and efforts of self-protection (Orcutt, Erikson, & Wolfe, 2002).

Perceptual changes due to trauma exposure and PTSD have been demonstrated through research on combat veterans with or without PTSD in a VA clinic. Those veterans with PTSD have been shown to differ in appraisals of themselves and other combat veterans across time compared to those Veterans without PTSD (Brown,

Buckner, & Hirst, 2011). Brown et al. found that veterans with PTSD appraised their pre-trauma selves more favorably than their current and imagined future selves, while not perceiving or projecting any difference in their functioning over time, meaning they see a constant decline of their functioning persisting into the future. Both groups of veterans appraise other (hypothetical) combat veterans as improving over time. Those without PTSD appraised themselves favorably before trauma, as well as perceiving their functioning since the trauma as improving (the opposite of those with PTSD), which suggest that this positive view may be a factor of resilience to PTSD (Brown, Buckner, & Hirst, 2011). Understanding the role of the perceptual changes associated with surviving a trauma, specifically developing PTSD, could be critical in ultimately treating PTSD as well as preventing high-risk behaviors that put survivors at risk for future trauma.

2.7 Current Study

In the current study, we expanded trauma, PTSD, and risk literature by comparing risk-taking behaviors between trauma survivors with and without PTSD as well as a control group. To our knowledge, this study was the first to compare risk-taking propensity through use of the Balloon Analogue Risk Task (BART; Lejuez et al., 2002) between trauma survivors with and without PTSD symptomatology. To further expand on risk-taking propensity in trauma surviving populations, the CARE-R (Fromme, Katz, & Rivet, 1997) was used to identify the participants past six month risk-taking, anticipated future risk-taking, and their perceptions of benefits associated with these high-risk behaviors.

We hypothesized that those who survived a traumatic event and presented with PTSD symptomatology would demonstrate an elevated risk-taking propensity compared to the trauma survivors without PTSD, while the Trauma without PTSD would demonstrate more risk-taking propensity than the control group with no trauma history. The second hypothesis was that those with PTSD symptomatology would report higher past frequency and prospective future involvement of subjectively high-risk behaviors when compared to the Trauma without PTSD group, while Trauma without PTSD would report higher past frequency and future involvement compared to the No-Trauma group. The third hypothesis of this study was that those in the PTSD group would report greater perceived benefits from the high-risk behaviors than the Trauma without PTSD group, who would report greater benefits than the control group. The final hypothesis of the study was that risk-taking propensity would mediate the relationship between PTSD symptom severity and overall risk-taking behaviors.

CHAPTER III

METHODS

3.1 Participants

A total of 56 participants were recruited from an undergraduate population at a Midwestern state university. The population consisted of 27 male (48%) and 29 female (52%) participants that were at least 18 years of age with a mean age of 25 ($SD = 9.71$) and a range of 18-55. Participants were compensated with partial credit for a course requirement. At the conclusion of the study, the participants with the ten best performances (i.e., most money earned) on the BART received prepaid Visa gift cards. The participant with the best performance received a \$50 gift card, the second and third received a \$25 gift card, and fourth through tenth received a \$10 gift card. Participants were treated in accordance with the “Ethical Principles of Psychologists and Code of Conduct” (APA, 1992).

3.2 Measures

Balloon Analogue Risk Task (BART; Lejuez et al., 2002). The BART is a computer-based measure of risk-taking propensity. The BART has been found to be related to the self-reported engagement in a variety of real-world risk behaviors such as substance use (Lejuez et al., 2002). During the task, the computer screen shows a small simulated balloon with a balloon pump, a reset button labeled “Collect \$\$\$”, a permanent money earned display labeled “Total Earned”, and a second display listing the money earned on the last balloon and labeled “Last Balloon”. With each pump, five cents will be earned in the temporary reserve. At any point during each balloon, the participant can stop pumping the balloon and click the Collect \$\$\$ button to add the total temporary reserve to the total money earned (Lejuez et al., 2002). This will repeat until all 30 balloons (trials) have been completed. All balloons have a different explosion point with the weakest balloon exploding on the first pump and the strongest balloon exploding after 128 pumps. The primary dependent variables that the BART measures are adaptive risk-taking and maladaptive risk-taking. Adaptive risk-taking propensity is measured by calculating the average number of balloon pumps on the balloons that did not explode. This adjusted average of pumps is used as the primary dependent variable from the task, with the higher the number of average pumps per balloon equating to higher the adaptive risk-taking. The value of the total money earned during the task is also used as a measure of adaptive risk-taking. Maladaptive risk-taking is measured by the number of balloons that exploded, or popped, per participant. The more popped balloons a participant has, the more maladaptive risk-taking (impulsivity).

Cognitive Appraisal of Risky Events-Revised (CARE-R; Fromme, Katz, & Rivet, 1997). The CARE-R is a questionnaire used to assess involvement in three types of risky behaviors: drug use, alcohol consumption, and risky sexual behaviors with satisfactory predictive validity (up to six months) and reliability ($\alpha = 0.86$) (Fromme, Katz, & D'Amico, 1997). The CARE-R measures both reports of anticipated future risky behavior and the perceived benefits associated with engaging in these behaviors. The participants' perceptions of risk and expected future involvement are assessed by utilizing a 7-point Likert scale (1 = not at all likely, 7 = extremely likely). Nine scores will be computed (one each for all 3 risky behavior categories for each subscale [past frequency, perceived benefits, and future involvement]).

Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, and Perry, 1997). The PDS is a clinical instrument used to diagnose PTSD. Items on the PDS are designed to mirror the diagnostic criteria of the *DSM-IV*. The scale assesses the presence and severity of PTSD symptoms (i.e. hyperarousal, avoidance, and re-experiencing), and overall level of impairment in functioning. The PDS has comparable validity ($\alpha = 0.82$) and reliability ($\alpha = 0.78 - 0.92$) as other PTSD measures (Foa, Cashman, Jaycox, and Perry, 1997). The PDS contains 17 symptom items assessing for severity of symptoms over the past month based on a four point Likert scale (0 = Not at all or only one time, 1 = Once a week or less/once in a while, 2 = Two to four times a week/half of the time, and 3 = Five or more times a week/almost always). Severity is based off of the sum of these 17 items, using a base cutoff score of 25 to receive an approximate diagnosis of PTSD.

3.3 Procedure

Participants were given a battery of self-report questionnaires as well as a subjective measure of real-world risk-taking propensity. Past trauma history and PTSD symptoms were assessed within the battery to identify possible trauma experiences and identify presenting PTSD symptoms and symptom severity. Past frequency of and expected future involvement in risky sexual, drug, and alcohol related behaviors were assessed, as well participants' perceptions of potential benefits associated with participating in these risky behaviors. A computerized measure of risk-taking propensity was used to measure the participants' actual real world risk-decision making propensity.

Based on their data, participants were categorized as having an approximated diagnosis of trauma with PTSD, trauma without PTSD, and No-Trauma. The approximate diagnosis of PTSD is calculated by summing scores across the 17 symptom items from the PDS using a cutoff score of 25 (a score of 25 or more qualifying as an approximate diagnosis of PTSD). The non-trauma (No-Trauma) group consisted of 14 members, the trauma without PTSD symptomatology (Trauma without PTSD) consisted of 33 members, and the trauma with PTSD symptomatology (Trauma with PTSD) consisted of nine members with a mean PDS score of 31 ($SD = 6.61$). These groups were compared for differences in prospective risky behaviors, perceived benefits of risk-taking, expected future involvement, and actual risk-taking propensity.

3.4 Analyses

Multiple bivariate correlations were conducted to assess for collinearity between the past frequency and expected future involvement of high-risk sex, drug, and alcohol

behaviors. The correlational analyses were used to determine whether the past and future risk-taking behaviors should be combined into one overall risk-taking construct. Past frequency and expected future involvement were converted into standard scores and combined into a total risk standard score. Expected benefits were compared for collinearity to establish a total expected benefit composite score. The risk-taking composite score, total money earned (mean = 30.70, SD = 8.75), adjusted average pump per balloon (adaptive risk-taking, mean = 30.79, SD = 13.46), and the total balloons popped (maladaptive risk-taking, mean = 7.51, SD = 3.46) from the BART were also compared for collinearity by utilization of bivariate correlations.

A multiple analysis of variance, MANOVA, was conducted to identify differences in risk-taking propensity, the participants' overall risk-taking, and perceived benefits of high-risk behaviors between the three groups. Furthermore, two mediational models were tested using linear regressions to assess the possible mediating effects of adaptive (total money earned and adjusted pumps) and maladaptive (total balloons popped) risk-taking propensity between PTSD symptom severity and overall risk-taking.

It should be noted that four participants (7%) from the total sample, one participant (7%) from the No Trauma group, two participants (6%) from the Trauma without PTSD group, and one participant (11%) from the Trauma with PTSD group were removed as outliers from the analyses. These participants earned under or over two standard deviations from the mean of (\$30.70) on the BART reflecting a significantly above or below average performance on the BART compared to the other participants. Also, due to a computer error, seven participants' adjusted pump values and total number of balloons popped were not used in analyses. All analyses reflect these exclusions.

CHAPTER IV

RESULTS

Correlational analyses were conducted on past 6 month frequency ($N = 68$) and expected future involvement ($N = 68$) of sexual, drug use, and alcohol abuse behaviors (See Table 1). Past frequency of sexual behaviors and past drug use behaviors were significantly correlated, $r = .597, p < .01$. Past sex and past alcohol abuse behaviors were significantly correlated, $r = .625, p < .01$. Past drug use and alcohol abuse were significantly correlated, $r = .835, p < .01$. Expected future involvement of risky sex and drug use behaviors were significantly correlated, $r = .819, p < .01$. Future sex and alcohol abuse were significantly correlated, $r = .830, p < .01$. Future drug use and alcohol abuse were significantly correlated, $r = .784, p < .01$. Past sex was significantly correlated with future sex ($r = .689, p < .01$), future drug ($r = .648, p < .01$), and future alcohol ($r = .574, p < .01$). Past drug use was significantly correlated with future sex ($r = .549, p < .01$), future drug ($r = .811, p < .01$), and future alcohol ($r = .595, p < .01$). Finally, past alcohol abuse was significantly correlated with future sex ($r = .684, p < .01$), future drug ($r = .789, p < .01$), and future alcohol ($r = .748, p < .01$). These individual

variables were then converted into standard scores and combined to create a composite total risk standard score.

Table 1

Bivariate correlations of past six month frequency of risky behaviors and expected future involvement in high-risk behaviors.

	Past Sex	Past Drug	Past Alcohol	Future Sex	Future Drug
Past Sex	–	.597**	.625**	.689**	.648**
Past Drug	.597**	–	.835**	.549**	.811**
Past Alcohol	.625**	.835**	–	.684**	.789**
Future Sex	.689**	.549**	.684**	–	.819**
Future Drug	.648**	.811**	.789**	.819**	–
Future Alcohol	.574*	.595**	.748**	.830**	.784**

** Correlation is significant at the 0.01 level (two-tailed).

Expected benefits from risky sexual (N = 68), drug use (N = 68), and alcohol abuse (N = 68) behaviors were compared through bivariate correlations. Perceived benefits from sex and perceived benefits from drug use were significantly correlated, $r = .728, p < .01$. Perceived benefits from sex and perceived benefits from alcohol abuse were significantly correlated, $r = .822, p < .01$. Lastly, perceived benefits from drug use and perceived benefits from alcohol abuse were significantly correlated, $r = .797, p < .01$. These individual variables were combined into a composite score of perceived benefit from the high-risk behaviors. The expected benefits for the three behaviors were on the same scale and did not need to be converted into standard scores to aggregate.

Bivariate correlations were conducted between the total amount of money earned during the BART ($N = 52$), total adjusted average of pumps per balloon that did not explode ($N = 45$), total number of balloons that exploded ($N = 45$), and the composite total risk score ($N = 68$). The composite total score for risk was not significantly correlated with total number of balloons that exploded, ($r = .225, p = .137$), total earned ($r = .229, p = .103$) or adjusted pump ($r = .128, p = .403$). This suggests that risk taking propensity (adaptive or maladaptive) is not measured by the CARE-R, reflecting different constructs of risk-taking.

The MANOVA was conducted to compare the differences in risk-taking propensity, the participants' overall risk-taking, and perceived benefits of high-risk behaviors between the groups of no trauma history (No Trauma, $N = 13$), trauma history without an approximate diagnosis of PTSD (Trauma without PTSD, $N = 31$), and trauma history with an approximate history of PTSD (Trauma with PTSD, $N = 8$, mean PDS score = 30.22, $SD = 6.63$). After controlling for gender effects, the overall MANOVA was not significant, $F(10, 76) = .848, p = .584$, between the three trauma groups on all dependent variables (see Table 2). Exploratory Post Hoc tests were conducted to identify possible mean differences between the groups on all dependent variables (see Table 3).

Table 2

Multivariate Analyses of Variance (MANOVA) Between Trauma Groups for risk-taking components

	Λ Value	<i>F</i>	df 1	df 2	Sig.
Trauma Group	.809	.848	10.000	76.000	.584

Note. Trauma components are as follows: Total Risk Standardized Composite Score (CARE-R), Total Expected Benefit Composite Score (CARE-R), Total Money Earned (BART), Adjusted Pump Value per Balloon that did not explode (BART), and Total Number of Balloons Popped (BART).

Table 3

Post Hoc (LSD) comparisons of risk-taking components between trauma groups

Dependent Variable	Trauma Group	Trauma Group	Mean Diff.	Sig.
Total Money Earned	No Trauma	Trauma w/o PTSD	1.5666	.604
		Trauma w/ PTSD	-.0727	.986
	Trauma w/ PTSD	No Trauma	.0727	.986
		Trauma w/o PTSD	1.6393	.667
Adjusted Pump	No Trauma	Trauma w/o PTSD	4.8752	.318
		Trauma w/ PTSD	6.7184	.335
	Trauma w/ PTSD	No Trauma	-6.7184	.335
		Trauma w/o PTSD	-1.8433	.764
Total Popped	No Trauma	Trauma w/o PTSD	1.3896	.256
		Trauma w/ PTSD	3.3182	.060
	Trauma w/ PTSD	No Trauma	-3.3182	.060
		Trauma w/o PTSD	-1.9286	.213
Total EB	No Trauma	Trauma w/o PTSD	.0451	.834
		Trauma w/ PTSD	.3463	.261
	Trauma w/ PTSD	No Trauma	-.3463	.261
		Trauma w/o PTSD	-.3012	.270
Total Risk	No Trauma	Trauma w/o PTSD	.3419	.484
		Trauma w/ PTSD	.7131	.308
	Trauma w/ PTSD	No Trauma	-.7131	.308
		Trauma w/o PTSD	-.3712	.547

Note. Dependent Variable list: Total Money Earned = Total value of money earned (BART), Adjusted Pump = Adjusted average amount of pumps per Balloon that did not explode (BART), Total Popped = number of balloons popped (BART), Total EB = Composite score of expected risk (CARE-R), and Total Risk = Standardized composite score of total risk (CARE-R).

Approaching significance = $p < .10$

The exploratory Post Hoc tests illustrated a difference that approached significance ($p = .06$) between the No Trauma ($M = 8.82$, $SD = 3.92$) and Trauma with PTSD ($M = 5.5$, $SD = 2.74$) in total balloons that exploded in the BART. Contrary to our prediction, this difference suggests that those with no history of trauma demonstrated more maladaptive risk-taking than those trauma survivors with PTSD symptomatology. All other mean differences were not significant, suggesting no difference in risk-taking between groups.

The linear regression assessing for the mediational effects of adaptive risk-taking propensity between PTSD symptom severity and overall risk-taking was not significant (see Table 4). The results of the regression indicated that symptom severity explained 0.3% of the variance, $R^2 = .003$, $F(1, 43) = 1.41$, $p = .709$. The first step of the regression found that PTSD symptom severity ($\beta = -.007$, $p = .709$) did not predict total risk-taking. When the adaptive risk-taking (total money earned and adjusted average pump count) components were added to the model, symptom severity and adaptive risk-taking accounted for 2.7% of the variance. This change in R^2 was not significant, $R^2 = .027$, $F(3, 41) = .372$, $p = .773$. The second step of the regression found that PTSD symptom severity ($\beta = -.009$, $p = .623$), total money earned ($\beta = .031$, $p = .594$) and adjusted average pump ($\beta = -.004$, $p = .911$) do not predict overall risk-taking behavior.

The second linear regression, which assessed for the mediational effects of maladaptive risk-taking propensity between PTSD symptom severity and overall risk-taking (see Table 5), was not significant, $R^2 = .052$, $F(2, 42) = 1.148$, $p = .327$. With the maladaptive risk-taking component added to the model, symptom severity and maladaptive risk-taking (total balloons popped) accounted for 5.2% of the variance in

overall risk-taking. This step of the regression found that PTSD symptom severity ($\beta = -.004, p = .832$) and total balloons popped ($\beta = .086, p = .150$) was more predictive, yet still not significant at predicting total risk-taking behavior when compared to adaptive risk-taking behaviors.

Table 4

Linear Regression for the prediction of Total Risk-Taking Behavior

Step	Predictors	<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	<i>B</i>	<i>t</i>	Sig.
1	Symptom Severity	.057	.003	-.020	-.007	-.376	.709
2	Symptom Severity	.163	.027	-.045	-.009	-.495	.623
	Total Money Earned				.031	.537	.594
	Adjusted Pump Count				-.004	-.112	.911

Note. Symptom Severity = total sum score of the 17 symptom items (PDS), Total Money Earned = Total value of money earned (BART), Adjusted Pump Count= Adjusted average amount of pumps per Balloon that did not explode (BART).
 $p = n.s.$

Table 5

Linear Regression for the prediction of Total Risk-Taking Behavior

Step	Predictors	<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	<i>B</i>	<i>t</i>	Sig.
1	Symptom Severity	.057	.003	-.020	-.007	-.376	.709
2	Symptom Severity	.228	.052	.007	-.004	-.213	.623
	Total Popped				.086	1.467	.150

Note. Symptom Severity = total sum score of the 17 symptom items (PDS), Total Popped = number of balloons popped (BART).
 $p = n.s.$

CHAPTER V

DISCUSSION

The purpose of the present study was to examine and identify differences in risk-taking behaviors and risk-taking propensity between trauma survivors with and without PTSD symptomatology, as well as a control group without a history of trauma. The results of this study were not in support of the hypotheses. We hypothesized that those with PTSD symptomatology would present with an elevated level of risk-taking propensity (either adaptive or maladaptive) compared to trauma survivors without PTSD symptoms, who would present with elevated propensity compared to the No Trauma group. The second hypothesis was that those with PTSD symptomatology would report greater overall risk-taking (higher frequency and greater expected future involvement in high-risk behaviors) compared to the Trauma without PTSD group, while both Trauma groups would report greater overall risk-taking than the control group. This was also not supported. Also unsupported by the data, was the hypothesis that those with PTSD symptoms would report greater perceived benefits from high-risk behaviors compared to the Trauma without PTSD group, and Trauma without PTSD would report greater

benefits than the control group. Lastly, the mediational effects of risk-taking propensity were not found between symptom severity and overall risk-taking.

The exploratory L.S.D. Post Hoc found a difference that approached significance ($p = .06$) between the total balloons popped during the BART task between the Trauma with PTSD symptomatology group and the No-Trauma history group. The difference demonstrated, that the Trauma with PTSD group popped (marginally significantly) less balloons compared to the No-Trauma history group, was opposite of what was hypothesized. The overall difference between the three groups for total number of balloons popped did approach significance, but this was opposite of our prediction. The MANOVA and exploratory Post Hoc tests did not confirm that those trauma survivors, with or without PTSD symptoms, or those without a history of trauma were more or less prone to risk-taking than others. These results were not suggestive that there are no differences in risk-taking after experiencing a trauma or, subsequently, developing PTSD, but that our sample just did not demonstrate significant differences.

Of the two mediational models, the model that included the maladaptive (punitive/impulsive) risk-taking was equivalent at predicting total risk taking when added to symptom severity, compared to adaptive risk-taking. Neither mediational model showed significant predictability of overall risk-taking based on symptom severity and risk-taking propensity.

The present results did not indicate any significant differences in risk-taking, perceived benefits, and risk-taking propensity between the groups. The results of the present study were incongruent with previous research, which suggests that trauma survivors, with or without PTSD, engage in more high-risk behaviors (i.e., Davis,

DeMaio, & Fricker-Elhai, 2004; Danielson et al., 2009) and report greater perceived benefits from engaging in high-risk behaviors (Smith, Davis, Fricker-Elhai, 2004) compared to non-trauma survivors. The current results were also inconsistent with previous research demonstrating that those with PTSD show greater levels of risk-taking propensity (Tull et al., 2009).

One possible explanation of this equivalent risk-taking could be due to the present sample's demonstration of much different risk-taking than the normative college-aged sample utilized by Katz and colleagues (2000). Their sample (Katz, Fromme, & D'Amico, 2000) reported higher rates of past six month drug use (Mean = 9.3, SD = 17.5) and alcohol abuse (Mean = 25.4, SD = 28.6) compared to the current overall sample's drug use (Mean = 0.32, SD = 0.52) and alcohol abuse (Mean = 1.25, SD = 1.20). The current sample reported higher rates of risky sexual behaviors (Mean = 16.85, SD = 12.74) compared to Katz and colleagues' (Mean = 6.9, SD = 15.00) sample. Although there were no significant differences in past frequency of risky behaviors between the current sample's three groups, the overall sample reported less risky drug use and alcohol abuse and more risky sexual behaviors compared to Katz and colleagues' (2000). This difference suggests that the present sample was involved in much less risk-taking than a normative college sample.

This difference could be due to the mean age of the current sample being 25 (SD = 9.71) compared to the mean age of 18.5 (SD = 0.87) of Katz and colleagues' sample. This age difference could account for less risk-taking behaviors due to the current sample being older and possibly less thrill-seeking and more mature. The study was conducted at a university with a predominantly commuter based student body. Katz and colleagues

(2000) looked at a sample that predominantly lived on campus. This difference in environment could also account for this difference in risk-taking, as commuting students are not exposed to the regular social and risky-situations that the students who live on campus are exposed to.

Potential Limitations

While using a college based sample may limit generalizability to a larger population, research has shown that college-age samples have a high exposure rate to traumatic events (Davis, DeMaio, & Fricker-Elhai, 2004). College-age samples have also been found to have more high-risk taking behaviors than other age groups (e.g., Wechsler, Dowdall, Davenport, & Castillo, 1995; Eisenberg, 2001; O'Malley & Johnston, 2002). Approximately 75% of our population of college students experienced a traumatic event. Although this proportion of trauma survivors coincides with trauma prevalence literature (e.g., Kessler, 1995), there was no supporting evidence that the trauma survivors, with or with PTSD symptomatology, and the non-trauma exposed groups differed in overall risk-taking, perceived benefits, and risk-taking propensity.

Other potential limitations to this study are sample size and unequal group sizes. A larger sample of equal group size would provide greater power, which could possibly yield significant differences in risk-taking, risk-taking propensity, and perceived expected benefits from high-risk behaviors between the groups of non-trauma exposed and trauma survivors with or without PTSD.

One further potential limitation to the current study is the past frequency of risky behaviors in the CARE-R. The past frequency assessed in the CARE-R is limited to the

past six months. It is possible that the relationship between PTSD and high-risk behaviors changes over time, such that those with PTSD symptomatology who experienced a traumatic event in the more distant past may have engaged in more high-risk behaviors immediately post-trauma, but their behavior changed over time. Specifically, they may have engaged in higher rates of risky behaviors and perceived greater expected benefits from high-risk behaviors closer to time of the trauma, which was not captured in this limited time span of the past six months.

Direction for Future Research

The focus of future research in this area should include studying these factors in a larger, possibly treatment seeking sample, that utilizes a risk measurement for overall past risky behaviors further than six months, or post-trauma risk-taking behaviors. Another possible direction would be to assess risk-taking in those who are seeking treatment directly following a traumatic event in a clinical setting. Future directions could assess for risk-taking, risk-taking propensity, and perceptions of risk in a sample of participants with PTSD comparing differences based on symptom severity. Comparing risk-taking in a sample of trauma survivors with an approximate or clinical diagnosis of PTSD could possibly illuminate key differences in risk-taking and risk-taking propensity with regards to differences in symptom severity.

The results of the current study were inconsistent with the findings of previous research suggesting that there are differences in risk taking in trauma survivors with or without PTSD and non-trauma exposed populations. The findings of this study do not necessarily suggest that those with PTSD are less risky than the trauma survivors without

PTSD or the non-trauma exposed samples. These results suggest that in this overall sample, there were no reported differences in total risk-taking or perceived benefits between groups. There was a marginally significant difference of total number of balloons popped between the No-Trauma and Trauma with PTSD groups, showing that the No-Trauma group popped more balloons than the Trauma with PTSD group on the BART.

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APPENDICES

APPENDIX A

IRB Approval Notification

From: _____@csuohio.edu

To: Richard Lawrence, Lisa Stines Doane, Ph.D.

Date: Mon, Dec 19, 2011 10:57 am

Subject: Irb submission29442doahs

Dear Investigators Doane and Lawrence,

I am in receipt of your follow-up email submission addressing those items that required response/revision as noted in my previous correspondence. You have complied with all of the recommendations and are hereby approved to commence with your study as of this day/date (Monday, December 19, 2011). You will be receiving written confirmation of this approval from the CSU IRB Office in the very near future.

Both myself and the secondary reviewer want to wish you the very best of luck in your investigative endeavor.

Respectfully,

XXXX, Primary Reviewer
IRB Submission # 29442-DOA-HS

APPENDIX B

Informed Consent

PTSD and High-Risk Behaviors Informed Consent

Introduction:

You are invited to participate in a research project being conducted by Student Investigator, Jason Lawrence under the supervision of Dr. Lisa Stines Doane, a faculty member in the Department of Psychology at Cleveland State University and licensed clinical psychologist. It is up to you to decide whether or not to take part in this study. Please read this entire consent form and take your time to make your decision.

Purpose:

Posttraumatic stress disorder, or PTSD, is an anxiety disorder that develops in some people as a result of experiencing a traumatic event, like an assault or a car accident. PTSD is characterized by problems like recurring thoughts about the trauma, avoiding reminders of the trauma, feeling jumpy or on edge, and having problems sleeping. Sometimes, people who experience a traumatic event also engage in risky behaviors such as drug or alcohol use, or having sex with multiple partners, sometimes as a way of coping with the earlier trauma. This study is being done to help psychologists understand the relationship between experiencing a traumatic event, PTSD, and engaging in high-risk behaviors such as alcohol use and sexual risk-taking. Approximately 100 people will participate in this study.

Procedures:

In this study you will be asked to complete a series of questions about your history of trauma and current psychological symptoms, which are factors that may influence whether you engage in high-risk behaviors. You will also be asked a series of questions relating to your past history, perceived benefits, and expected involvement in high-risk behaviors. In addition to the questionnaires, you will be asked to perform a computer based task. This study will take approximately one-hour to complete.

Risks and Discomforts:

Risks from participating in this study are minimal, and include psychological distress at the content of the questions. It is possible that you may find that some of the more personal items on the questionnaires may cause you to feel distressed, upset, or uncomfortable. There may also be risks in your taking part of this study that we do not know about. If at any point during the study you feel uncomfortable, upset, or distressed, notify the researcher who will assist you to the best of their ability. You have the right to withdraw from the study at any time if you find the questions too distressing or personal. Cleveland State University students may call the Cleveland State University Counseling Center at 216-687-2277.

Benefits:

If you agree to take part in this study, there may or may not be direct benefit to you. We hope the information learned from this study will benefit people who are victims of trauma or have symptoms of PTSD.

Payments to Participants:

You will receive 1 hour of research participation credit for psychology research requirements. At the conclusion of the study in April, 2012, the 10 participants with the highest hypothetically earned money from the Balloon Analogue Risk Task (BART), a computer-based risk-taking task, will receive prepaid visa gift cards. The participant with the highest amount earned will receive a \$50 gift card, the second and third highest amount earned will receive a \$25 gift card, and fourth through tenth will receive a \$10 gift card.

Right to refuse or withdraw:

Participation in this research is voluntary and you have the right to withdraw at any time. Failure to participate in this research will have no direct impact on you.

Confidentiality of records:

All study data relating to this project will be handled confidentially. You will be assigned a code number and your data will be analyzed by this code number only. All data will be kept in locked files in the department of psychology at the Cleveland State University. The results of this research may be presented at scientific meetings or published in professional journals. These reports will not contain any specific or individual responses, only the total as a group.

There are limits to this confidentiality. In cases where you indicate you plan to harm yourself or others, or in cases where you reveal current, ongoing child abuse, we are ethically and legally mandated to report this to the proper authorities.

Confidential Data Collection:

All data collected as part of your participation in this study will remain confidential, with few exceptions for legal/ethical mandates (see above). All of the measures you complete will list only your study ID number. Your signed consent form will be kept separate from your data, and no one (with the exception of the study PI, Dr. Doane) will be able to link your responses to you.

Who to contact with questions:

If you have questions about this study, you may contact:
Lisa Stines Doane, Ph.D.: l.doane@csuohio.edu, 216-687-3759
Jason Lawrence: r.j.lawrence@csuohio.edu, 216-687-3540

Institutional Review Board

This project has been reviewed and approved by the Cleveland State University Institutional Review Board (IRB). If you have any questions about your rights as a research participant, you may call the IRB at 216-687-3630.

Acceptance & signature:

I have read the information provided above, I understand this consent form, and all of my questions have been answered. I am 18 years or older and I voluntarily agree to participate in this study. I will sign two copies of this consent form. One copy will be retained by the researcher and I will keep one copy for my records.

Participant Name Printed

Participant Signature

Date

Research Team Member Signature

Date

APPENDIX C

BART Direction Screen

Now you're going to see 30 balloons, one after another, on the screen. For each balloon, you will use the mouse to click on the button that will pump up the balloon. Each click on the mouse pumps the balloon up a little more.

BUT remember, balloons pop if you pump them up too much. It is up to you to decide how much to pump up each balloon. Some of these balloons might pop after just one pump. Others might not pop until they fill the whole screen.

You get MONEY for every pump. Each pump earns \$0.05. But if a balloon pops, you lose the money you earned on that balloon. To keep the money from a balloon, stop pumping before it pops and click on the button labeled "Collect \$\$\$".

After each time you collect \$\$\$ or pop a balloon, a new balloon will appear.

At the end of the experiment, you will be paid the amount earned on the game.

Click the left mouse button to see the summary.

APPENDIX D

BART Experiment Screen



Pump up the balloon

Potential earnings: \$2.10

Balloon number: 3 of 30

Number of pumps: 42

Total Winnings: \$2.10

Collect \$\$\$