

Impulsivity and the Experience of Childhood Trauma on the Effect of
Psychological Maladjustment

by

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ABSTRACT

Research in the area of childhood trauma has shown a substantial amount of psychological maladjustment following the experience of traumatic events in childhood. Trauma survivors are at risk for developing a multitude of adverse psychological outcomes as well as unsafe behaviors following the event of trauma. One unifying theme within these psychological sequelae is the nature of impulsive behaviors. Delay-discounting refers to the subjective decrease in value of a reward when its presentation is delayed. Delay-discounting is often used as an index of impulsive behavior. This study poses two primary questions: 1) Can childhood trauma predict rates of delay-discounting? 2) Could delay-discounting predict psychological maladjustment for individuals who have experienced childhood trauma? This study will seek to answer these questions using an online version of the Kirby et al., 1999 hypothetical delay-discounting method, as well as the Barratt Impulsiveness Scale (BIS-11), to measure trait impulsivity. Measures of depression (BDI-II), life events (LEC), post-traumatic stress (PCL-C), and drug and alcohol abuse (DAST-20) will also be included. Participants included a sample of university students ages 18-52 (n=521, females = 386, males = 135) with a mean age of 25.19 years. Results indicated that childhood trauma was not a significant predictor of delay-discounting rate, nor was delay-discounting rate a significant predictor of psychological maladjustment. Limitations and future directions are discussed.

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INTRODUCTION

Children and adolescents in today's society are increasingly exposed to a myriad of environmental stressors. Whether it is domestic or community violence, terrorism, natural disasters, or different forms of abuse and neglect, the rates of exposure are staggeringly high. According to a nationally representative study by Kilpatrick and Saunders (1997) by the National Child Traumatic Stress Network, 8% of 12 to 17 year olds in the United States reported a lifetime prevalence of sexual assault, 17% reported physical assault, and 39% reported witnessing one or more acts of violence. A longitudinal general population study of children and adolescents ages 9 to 16 years in North Carolina found that 25% had experienced at least one if not more potentially traumatic events in their lifetime, and 6% within the past three months (Costello, Erkanli, Fairbank, & Angold, 2002). In a continuation of this study, more than 68 percent of children and adolescents sampled were found to have experienced a potentially traumatic event by the age of 16. For those who had experienced more than one traumatic event, clinical rates of post-traumatic stress disorder (PTSD) were nearly 50 percent (Copeland, Keeler, Angold, & Costello, 2007). Research on a sample of 536 elementary and junior high children in the urban school systems of Chicago found that 30 percent had witnessed a stabbing and 26 percent had witnessed a shooting (Bell & Jenkins, 1993).

Research has shown that the experience of early childhood trauma can lead to a multitude of adverse outcomes in adolescence and adulthood. While most professionals agree that no single risk factor or experience leads a young

person to adverse outcomes (Wasserman et al., 2003), the chances of psychological impairment and maladaptive social functioning clearly increase when a child is witness to or is the victim of violence and experiences traumatic stress as a result. A literature review by Browne and Finkelhor (1986) shows that depression, feelings of isolation, stigma, poor self-esteem, distrust, substance abuse, and sexual maladjustment are the most frequently reported long-term psychological effects of childhood abuse and other forms of trauma. More recent findings point to the same psychological consequences but include a variety of other psychopathological disorders such as suicide (Brodsky et al., 2001), panic disorder (Roy, A., 2005), dissociative disorders (Koverola, Pound, Heger, & Lytle, 1993), post-traumatic stress disorder (Ligezinska et al., 1996 Merry & Andrews, 1994; Oats, O'Toole, Lynch, Stern, & Cooney, 1994; Bensley et al., 2000; De Bellis & Thomas, 2003; English et al., 2004; Johnson & Leff, 1999; Silverman et al., 1996; Teicher, 2000), antisocial behaviors (Sher et al., 1991), and eating disorders (Zeitlen, 1994).

Certain types of trauma, such as child abuse and neglect, have also been found to result in impaired brain development with long-term consequences for cognitive, language, and academic abilities (Watts-English et al., 2006; Zolotor et al., 1999) that put survivors at greater risk for developing PTSD and dissociations. It is also apparent that approximately 80% of individuals diagnosed with PTSD after a traumatic event meet criteria for at least one other psychiatric disorder in their lifetime (Helzer, Robins, and McEvoy, 1987; Breslau et al., 1991).

In addition to these psychopathological disorders, findings suggest a host of other significant correlations between the experience of childhood traumatic events and behavioral maladaptations. For example, research has found a significant correlation between the experience of childhood traumatic events and an increased risk for juvenile incarceration (Arroyo, 2001; Abram et al., 2004; Cauffman et al., 1998; Steiner, 1997; Wasserman et al., 2002; Wood et al., 2002a; Wood et al., 2002b), future incarceration in adulthood (Cuomo, C., Sarchiapone, M., Giannantonio, M. D., Mancini, M., & Roy, A., 2008), risky sexual behavior and increased risk for clinical HIV contraction (Walton, G., Co, S., Milloy, M., Qi, J., Kerr, T., et al., Jun 2011), alcohol abuse and dependency and illicit substance abuse and addiction (Bagley, 1991; Blankertz et al., 1993; Young, 1990; Bollerud, 1990; Blankertz et al., 1990; Browne & Finkelhor, 1986; Simons, L., Ducette, J., Kirby, K., Stahler, G., Shipley, T., 2003; Volpicelli et al., 1999), cigarette smoking and nicotine dependence (Roberts, Fuemmeler, McClernon, & Beckham, 2008; Heatherton, Kozlowski, Frecker, & Fagerström, 1991; Anda et al., 1999; Jun et al., 2008), pathological gambling (Kausch, O., Rugle, L., & Rowland, D. Y., 2006), and increased risk for aggression and violence (Roy, A., 2005). The use of maladaptive coping strategies and impaired social functioning have also been found to be associated with the experience of childhood trauma, and are thought to put trauma survivors at greater risk for maladaptive behaviors such as participating in risky sexual situations, juvenile delinquency, gambling and drug use.

As is evident, the experience of childhood trauma puts individuals at risk for developing a plethora of psychological maladies in the social, neuroadaptive, psychopathological, and behavioral domains. One common theme amongst this host of behavioral maladaptations in childhood trauma survivors is the presence of elevated levels of impulsivity and impulsive behaviors. The concept of impulsivity has been defined in numerous ways; for example: “[impulsivity is characterized by] actions that are poorly conceived, prematurely expressed, unduly risky, or inappropriate to the situation and that often result in undesirable outcomes” (Evenden, 1999, p. 348). Similar definitions of impulsivity include “decreased sensitivity to negative consequences of behavior, rapid, unplanned reactions to stimuli before complete processing of information, and lack of regard for long-term consequences” (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001, p.1784) and as “socially inappropriate or maladaptive [behavior]...being emitted quickly and without forethought” (Oas, 1985, as cited in Kieres, Hausknecht, Farrar, Acheson, de Wit, & Richards, 2004, p. 167). Impulsivity can be considered as a personality trait or as a behavior or state (Frosch, J., Wortis, S., 1954). The following review seeks to explore the relationship between various characteristically impulsive maladaptive behaviors or outcomes, and childhood trauma and will be using an additive perspective of impulsivity, where impulsivity can be comprised of either both or singular personality and state facets.

Impulsivity and Behaviorally Maladaptive Correlates of Trauma

Post-traumatic stress disorder and other mood and anxiety disorders

It is well known that the experience of traumatic events puts children as well as adults at risk for the development of post-traumatic stress disorder. Lifetime trauma exposure has been demonstrated to be related to behaviors that are consistent with psychiatric disorders such as Major Depressive Disorder (Mozley, Miller, Weathers, Beckham & Feldman, 2005), Panic Disorder (Owens & Chard, 2003), Agoraphobia (Rodriguez, Weisberg, Pagano, Machan, Culpepper, & Keller, 2003), Obsessive-Compulsive Disorder (de Silva & Marks, 1999), Generalized Anxiety Disorder (Brown, Campbell, Lehman, Grisham, & Mancill, 2001), Specific Phobia (Keppel-Benson, Ollendick & Benson, 2002), and Bipolar Disorder (Orsillo, Weathers, Litz, Steinberg, Huska & Keane, 1996). Approximately 80% of individuals diagnosed with PTSD after a traumatic event meet criteria for at least one other psychiatric disorder in their lifetime (Helzer, Robins & McEvoy, 1987; Breslau et al., 1991).

Most research to date has confirmed the fact that the diagnostic symptom clusters of DSM-IV-TR apply to traumatized children of all ages, as well as they apply to traumatized adults (Saigh, Yasik, Sack, & Koplewicz, 1999). According to Fletcher, 1994, in a study based on 2,697 children from 34 samples, an average of 36 percent of children exposed to traumatic events develop PTSD, as opposed to 24 percent of adults exposed to traumatizing events (based on 3,495 adults from 5 samples (as described in den Vlede et al., 1993; Kilpatrick & Resnick, 1993; Smith & North, 1993). Similarly, in a study by Schwarz & Kowalski, (1991a), researchers found that children were at least as likely as adults to be diagnosed with PTSD when exposed to the same potentially traumatizing event.

Research has found high levels of internalizing and externalizing behaviors as well as PTSD symptoms of reexperiencing, avoidance, and hyperarousal in toddlers who experience traumatic life events (Mongillo, Briggs-Fowan, Ford, & Carter, 2009; Scheeringa, et al., 2003). Likewise, children who experienced chronic abuse were more likely to develop symptoms of PTSD and dissociation than were children who experienced an acute or singular traumatic event (Fletcher, 1996).

Brodsky et al., 2001 found that depressed adults who had experienced one or more episodes of childhood trauma had higher rates of impulsivity and aggression than individuals who did not report the experience of childhood trauma. These researchers suggested a diathesis-stress model where impulsivity may be an inherited trait, but is latent or perhaps made worse by the experience of childhood trauma. A diathesis-stress model (Zuckerman, 1999) attempts to explain behavior as a result of genetic (or more broadly developmental) vulnerability. This model thus assumes that the onset of a certain disorder (or at least episodes of a disorder) results from a combination of one's biological disposition towards the given disorder (or rather traits that may lead to disorders) and stressful events that bring about the onset of a disorder. The term "diathesis" can refer specifically to a genetic predisposition toward an abnormal or diseased condition, but has been more broadly defined as a vulnerability arising out of early child development. According to the model, this predisposition, in combination with certain kinds of environmental stress, results in abnormal conditions (Zuckerman, 1999).

Further evidence of this diathesis-stress model of impulsivity in PTSD diagnosed trauma survivors can be found in neuroscience literature, which will be discussed in detail later in review.

Juvenile Delinquency, Incarceration, and Substance Abuse

Another serious problem associated with the adverse outcomes of childhood trauma is juvenile delinquency and incarceration in adolescence and adulthood. Juvenile delinquency refers to a number of behaviors including but not limited to unsafe sexual practice, truancy, petty or grand theft, substance abuse, and violence and aggression, which may lead to incarceration in juvenile correction facilities and later incarceration in adulthood (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998). These behaviors have a significant impact on individuals and society. Prevent Child Abuse America (2001) estimated that Americans pay over \$8 billion dollars annually as a result of juvenile delinquency, which includes the cost of incarceration, treatment, repairing and replacing damaged property, and other associated costs. Research has shown a strong link between the experience of traumatic events in childhood (i.e. child abuse) and juvenile delinquency and later incarceration. In a landmark study by Abrams et al., 2004, researchers found that in a sample of 898 youth in juvenile detention facilities in the United States, 92.5% had experienced one or more traumatic events, with a mean of 14.6 events and a median of 6 incidents, and that 11.2% of detainees had PTSD in the past year. These researchers hypothesized that traumatic experiences can precipitate many externalizing

conditions, aside from PTSD, which are marked by impulsive and rash behavior that is commonly associated with delinquency and often lead to conviction, and could be a possible explanation for the high rate of traumatic experiences among juvenile delinquent detainees.

Substance abuse and dependency of alcohol as well as illicit drug usage, is a common problem among juvenile offenders and adolescent non-offenders who have experienced traumatic events in childhood (Clark, Lesnick, & Hegedus, 1997; Cuomo et al., 2008; Deykin, & Buka, 1997; Funk, McDermeit, Godley, and Adams, 2003; Giaconia, Reinherz, Hauf, Paradis, Wasserman, and Langhammer, 2000). In a sample of incarcerated adults, Cuomo et al., (2008) found that 78.8% of their sample of prisoners who were substance abusers had multiple convictions and incarcerations, 60.2% had more juvenile convictions and higher impulsivity levels and higher scores of childhood trauma than prisoners without substance abuse problems. These researchers hypothesized that prisoners with substance abuse problems may constitute a sub-group with increased judiciary and psychiatric issues possibly due to the experience of early trauma and high impulsivity.

Similarly, Volpicelli and colleagues (1999) found that women with a history of physical and sexual abuse were two to three times more likely to develop a co-occurring disorder of PTSD and alcohol abuse. Investigations on childhood abuse have supported that alcohol and drug use is a long-term effect from child abuse independent of PTSD (Beitchman, 1992; Briere, 1992; Hagan, 1988). Studies on alcohol abuse suggest that the majority of alcohol and drug

abusers with and without a co-occurring psychological disorder have experienced multiple types of abuse during childhood (Mueser et al., 1998; Volpicelli et al., 1999). Similarly, Howard et al., 2008 found that in a sample of 723 incarcerated youth, those with more “extensive” histories of trauma, were more at risk for substance abuse, including inhalants such as gasoline, permanent markers, and spray paint, as well as alcohol and other illicit inhalant drugs such as cocaine. Howard et al., (2008) concluded that traumatized incarcerated youth may possess lower levels of impulse control which may have led them to partake in substance abuse and other maladaptive behaviors which may have led them to said criminal behaviors.

Risky sexual behavior, and HIV contraction

Research linking childhood trauma with later risky sexual behaviors has largely focused on the experience of childhood sexual abuse, however it is well known that childhood sexual abuse rarely occurs on a singular and isolated occasion. Child sexual abuse often takes the form of an ongoing and chronic problem including other forms of abuse such as emotional and physical abuse (Dubo, Zanarini, Lewis, & Williams, 1997; as reported in Bornovalova et al., 2008). Studies have indicated that sexually abused individuals are at an increased risk of later engagement in risky sexual behavior, such as multiple short-term sexual encounters, the exchange of sex for money, drugs, or shelter, and unprotected sex (Paolucci, Genuis, & Violato, 2001). Furthermore, literature suggests that multiple forms of abuse (i.e. sexual, emotional, and physical)

contribute in unique ways to participating in HIV-related risk behavior.

Therefore, while much of the literature fixates on victims of child sexual abuse, many forms of traumatic experiences may have a contribution to HIV risk behavior.

A study by Walton et al., 2011, found that in a sample of 233 HIV-positive injection drug users, moderate to severe emotional childhood abuse was reported by 51.9% of participants, emotional neglect by 36.9%, physical abuse by 51.1%, physical neglect by 46.8% and sexual abuse by 41.6%. In multivariate analyses, emotional, physical and sexual abuses were independently associated with greater odds of recent incarceration.

A study by Ramiro, Madrid, & Brown, 2011, found that number of traumatic experiences in childhood was directly correlated with severity of risky health behaviors including engaging in risky sexual encounters. The researchers surveyed 1,068 urban residents aged 35 years and older to describe their adverse childhood experiences. They found that almost 75 percent of the respondents reported experiencing at least one traumatic event in childhood. Their results also found that about 35% of respondents had engaged in unprotected sex, 35% had unintended first pregnancy, and about 48.9% of males had multiple sexual partners by the age of 19 years. Finally, their data showed that as the number of adverse childhood experiences increased, suicide attempts, use of illicit drugs, early smoking initiation, and engaging in sexually risky behaviors became more prevalent. In a similar study by Medrano, Desmond, Zule, & Hatch, 2005, researchers investigated the link between the experience of childhood trauma and

impulsive behaviors, specifically risky sexual practices and the contraction of HIV. They found that as the number and severity of childhood traumatic experiences increased, as measured on the Childhood Trauma Questionnaire and the Impact of Events Scale, the number of sexually transmitted diseases and likelihood of being HIV positive increased. Lastly, in a study by Bornovalova et al., 2001, abuse history was found to be positively related to self-reported engagement in HIV-related risk behaviors as well as risk-taking propensity on the Balloon Analogue Risk Task-Youth Version (BART-Y), and sensation seeking, on the Sensation Seeking Scale. The authors used a mediational model to explain their findings in that risk-taking propensity and sensation-seeking mediated the relationship between childhood trauma and HIV-related risk behaviors.

Pathological gambling

While the literature concerning trauma and pathological gambling is not well developed, the studies that are devoted to this relationship have provided sound evidence for the theory that childhood trauma survivors are at greater risk for developing pathological gambling habits. In a study by Kausch, Rugle, & Rowland, 2006, 111 patients admitted to a gambling treatment program were found to have experienced trauma 64 percent of the time. It was noted that most of this trauma occurred in childhood. The researchers found that a history of trauma was associated with a greater relative frequency of drug and alcohol dependence, and higher scores on impulsivity subscales. In a similar twin study by Scherrer, Xian, Kapp, et al., 2007, researchers found that exposure to

childhood and lifetime traumatic events are significantly associated with problem and pathological gambling. They postulated that a decreased sense of impulse control, as a correlate of abuse in childhood, may put survivors at a special risk for developing problem and pathological gambling behaviors. This lack of impulse control, which can lead to more problematic gambling behaviors, is thought to be analogous to the lack of impulse control which can lead trauma survivors to other risky behaviors such as drug abuse.

Neurobiological correlates of Trauma and Impulsivity

Recent research has focused on the neurobiological changes that occur in children's brains who have experienced traumatic events. Specific brain regions that are encompassed by the limbic system, such as the hippocampus and amygdala, are the main target for research, as their role in learning and memory and emotion regulation is highly related to neurological correlates of abuse. While much of the literature on structural and functional changes that occur in the brain from the experience of trauma largely focuses on ongoing and chronic experiences of trauma such as child abuse, other forms of non-abuse related trauma and acute forms of trauma are also discussed. The following cited research has noted that these preclinical studies are merely correlational, and no direct causation has been identified between the experience of trauma and structural changes in the hippocampal and amygdaloid regions of the human brain. However, the compelling research does draw some interesting correlations, with the note that future research would do well to incorporate a direct causal

experimental design in order to infer that trauma does in fact induce brain abnormalities.

Hippocampus

The chronic stress that affects children who suffer from the trauma of maltreatment may alter many important brain functions that allow children to grow, adapt to different situations, and to learn. Specific brain regions have been shown to be especially affected by stress. The first of these brain regions is the hippocampus. Preclinical studies have found the hippocampus especially vulnerable to the effects of chronic and sustained stress in children, in that this area has a high density of glucocorticoid receptors and enduring postnatal neurogenesis (Teicher et al., 2003). The density of these receptors varies with age, and the experience of early stress prevents the normal peripubertal pruning and elimination of axons and receptors that are known to increase in production postnatally (Teicher et al., 2003). Early stress leads to an overall deficit in synaptic density that is chronic (Andersen et al., unpublished observation.)

Clinical studies on the hippocampus and the effect of early childhood trauma have shown that in adults with childhood trauma and a current diagnosis of dissociative identity disorder or PTSD, the left hippocampal volume was reduced by 5% (Stein et al., 2007). Stein also found that the size of the hippocampus correlates directly with the magnitude of cortisol suppression on the low-dose dexamethasone suppression test. According to Stein et al., 2007, the dexamethasone suppression test is designed to diagnose and differentiate

among the various types of Cushing's syndrome, and other hypercortisol states. Cushing's syndrome is a hormone disorder caused by high levels of cortisol in the blood. This can be caused by taking glucocorticoid drugs, or by tumors that produce cortisol or adrenocorticotropic hormone (ACTH) or CRH (Stein et al., 2007). Dexamethasone is an exogenous steroid that provides negative feedback to the pituitary to suppress the secretion of ACTH. This steroid is unable to pass the blood brain barrier which allows this test to assess a specific part of the hypothalamic-pituitary-adrenal axis. Specifically, dexamethasone binds to glucocorticoid receptors in the pituitary gland, which lies outside the blood brain barrier, resulting in regulatory modulation. A normal result is a decrease in cortisol levels upon administration of low-dose dexamethasone. Results indicative of Cushing's disease involve no change in cortisol on low-dose dexamethasone, but inhibition of cortisol on high-dose dexamethasone. If the cortisol levels are unchanged by low- and high-dose dexamethasone then other causes of Cushing's syndrome must be considered with further work-up necessary (Stein et al., 2007).

According to a revolutionary study by Bremner et al., 2003, adult women with a history of childhood sexual abuse had 19% lower mean hippocampal volume than non-abused women. According to Driessen et al., 2003, adult women with a current diagnosis of borderline personality disorder and a history of child abuse were found to have a 16% reduction in hippocampal volume.

It is known that the hippocampus is a structure that is responsible for encoding and retrieval of episodic information, and is associated with the formation of dissociative states that are common to the diagnosis of PTSD and

dissociative disorders (Teicher et al., 1993, 1994, 1995, 2003) and the pathophysiology of generalized anxiety and panic disorders (Teicher, 2002). The behavioral inhibitory system, which halts environmentally inappropriate behavior (i.e. violent or loud outbursts, acting as if one is in a different time or place which often takes place in dissociative episodes of PTSD patients, aggressive behavior, etc.), is greatly affected by the hippocampus as well as the septal area. Further, Teicher, 2002 states that “serotonergic projections from the median raphe nuclei to the hippocampus presumably play an important role in establishing an individual’s overall level of behavioral inhibition” (page 81). Consequently, changes in the development of the hippocampus experienced by trauma survivors may bring about the anxiogenic, dissociative, amnesic, and behavioral disinhibitory aspects of PTSD and other trauma related behaviors (Teicher et al., 2002).

Amygdala

The process of kindling, in which sporadic and repeated neuronal stimulation greatly alters the availability of neurons in the amygdala to produce involuntary electrical discharges, or seizures, is heavily present in the amygdala (Teicher 2003). Kindling produces longstanding changes in excitability of neurons in the amygdala, which in turn has severe consequences in behavioral control. Teicher et al., 2003 found that psychiatrically hospitalized children with a history of abuse had two times as many clinically significant EEG abnormalities in the frontotemporal region in the left hemisphere. They also found a 9.8%

reduction in the size of the left amygdala, and left amygdala size showed an inverse correlation with self-report ratings of depression, irritability, and impulse control (Navalta et al. 2000).

The amygdala appears to play a crucial role in fear conditioning and in the control of aggressive, oral, and sexual behaviors (Teicher et al., 2003). Patterns of abnormal and frequently violent and impulsive social behavior, also known as episodic dyscontrol (Teicher et al. 2003) may be caused by irritable foci in the amygdaloid nuclei. The amygdala is also thought to play a critical part in activating fight-or-flight responses (Teicher, 1994). Teicher et al., 2003 suggest that excessive activation of the amygdala may play an important role in the development of PTSD and in major depression.

As these collective research findings suggest, problem behaviors exhibited by survivors of childhood trauma may be unified by characteristics of impulsivity. These problem behaviors, and the outcomes of abuse (i.e. drug taking behavior, risky sexual behavior the development of PTSD) possess common elements of impulsivity. Many psychological instruments have been designed to measure impulsivity, sometimes leading to difficulties in the comparison of results between different studies. The majority of these impulsivity scales serve to measure trait impulsivity, rather than behavioral correlates of impulsivity. Because of the nature of the diathesis-stress model for increased levels of impulsivity and impulsive behaviors following traumatic experiences in adulthood, the use of a measure that is associated with behavioral or state

impulsivity would be extremely beneficial in determining levels of impulsivity in trauma survivors who may be at risk for problem behaviors.

One behavioral measure of impulsivity is the relative value of delay-discounting rate. Delay-discounting largely refers to a phenomenon in which the value of a certain reward decreases with the delay of its presentation or availability. An individual is said to discount the value of a reward, such as money, food, drugs, etc., if they choose a smaller reward that will be presented sooner over a larger reward whose presentation is delayed for a given period of time. Delay-discounting has been observed in both human and animal models (Bickel et al., 1999; Green et al., 1994; Mazur, 1987; Rachlin et al., 1991; Richards et al., 1997; Reynolds, 2006b; Rodriguez and Logue, 1998; Woolverton et al., 2007). Higher rates of delay-discounting are often operationalized as an index of impulsivity, and higher forms of impulsivity are known to be associated with a wide range of problematic behaviors such as alcohol or drug abuse, cigarette smoking, and gambling (Reynolds 2006a). There are generally three methods for measuring delay-discounting behavior and they are hypothetical situation measures, real reward measures, and real time measures.

Methods for measuring delay-discounting

Hypothetical reward tasks encompass most of the delay-discounting research that is conducted on human subjects. Hypothetical reward tasks involve presenting a subject with two hypothetical (or imaginary) sums of money, food, or drugs, where one reward is delayed by a varying amount of time, and the other is

presented immediately. These two rewards are called the smaller immediate reward and the larger delayed reward. Participants decide which reward they would hypothetically prefer, between the immediate and delayed reward in a series of choice tasks. A second shorter form of the hypothetical reward tasks, also known as the Kirby task (Kirby, 1999) is another hypothetical reward task for measuring delay-discounting. The Kirby task consists of 27 items in a survey fashion, where participants are asked to make choices between smaller immediate rewards and larger delayed rewards. Epstein et al., 2003 reported a significant association ($r= 0.82$) between the Kirby method of calculating discount rates and other long-form hypothetical question measures of delay-discounting. Therefore the Kirby is thought to provide an equivalent measure of delay-discounting that takes a shorter amount of time. Hypothetical reward measures of delay-discounting are often used in research because they have the advantage of being inexpensive and easily administered.

Real-reward measures make up the second type of delay-discounting tasks. This type of task is carried out in the same manner as the hypothetical reward tasks, but the important difference is that participants are informed that they will actually receive one randomly selected immediate or delayed reward they have chosen in one of the choice tasks. This type of assessment was developed to increase the likelihood that participants would actually respond honestly, as opposed to the hypothetical reward task, because they will actually be receiving either the immediate or delayed reward they have chosen. Studies by Johnson and Bickel, 2002; Madden et al., 2003; and Lagorio and Madden, 2005;

have all shown no significant differences between hypothetical and real reward measurements in rate of delay-discounting, indicating that both methods estimate similar discounting rates.

The last method for measuring delay-discounting is to use real-time measures. These types of measures are fundamentally different from the first two because participants will actually experience all rewards in real time delays while completing the task. While the first two methods involve delay periods that include days, weeks, months, or a year, real time methods generally utilize shorter delays and smaller monetary amounts. This method is often used in state-dependent conditions, such as when a subject is under the influence of a substance, or is in withdrawal from a substance. According to Reynolds et al., 2006a, this type of measure allows for a more state-sensitive tool for determining short-term increases or decreases in delay-discounting, because participants experience the consequences of their choices while in the changed state. Being able to determine short term effects on delay-discounting is important in defining the specific time course of drug or withdrawal effects on rate of discounting. Real time measures are also thought to be a better assessment for research on children, as hypothetical and abstract concepts may cloud the child's ability to decide which reward they would prefer.

Delay-discounting relations to drug use and gambling

Extreme tendencies to discount reward values as a function of the delay of their presentation is considered an aspect of impulsivity (Reynolds et al., 200a;

Melanko et al., 2009). Assessments of delay-discounting, in all three forms, have been found to be associated with impulsive behavioral attributes such as drug use, addiction, and gambling.

Petry (2001a) found a greater delay-discounting rate among currently using alcoholics than non-alcoholic controls on four different types of delay-discounting paradigms. Vuchinich and Simpson (1998) found that college students identified as heavy drinkers and problem drinkers (based on the Michigan Alcoholism Screening Test, and Adult Alcohol Problem Screening Test) discounted the value of delayed monetary rewards more than light drinkers. Both studies cautioned that a direction of effect is unknown as of this point, where higher delay-discounting rates may also predispose individuals to alcoholism.

Bickel et al., (1999) found that current smokers discounted the value of monetary amounts significantly more than never smokers. Mitchel (1999) found similar results in that adult smokers discounted the value of delayed monetary rewards at higher rates than nonsmokers.

In the case of illicit substance abusers, Madden et al., (1997) found that opioid dependent individuals discounted monetary amounts significantly more than controls. It has also been shown that individuals who are cocaine dependent discount monetary amounts more than controls (Coffey et al, 2003).

One area that is underrepresented in the current literature is the link between the experience of trauma and its association with higher delay-discounting rates. As previously discussed, trauma exposure is prevalent among children and adolescents and can have a negative impact on social, emotional, and

occupational functioning both immediately after the event and later in life (Green 2010). The experience of traumatic life events has been linked to increased rates of substance abuse over controls (Dass-Brailsford, 2010), as well as alcohol abuse and injection drug abuse, risky sexual behavior (Zubriggen, 2004), and gambling addiction (Greco-Gregory, 2002). Therefore it is important to understand the link between the experience of early traumatic life events and its adverse outcomes.

Much literature exists on the higher levels of impulsivity in individuals who have experienced traumatic life events compared to those who have not experienced trauma (MacMillan et al, 2001; Brodsky et al, 2001; Cuomo et al, 2008; Greene 2010; Zlotnick et al, 1997; Roy, 2005; Corstophine et al., 2007). Yet, little research has been done that would investigate the link between early traumatic events and behavioral indexes of measuring impulsivity, i.e. higher delay-discounting rates. Therefore this study proposes to investigate the relationship between delay-discounting and the experience of childhood traumatic events. This study poses two primary questions: 1) Can the experience of childhood trauma predict delay-discounting rates? 2) Could delay-discounting predict psychological maladjustment (as defined by the presence of clinically significant scores on depression, PTSD, and substance abuse scales) for individuals who have experienced childhood trauma? This study will seek to answer these questions using an online version of the Kirby et al., 1999 hypothetical delay-discounting method, as well as the Barratt Impulsiveness scale (BIS-11), to measure trait impulsivity. This multi-method approach to assessing both trait and behavioral or state impulsivity is intended to assess multiple forms

of impulsivity in order to understand its relationship to childhood trauma in a more comprehensive manner. Measures of depression (BDI), life events (LEC), post-traumatic stress (PCL-C), and drug and alcohol abuse (DAST-20) will also be included to assess rate of delay-discounting as potential predictor of more serious psychopathology in childhood trauma survivors.

Method

Participants

A university sample of students was recruited through Arizona State University West Campus Sona subject pool system, where students enrolled in psychology courses with a research participation experience requirement. Student participants received two course credits for participating.

Session Environment

Participation in this research took place over the internet, where participants could log on to the Arizona State University Sona website to sign up for and complete the study on any internet-enabled compatible computer.

Delay-Discounting Measure

Participants completed the Kirby (Kirby, 1999) short form of hypothetical reward delay-discounting procedure. For the purposes of this study, this brief form of hypothetical model of reward was chosen in order to make the

study more readily available in an online version to ensure anonymity and ease of participation. Participants were asked, in 27 questions, to choose between a hypothetical immediate reward and a hypothetical delayed reward. For example,

“Would you prefer \$11 now, or \$30 in 7 days?”

The Kirby identifies a single indifference point for small, medium, and large delayed reward amounts. As such, participants experienced three types of questions, for small delayed, medium delayed, and large delayed rewards. The following are examples of a medium delayed reward and a large delayed reward, respectively: (For the Kirby questionnaire in its entirety, please refer to page 54).

“Would you prefer \$27 now, or \$50 in 14 days?”

and

“Would you prefer \$41 now, or \$75 in 20 days?”

Rates of delay-discounting were assessed by locating the “switching point,” or indifference point where the participant ceased to prefer the smaller immediate reward and began to prefer the larger delayed reward. Indifference points were found for small, medium, and large delays, and their geometric mean was accepted as the participant’s delay discount rate (k).

Self-Report Measures

In addition to the delay-discounting assessment, subjects completed the Barratt Impulsiveness scale (BIS-11), the Beck Depression Inventory (BDI-II), the Life Events Checklist (LEC), the PTSD CheckList—Civilian Version (PCL-C), and the Drug Abuse Screening Test (DAST-20).

Barratt Impulsiveness Scale (BIS-11)

The BIS-11 (Patton, Stanford, & Barratt et al., 1995) is a 30-item self-report measure used to assess levels of trait impulsivity in adults. Higher scores on the BIS-11 indicate greater levels of impulsivity. The BIS-11 is subdivided into different facets of impulsivity, and is scored to assess six first order factors of impulsivity (attention, motor, self-control, cognitive complexity, perseverance, and cognitive instability), and three-second order factors of impulsivity (attentional, motor, and non-planning). Data for this sample was subdivided to assess the three second order factors of impulsivity both separately and in addition to total scores of impulsivity on the BIS-11.

Beck Depression Inventory (BDI-II)

The BDI-II (Beck, Steer, & Brown, 1996) is a 21-item self-report questionnaire that assesses behavioral, cognitive, and motivational symptoms of depression. Each item is a list of four statements arranged in increasing severity about a particular symptom of depression. These new items bring the BDI-II into alignment with DSM-IV criteria. Higher scores on the BDI-II indicate more severe levels of depression. Items on the new scale replace items that dealt with

symptoms of weight loss, changes in body image, and somatic preoccupation. Another item on the BDI that tapped work difficulty was revised to examine loss of energy. Also, sleep loss and appetite loss items were revised to assess both increases and decreases in sleep and appetite. After testing original and new items on a large clinical sample (N = 500), test developers compared item-option characteristic curves. The new editions showed improved clinical sensitivity, with the reliability of the BDI-II (Coefficient Alpha = .92) higher than the BDI (Coefficient Alpha = .86).

Life Events Checklist (LEC)

The LEC (Gray, Litz, Hsu, & Lombardo, 2004) is a 17-item self-report scale that measures exposure to potentially traumatic events, was developed at the National Center for Posttraumatic Stress Disorder (PTSD) concurrently with the Clinician Administered PTSD Scale (CAPS) to facilitate the diagnosis of PTSD. The scale asks participants to indicate if different forms of traumatic events such as “physical assault, assault with a weapon, sexual assault, natural disasters, or life threatening illness or injury,” either happened to them, witnessed it, learned about it, weren’t sure, or does not apply. Participants received a score of 1 for events that happened to them, and a score of 0 for all other responses with a maximum score of 17. Higher scores on the LEC indicate a higher rate of exposure to trauma throughout the participants life-course. The LEC exhibited adequate temporal stability, good convergence with an established measure of trauma history—the Traumatic Life Events Questionnaire (TLEQ)— and was

comparable to the TLEQ in associations with variables known to be correlated with traumatic exposure in a sample of undergraduates. In a clinical sample of combat veterans, the LEC was significantly correlated, in the predicted directions, with measures of psychological distress and was strongly associated with PTSD symptoms.

The PTSD-CheckList—Civilian Version

The PCL-C (Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report measure of the 17 DSM-IV symptoms of PTSD. The PCL has a variety of purposes, including screening individuals for PTSD, diagnosing PTSD, and monitoring symptom change during and after treatment. There are three versions of the PCL, and the civilian version most accurately describes the sample population assessed in this study, as opposed to addressing Military personnel (PCL-M) or specific incidents (PCL-S). The PCL-C (civilian) asks about symptoms in relation to "stressful experiences." The PCL-C is useful because it can be used with any population. The symptoms endorsed may not be specific to just one event, which can be helpful when assessing survivors who have symptoms due to multiple events. The PCL can be scored in different ways:

A total symptom severity score (range = 17-85) can be obtained by summing the scores from each of the 17 items. A diagnosis can be made by determining whether an individual meets DSM-IV symptom criteria, i.e., at least 1 B item (questions 1-5), 3 C items (questions 6-12), and at least 2 D items (questions 13-17). Symptoms rated as "Moderately" or above (responses 3

through 5) are counted as present. Second, determining whether the total severity score exceeds a given cut point. Lastly, by combining methods (1) and (2) to ensure that an individual has sufficient severity as well as the necessary pattern of symptoms required by the DSM.

The Childhood Trauma Questionnaire (CTQ)

The CTQ (Bernstein & Fink, 1997) is a 28-item self-report is useful with individuals referred for a broad range of psychiatric symptoms and problems, including, Post-traumatic stress disorder, depression, eating disorders, addictions, suicide attempts, personality disorders, sexual problems. There are five scales including physical abuse, sexual abuse, emotional abuse, physical neglect, and Emotional neglect. The questionnaire also includes a minimization/denial scale for detecting individuals who may be underreporting traumatic events. The CTQ scores can be compared to data from more than 2,200 males and females from seven different clinical and community samples, representing a broad range of ages, socioeconomic status and different racial/ethnic groups. The CTQ is highly reliable, very stable over time, has good convergent and divergent validity with trauma histories from other measures, and is highly sensitive to identifying individuals with verified histories

Drug Abuse Screening Test (DAST-20)

The DAST-20 (Gavin, Ross, & Skinner, 1989) is a 20-item assessment of problems related to drug and alcohol abuse. The DAST total score orders

individuals along a continuum with respect to their degree of problems or consequences related to drug and alcohol abuse. A score of zero indicates there are no drug related problems. As the DAST score increases, there is a corresponding rise in the level of drug problems reported. The maximum score of 20 would indicate substantial problems. Thus, as the DAST total score increases one may interpret that a given individual has accrued an increasingly diverse range of drug-related consequences. Individual items may also be assessed to investigate problem areas. An internal consistency coefficient of .92 was obtained for a sample of 256 drug/alcohol abuse clients. Adequate concurrent or convergent validity was reported to have been demonstrated by the fact that the DAST attained 85 percent overall accuracy in classifying clients according to DSM-III diagnosis, and also to have been demonstrated by significant correlations of the DAST scores with frequency of various types of drugs used during the preceding 12 months. The statistical significance of the DAST scores to distinguish between DSM-III diagnosed abuse "cases" from "non-cases" is reported evidence of discriminant validity. The DAST scores were found to be only "moderately correlated" with scores for social desirability and denial.

Results

Socio-demographic characteristics of respondents

A total of 521 participants participated in this research (female= 386, male= 135). The sample was comprised of 60.7% Caucasian, 23.2% Hispanic,

5.01% African American, 4.81% Asian, and 1.0% Native American, (6.2% Other).

History of exposure to Childhood Trauma

A vast array of traumatic events experienced in childhood were reported by respondents. The most commonly reported singular traumatic events were accidents, reported by 14.59% of all respondents, illness/death reported by 9% of respondents, and experiencing violence reported by 7.5%. Eleven percent of respondents reported experiencing more than one traumatic event. Results showed no significant differences between and females in the experience of type or number of traumatic events. (See Table 1. for rates of trauma exposure).

Data Cleaning and Preliminary Analysis

Prior to addressing the primary hypotheses, data were examined for issues of non-normality. Specifically, data were screened for missing entries and indications of non-normality of distributions (i.e., outliers, skewness and kurtosis). Delay-discounting data on the Kirby task were missing for 16 participants. These subjects' data were subsequently removed from the data pool.

Preliminary analyses were then conducted to determine if there were differences on demographic variables for the measures of impulsivity, depression, post-traumatic stress disorder, and drug abuse across gender, race, or age group.

There were no differences found on these measures across any of the demographic groups.

Estimation of Delay-discounting Rate

An estimate of a participant's discounting rate parameter (k) was made from the participant's pattern of choices across the 27 questions on the monetary-choice questionnaire. Participant's choices on the 27 questions were then organized into small medium and large reward groups. Then each subject was analyzed individually to locate the switching point where the participant no longer preferred a smaller, sooner reward, and began to prefer a larger delayed reward; this is referred to as an indifference point. Three indifference points were found for each subject, one for each small, medium, and large reward, and the geometric mean was used to calculate the midpoint of these three values, so as to avoid under-weighting the smaller reward.

For example, question 19 asks if a participant would prefer "\$33 today or \$80 in 14 days?" If the participant was indifferent between the two rewards, they would choose the immediate reward, and one could infer that this person had a discount rate greater than 0.10. Question 4 asked if participants would prefer "\$31 today or \$85 in 7 days?" If this same participant chose the delayed reward on this trial, one could infer that this participant had a discount rate less than 0.25 and greater than 0.10. Using the geometric mean, this would yield a k value of 0.16.

According to Kirby et al., 1999, researchers using this method should, “assign each participant a k value that yields the highest consistency among his or her choices, “ (p.81). While these authors also note that consistency is relative rather than an absolute measure, many participants data could not be found to follow a consistent pattern of any kind (for example that greater immediate rewards are preferred over smaller delayed rewards, or that smaller immediate rewards are preferred over similar or slightly greater delayed rewards), and some followed a non-normative pattern indicating that the subject did not understand the directions of the questionnaire (for example that they preferred smaller delayed rewards over larger immediate rewards). 213 subjects were found to switch back and forth between delayed and immediate rewards that were not consistent with their own previous choices. For example, one participant indicated that they would prefer, “\$25 in 53 days,” as opposed to “\$19 today,” and then endorsed that they would prefer “\$24 today,” as opposed to , “\$35 in 29 days.” They continued to switch back and forth throughout the questionnaire, without indicating a clear pattern of indifference points between small, medium, and large rewards. Other subjects appeared to be unclear of the directions of the questionnaire, as they selected only delayed rewards or only immediate rewards for the entire questionnaire. Overall, 26 participants were deemed to have non-normative patterns of data and were excluded from further analysis, reducing the number of analyzed participants to 479.

Hypothesis 1: Does childhood trauma predict a higher rate of delay-discounting?

In order to test for the first hypothesis of whether or not the experience of childhood trauma could predict a higher rate of delay-discounting, a bivariate correlation was conducted to investigate possible positive correlations between test variables. Pearson's product-moment correlations were calculated and significant correlations were found between impulsivity scores on the BIS-11 and depression scores on the BDI-II, $r(477) = 0.39, p < 0.001$, between the BIS-11 and scores on the Life Events Checklist (LEC), $r(477) = 0.29, p < 0.001$, between the BIS-11 and scores on the Post-traumatic stress Checklist-Civilian (PCL-C), $r(477) = 0.29, p < 0.001$, and between the BIS-11 and scores on the Childhood Trauma Questionnaire (CTQ), $r(477) = 0.44, p < 0.001$, and between the Drug Abuse Screening Test (DAST-20), $r(477) = 0.23, p < 0.001$. No significant correlations were found between Delay-Discounting rate (k), and any of the other test variables, specifically between k and scores on the CTQ, $r(477) = -0.01, p = 0.85$.

Even though the results of a Pearson product-moment correlation were not significant, a linear regression was conducted to assess the possibility of a predictive relationship between the experience of childhood trauma and higher delay-discounting scores. The results of the linear regression analysis did not reveal that childhood trauma is a significant predictor of scores on the delay-discounting task, $b = 0.02, t(477) = 0.486, p = 0.63$. Childhood trauma did not explain a significant proportion of variance in delay-discounting scores, $R^2 = 0.00, F(1, 477) = 0.24, p = 0.63$.

Upon assessing the two different forms of impulsivity that were collected in this study, scores on the BIS-11 and scores on the Kirby hypothetical delay-discounting task were not significantly correlated $r(477) = -0.003, p = 0.947$. Furthermore, in an linear regression analysis, scores on the BIS-11 were not found to be significant predictors of scores on the Kirby delay-discounting task $b = -0.003, t(477) = -0.07, p = 0.947$.

Hypothesis 2: Can delay-discounting rate predict psychological maladjustment in individuals who have experienced childhood trauma?

In order to find if delay-discounting can predict psychological maladjustment in individuals who have experienced childhood trauma, multiple linear regressions were performed between delay-discounting, and scores on the BDI-II, PCL-C, and DAST-20. In this analysis, participants had their LEC and CTQ scores transformed in a “trauma yes or no” category (see Table 1. for entire trauma codes). Individuals who endorsed at least one traumatic event on the LEC or CTQ were included in this analysis. After score transformation, 296 individuals endorsed some form of traumatic event and were included in this analysis. A linear regression found that delay-discounting was not a significant predictor of depression scores on the BDI-II, $b = 0.05, t(294) = 0.84, p = 0.39$, the PCL-C, $b = -0.03, t(294) = -0.514, p = 0.61$, or the DAST-20, $b = 0.05, t(294) = 0.84, p = 0.39$. Delay-discounting did not explain a significant proportion of variance in depression scores, $R^2 = 0.002, F(1, 294) = 0.71, p = 0.399$, scores on

the PCL-C, $R^2 = 0.001$, $F(1, 294) = 0.264$, $p = 0.61$, or the DAST-20, $R^2 = 0.002$, $F(1, 294) = 0.71$, $p = 0.399$.

Exploratory Analysis

In light of inconclusive findings concerning the role of childhood trauma as a predictor of delay-discounting rate, and delay-discounting rates as a predictor of psychological maladjustment in childhood trauma survivors, a third mediational model was proposed. It was hypothesized that impulsivity (as operationalized by delay-discounting rate) may be acting as a mediator in the relationship between the experience of childhood trauma and adverse psychological outcomes, which may potentially be clouding an existing relationship between childhood trauma and psychological maladjustment. In order to test for a mediational model, linear regressions were performed between scores on the CTQ and scores on the BDI-II, LEC, PCL-C, and DAST-20, as well as between childhood trauma and impulsivity. Multiple linear regressions found that childhood trauma was a significant predictor of scores on the BDI-II, $b = 0.23$, $t(477) = 5.20$, $p < 0.001$, and of scores on the LEC, $b = 0.13$, $t(477) = 2.78$, $p = 0.006$. The linear regression analysis did not indicate that scores on the CTQ were predictive of scores on the PCL-C, $b = 0.07$, $t(477) = 1.47$, $p = 0.14$, or scores on the DAST-20, $b = 0.03$, $t(477) = 1.12$, $p = 0.58$. A linear regression analysis indicated that childhood trauma was not a significant predictor of delay-discounting $b = 0.02$, $t(477) = 0.486$, $p = 0.63$. Therefore the data do not support a

mediational model for the role of impulsivity (delay-discounting) on the relationship between childhood trauma and psychological maladjustment. To further explore a multi-trait method of understand the relationship of impulsivity possibly mediating a relationship between the experience of childhood trauma and psychological maladjustment (as measured on the BDI-11, LEC, PCL-C, DAST-20 scales) multiple linear regressions were completed to investigate. Results of a linear regression showed that childhood trauma was a significant predictor of scores on the BIS-11, $b = 0.44$, $t(477) = 10.59$, $p < 0.001$, and childhood trauma explained a significant proportion of variance in impulsivity (BIS-11) scores, $R^2 = 0.190$, $F(1, 477) = 112.04$, $p < 0.001$. Next, results of multiple linear regression showed that childhood trauma was a significant predictor of psychological maladjustment on the BDI-II, $b = 0.231$, $t(477) = 5.20$, $p < 0.001$, and the LEC, $b = 0.126$, $t(477) = 2.78$, $p = 0.006$.

Childhood trauma explained a significant proportion of variance in depression (BDI-II) scores, $R^2 = 0.05$, $F(1, 477) = 26.98$, $p < 0.001$, the LEC, $R^2 = 0.02$, $F(1, 477) = 7.74$, $p = 0.006$. Childhood trauma was not a significant predictor of post-traumatic stress scores on the PCL-C or drug abuse scores on the DAST-20. In light of these results, impulsivity as measured by the BIS-11, does not support evidence for a full mediational model between the relationship of childhood trauma and psychological maladjustment.

Discussion

The primary hypotheses in this study were twofold; first to demonstrate the relationship between delay-discounting and childhood trauma, in that childhood trauma could predict rates of delay-discounting; and second, that higher rates of delay-discounting could predict psychological maladjustment in individuals who have experienced childhood trauma.

The results of multiple linear regression analyses did not indicate a predictive relationship between childhood trauma and delay-discounting, or between delay-discounting and psychological maladjustment in childhood trauma survivors. Exploratory analysis also did not reveal the presence of impulsivity as a mediator in the relationship between childhood trauma and psychological maladjustment. There may be several reasons that the data drew inconclusive results, and their explanations follow.

Delay-Discounting Task

During data collection it became apparent that some participants perhaps did not understand the instructions of the delay-discounting procedure. Many endorsed that they would prefer monetary rewards at a given delay that contradicted some of their previous responses, and many participants data revealed a continuous switching back and forth on every other choice task. Other participants endorsed only preferences for delayed rewards, and others endorsed only preferences for immediate rewards. It was important to eliminate these types of responses, as these participants were clearly answering questions haphazardly without giving thought or regard to experimental procedure. Upon eliminating

these more obvious non-normative data, there remained many other participants who failed to exhibit clear and consistent indifference points between each of the small, medium, and large delayed rewards, but yet could not be eliminated on the basis of which other studies have used to eliminate non-normative data (Dixon et al., 2003; Reynolds et al., 2007). Therefore their presence in the study may have served to offset the relationship of delay-discounting and other test variables.

Upon further analysis, 17% of cases in which a participant was eliminated from analyses because they were missing delay-discounting data or their indifference points could not be calculated due to a haphazard fashion of answering choice tasks, these participants had other data which met clinical thresholds for the PCL-C and DAST-20. There were extremely few cases in which data met clinical thresholds for the PCL-C and fewer still for the DAST-20 variables. This may have clouded the relationship between childhood trauma as a predictor of delay- discounting and also with delay-discounting as a predictor of psychological maladjustment in trauma survivors.

While Reynolds et al., 2006 found no differences between subjects on real reward versus hypothetical reward tasks for delay-discounting measures, perhaps the hypothetical nature of the task, and the fact that the study was conducted over the internet eliminated the need for participants to answer truthfully on the delay-discounting task, and also eliminated the real understanding of the delays being expressed. In other words, perhaps participants did not feel the need to actually think about which reward they would prefer more, as they would not be receiving the reward, and there were no research personnel nearby to make sure that

participants were answering truthfully, instead of haphazardly choosing random responses. It is a possibility that in this particular study, a real-reward method may have been better suited for participants to answer honestly, as they may have a better understanding of the delays being presented. Future studies should consider using multiple methods of delay-discounting or at least using a real-reward method of analysis.

Lastly, there are some significant differences between the way Kirby, 1999 administered his delay-discounting task, and the way this study was administered, which could also account for the inconclusive results that were detected in this study. First, in Kirby, 1999, participants were told that they had a 1 in 6 chance (by a roll of die) to actually receive one randomly chosen sum of money they had chosen during the task. If participants rolled a six on a die they would pick a number from a hat that corresponds to an item number on the task and they would receive whatever they chose on that item number. They were also informed, “To make sure that you get a reward you prefer, you should answer every question as though it were the one you will win.” This was to ensure that the respondents answered honestly. Our study did not offer actual monetary rewards, which may have effected the accuracy, truthfulness, and honesty with which participants answered.

Relations Among Impulsivity Measures

Contrary to what was predicted, delay-discounting, as measured by the Kirby task was not related to the BIS-11 scores on impulsivity. This finding is consistent with several other studies, which found that trait and behavioral measures of impulsivity do not correlate well between subjects (Reynolds et al., 2006a). Reynolds et al., 2006 suggests that measures of delay-discounting may characterize more specific behavioral processes than those characterized by self-report measures. While the measures of impulsivity as expressed by the BIS-11 were consistent in predicting scores on the childhood trauma questionnaire, scores on the delay- discounting task were not significant predictors of childhood trauma, nor psychological maladjustment. There are mixed findings in the literature regarding trait and behavioral levels of impulsivity and their actions as predictors of psychological maladjustment. Bornovalova et al., 2008, found that a history of child abuse was positively related to self-reported engagement in HIV-related risk behaviors as well as risk taking propensity. These researchers however, found that measures of trait level impulsivity were not related to abuse history (Bornovalova et al., 2008). In contrast to their findings, Bailey and McCloskey, 2005, found that impulsivity may act as a mediator in the relationship between child abuse and risky behavior. Collectively, these findings may indicate that there may be a special effect of the experience of childhood trauma that may be specific to trait impulsivity and not behavioral impulsivity. Future studies should assess different types of childhood trauma in relationship to trait and behavioral impulsivity.

Chronic versus Acute Trauma

One aspect of data that was not collected in this study was the time frame of the trauma that took place. When participants were asked to state what type of trauma they were referring to when completing the PCL-C, LEC and CTQ, many volunteered information regarding a time frame for the traumatic event, but not every subject revealed this information. A multitude of research has provided the conclusion that the ongoing stress associated with the experience of chronic or multiple traumatic events, leads to a multitude of psychological maladaptations such as dissociations, post-traumatic stress disorder, bipolar disorder, borderline personality disorder, depression, anxiety, eating disorders, to name a few (Beitchman et al, 1991; Kendall-Tackett et al, 1993; Wolfe & Birt, 1995, 1997). Furthermore, research has also shown that the experience of ongoing trauma, such as is typical with child abuse and neglect, is associated with structural and functional changes in the hippocampus and amygdaloid regions of the brain (Bremner et al; Driessen et al.; Navalta et al. 2000; Teicher et al., 2002). These findings taken together could support the hypothesis that the data from this investigation reflect more acute forms of trauma rather than chronic or ongoing forms that are needed to produce the structural and functional changes in the brain and HPA axis dysregulation to bring about significant changes in behavior that could be measured by the Kirby delay-discounting task. This hypothesis could be supported by the fact that two of the top three most commonly reported singular forms of trauma in this study were accidents and acts of violence. Forms of trauma that are typically characterized by ongoing stress, such as sexual, physical,

or emotional abuse, neglect, or combat violence, were low in number in this study.

A second model suggested by Galvin et al., 1991, posits that ongoing traumatic experiences in childhood lead to neurochemical dysregulation, which in turn lead to deficits in behavioral regulation and inhibition. These researchers reported that children who have experienced significant abuse and/or neglect are considerably more likely to have reduced levels of plasma dopamine beta hydroxylase (DBH), when compared to children without a history of abuse. As such, behavioral dyscontrol, biological irregularities, and intense negative affect that is often associated with a history of abuse, may work together to lead victims to perceive positive consequences of the risky behavior that is so often characterized by those who have experienced childhood traumatic events. Therefore, with a low incidence of chronic traumatic experiences in this study, there may be a lower chance of finding delay-discounting as a significant predictor of psychological maladjustment in childhood trauma survivors, as perhaps there is a need for chronic stressors to produce the behavioral impulsivity this research was seeking to find.

Future Directions: Coping Mechanisms, Impact of Events, and IQ

Furthermore, three pieces of data that may have aided in this study would be the types of coping mechanisms trauma survivors utilized post-trauma, the scale of impact that the endorsed event had on their subjective well-being, and the intelligence level of the participant.

Coping strategies are defined by Lazarus & Folkman, 1987 as, “constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person,” (p. 141). Coping mechanisms have been shown to have a large effect on the psychological adjustment of a trauma survivor (Chaffin et al., 1997; Conte and Schuerman, 1987; Himelein et al., 1996; Johnson & Kenkel, 1991). Specifically, researchers have found that survivors of ongoing traumatic experiences, such as abuse, report less psychological maladjustment if they also endorsed utilizing avoidance coping strategies (Chaffin et al., 1997; Conte et al., 1987) as children. However it is suspected by these researchers that if these avoidance coping strategies continue into adulthood, adverse outcomes such as drug use and other risky behaviors could become a problem (Chaffin et al., 1997). The presence of this type of coping strategy in childhood may have served as a protective factor against the development of psychological maladjustment in this sample. Future studies would need to assess current and past coping strategies of participants in order to fully understand the relationship of the experience of trauma and its relationship to behavioral correlates of impulsivity as measured by a delay-discounting task.

One piece of data that would be crucial to the understanding of the relationship between delay-discounting and the experience of trauma would be to assess the impact of the event on the participant. Trauma is a subjective experience, and what may be traumatic for one individual may not be traumatic for a different individual. Participants in this study endorsed a variety of

traumatic events, with everything from, “rape,” to “threat of death,” to “crying.” The Impact of Events Scale (IES), is a 22-item self-report measure that assesses subjective distress caused by traumatic events (Weiss & Marmar, 1996), and could be included as a variable in future studies to assess the relationship between trauma and impulsivity and adverse psychological outcomes. With the IES, future researchers may better understand if it is necessary to experience severe and chronic forms of trauma to predict psychological maladjustment, or if acute stressors may also predict adverse outcomes.

Lastly, an increasing body of research has investigated the possible link between deleterious effects of trauma and levels of intelligence. Importantly, there is no direct causal link that has been found between the experience of trauma and decreased levels of intelligence, but correlational studies, such as Lewandowski, Somers, Yoon, and Chiodo, (2012), have found that sub-categories of trauma such as abandonment and personal identity trauma as related to sexual abuse, were found to have direct negative effects on intelligence factors (such as perceptual reasoning, verbal comprehension, working memory, and processing speed). This type of data would be very beneficial to have collected, in terms of type of trauma and intelligence level, as the delay-discounting task requires an effective working memory capacity, and perceptual reasoning skills. Future research would do well to collect intelligence data with respect to working memory, perceptual reasoning skills, verbal and written comprehension skills, and processing speed for all respondents.

Sample

One final possibility for the explanation of inconclusive results, may be that socio-economic status data was not collected from participants. Individual socio-economic status may have had an effect on the choices participants selected in the Kirby delay-discounting task, in that financial backgrounds may shape the subjective value of the various amounts of monetary rewards and delays that were presented, above and beyond the experience of psychological trauma or levels of trait impulsivity. This may also be a possible explanation for why the delay-discounting measure of impulsivity was not significantly correlated with trait levels of impulsivity on the BIS-11. Previous research done by Melanko et al., 2009 found no association between socio-economic status and rates of delay-discounting in adolescent smokers and non-smokers. However, it may still be beneficial for future studies in this area to consider collecting socio-economic status data in order to assess if this individual variable has a significant effect on delay-discounting rate over and above the effect of psychological sequelae of trauma.

In sum, this study sought to investigate the relationship between childhood trauma and delay-discounting as a measure of behavioral impulsivity. The hypothesis that childhood trauma is a predictor of delay-discounting was not supported by the current data. Secondly, the hypothesis that delay-discounting predicts psychological maladjustment in childhood trauma survivors was also not supported by the data. Future research should assess these variables in conjunction with the collection of socio-economic status data, the use of multiple

or real-time and hypothetical tests of delay-discounting, as well as the assessment of acute versus chronic trauma, the impact of the event, and coping mechanisms utilized during and after the traumatic event.

References

- Abram, K. M., Teplin, L. A., Charles, D. R., Longworth, S. L., McClelland, G. M., & Dulcan, M. K. (2004). Posttraumatic stress disorder and trauma in youth in juvenile detention. *Archives of General Psychiatry*, *61*(4), 403-410. doi:10.1001/archpsyc.61.4.403.
- Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA: Journal of the American Medical Association*, *282*(17), 1652-1658. doi:10.1001/jama.282.17.1652.
- Arroyo, W. (2001). In Eth S. (Ed.), *PTSD in children and adolescents in the juvenile justice system*. Washington, DC, US: American Psychiatric Association. Retrieved from <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619618362?accountid=4485>.
- Bagley, C. (1991). The long-term psychological effects of child sexual abuse: A review of some british and canadian studies of victims and their families. *Annals of Sex Research*, *4*(1), 23-48. doi:10.1007/BF00850138.
- Bailey, J. A., & Ann McCloskey, L. (2005). Pathways to adolescent substance use among sexually abused girls. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, *33*(1), 39-53. doi:10.1007/s10802-005-0933-0.
- Beck, A.T., Steer, R. A., & Brown, G. K., (1996). Manual for the Beck Depression Inventory-II. San Antonio, TX: *Psychological Corporation*.
- Becker-Lausen, Evelyn L. *Child abuse and negative life experiences: An analysis of depression and dissociation as mediator variables*. *Dissertation Abstracts International*, , 557. Retrieved from <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview618366810?accountid=4485>.
- Becker-Lausen, E., Sanders, B. and Chinsky, J. M. (1995), Mediation of Childhood Abuse Experiences: Depression, Dissociation, and Negative Life Outcomes. *American Journal of Orthopsychiatry*, *65*: 560–573. doi: 10.1037/h0079670.
- Bell, C.C., Jenkins, E.J. (1993) Community violence and children on Chicago's Southside, *Psychiatry*, *56* (1): 46-54.

- Beitchman, J. H., Zucker, K. J., Hood, J. E., & DaCosta, G. A. (1991). A review of the short-term effects of child sexual abuse. *Child Abuse & Neglect*, 15(4), 537-556. doi:10.1016/0145-2134(91)90038-F
- Beitchman, J. H., Zucker, K. J., Hood, J. E., & DaCosta, G. A. (1992). A review of the long-term effects of child sexual abuse. *Child Abuse & Neglect*, 16(1), 101-118. doi:10.1016/0145-2134(92)90011-F.
- Bensley, L. S., Eenwyk, J. V., & Simmons, K. W. (2000). Self-reported childhood sexual and physical abuse and adult HIV-risk behaviors and heavy drinking. *American Journal of Preventive Medicine*, 18(2), 151-158. doi:10.1016/S0749-3797(99)00084-7.
- Bickel, W.K., Odum, A.L., Madden, G.J., (1999). Impulsiveness and cigarette smoking: delay-discounting in current, never, and ex-smokers. *Psychopharmacology*, 146, 447-454.
- Blalock, J. A., Nayak, N., Wetter, D. W., Schreindorfer, L., Minnix, J. A., Canul, J., & Cinciripini, P. M. (2011). The relationship of childhood trauma to nicotine dependence in pregnant smokers. *Psychology of Addictive Behaviors*, 25(4), 652-663. doi:10.1037/a0025529.
- Blankertz, L. E., Cnaan, R. A., White, K., & Fox, J. (1990). Outreach efforts with dually diagnosed homeless persons. *Families in Society*, 71(7), 387-397. <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/617897710?accountid=4485>.
- Blankertz, L. E., Cnaan, R. A., & Freedman, E. (1993). Childhood risk factors in dually diagnosed homeless adults. *Social Work*, 38(5), 587-596. <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618446151?accountid=4485>.
- Bollerud, K. (1990). A model for the treatment of trauma-related syndromes among chemically dependent inpatient women. *Journal of Substance Abuse Treatment*, 7(2), 83-87. doi:10.1016/0740-5472(90)90003-9.
- Bornovalova MA, Daughters SB, Hernandez GD, Richards JB, Lejuez CW (2005). Difference in impulsivity and risk-taking propensity between primary users of crack cocaine and primary users of heroin in a residential substance- use program. *Exp Clin Psychopharmacol* 13:311–318.
- Bornovalova, M.A., Gwadz, M.A. Kahler, C., Aclin, W.M., Lejuez, C.W., (2008) Sensation seeking and risk-taking propensity as mediators in the relationship between childhood abuse and HIV-related risk behavior, *Child Abuse & Neglect*, 32(1), 99-109, ISSN 0145-2134, 10.1016/j.chiabu.2007.04.009.

- Bremner, J. D. (2006). In Yehuda R. (Ed.), *The relationship between cognitive and brain changes in posttraumatic stress disorder*. Malden: Blackwell Publishing, Malden.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/621456060?accountid=4485>.
- Breslau, N., Davis, G. C., Andreski, P., & Peterson, E. (1991). Traumatic events and posttraumatic stress disorder in an urban population of young adults. *Archives of General Psychiatry*, 48(3), 216-222.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/617939275?accountid=4485>.
- Briere, J. N. (1992). *Child abuse trauma: Theory and treatment of the lasting effects*. Thousand Oaks, CA, US: Sage Publications, Inc, Thousand Oaks, CA.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618230482?accountid=4485>.
- Brodsky, B., Oquendo, M. & Ellis, S. (2001). The relationship of childhood abuse to impulsivity and suicidal behavior. *American Journal of Psychiatry*, 151, 1132-1136.
- Finkelhor, D., & Browne, A. (1986). The traumatic impact of child sexual abuse: A conceptualization. *Annual Progress in Child Psychiatry & Child Development*, , 632-648.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/617996413?accountid=4485>.
- Brown, T. A., Campbell, L. A., Lehman, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology*, 110(4), 585-599. doi:10.1037/0021-843X.110.4.585.
- Cauffman, E., Feldman, S., Watherman, J., Steiner, H. (1998). Posttraumatic stress disorder among female juvenile offenders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37(11), 1209-1216.
- Chabris, C.F., Laibson, D., Morris, C.L., Schuldt, J.P, & Dmitry Taubinsky, D. (2008). Individual laboratory-measured discount rates predict field behavior. *Journal of Risk and Uncertainty*, 37, 237–269.
- Chaffin, M., Wherry, J. N., & Dykman, R. (1997). School age childrens coping with sexual abuse: Abuse stresses and symptoms associated with four coping strategies. *Child Abuse & Neglect*, 21(2), 227-240.
doi:10.1016/S0145-2134(96)00148-2.

- Cicero, S. D., Nooner, K., & Silva, R. (2011). In Ardino V. (Ed.), *Vulnerability and resilience in childhood trauma and PTSD* Wiley-Blackwell. Retrieved from <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/913454822?accountid=4485>.
- Clark, D. B., Lesnick, L., and Hegedus, A. M. (1997). Traumas and other adverse life events in adolescents with alcohol abuse and dependence. *J Am Acad Child Adolesc Psychiatry*, 36(12), 1744-51.
- Coffey, S. F., Gudleski, G. D., Saladin, M. E., & Brady, K. T. (2003). Impulsivity and rapid discounting of delayed hypothetical rewards in cocaine-dependent individuals. *Experimental and Clinical Psychopharmacology*, 11(1), 18-25. doi:10.1037/1064-1297.11.1.18.
- Conte, J. R., & Schuerman, J. R. (1987). Factors associated with an increased impact of child sexual abuse. *Child Abuse & Neglect*, 11(2), 201-211. doi:10.1016/0145-2134(87)90059-7.
- Copeland, W.E., Keeler, G., Angold, A., Costello, E.J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry*, 64 (5): 577-584.
- Corstorphine, Emma; Waller, Glenn; Lawson, Rachel; Ganis, Christine. Trauma and multi-impulsivity in the eating disorders. *Eating Behaviors*. Vol 8(1), Jan 2007, pp. 23-30.
- Costello, E.J., Erkanli, A., Fairbank, J.A., & Angold, A. (2002). The prevalence of potentially traumatic events in childhood and adolescence. *Journal of Traumatic Stress*, 15 (2):99-112.
- Cuomo, Chicara; Sarchiapone, Marco; Giannantonio, Massimo Di; Mancini, Michele; Roy, Alec. 2008. Aggression, impulsivity, personality traits, and childhood trauma of prisoners with substance abuse and addiction. *The American Journal of Drug and Alcohol Abuse*. Vol 34(3), pp 339-345.
- Dallery, J., & Raiff, B. R. (2007). Delay-discounting predicts cigarette smoking in a laboratory model of abstinence reinforcement. *Psychopharmacology*, 190, 485-496.
- Dass-Brailsford, Priscilla; Myrick, Amie C. (2010). Psychological trauma and substance abuse: The need for an integrated approach. *Trauma, Violence, & Abuse*. Vol 11(4), Oct 2010, pp. 202-213.

- De Bellis, M.D., Thomas, L. A., (2004). Pituitary volumes in pediatric maltreatment-related posttraumatic stress disorder. *Biological Psychiatry*, 55(7), 752-758. doi:10.1016/j.biopsych.2003.11.021.
- de Silva, P., & Marks, M. (1999). In Yule W. (Ed.), *Intrusive thinking in post-traumatic stress disorder*. New York, NY, US: John Wiley & Sons Ltd, New York, NY.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619391658?accountid=4485>.
- Deykin, E. Y., and Buka, S. L. (1997). Prevalence and risk factors for posttraumatic stress disorder among chemically dependent adolescents. *Am J Psychiatry*, 154(6), 752-7.
- Dixon, L., Browne, K., Hamilton-Giachritsis, C., & Ostapuk, E. (2010). Differentiating patterns of aggression in the family. *Journal of Aggression, Conflict and Peace Research*, 2(1), 32-44. doi:10.5042/jacpr.2010.0003.
- Driessen, M., Beblo, T., Mertens, M., Piefke, M., Rullkoetter, N., Silva-Saavedra, A., . . . Woermann, F. G. (2004). Posttraumatic stress disorder and fMRI activation patterns of traumatic memory in patients with borderline personality disorder. *Biological Psychiatry*, 55(6), 603-611. doi:10.1016/j.biopsych.2003.08.018.
- Dubo, E. D., Zanarini, M. C., Lewis, R. E., & Williams, A. A. (1997). In Zanarini M. C. (Ed.), *Relationship between lifetime self-destructiveness and pathological childhood experiences*. Washington, DC, US: American Psychiatric Association, Washington, DC.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619033217?accountid=4485>.
- Evenden, J. L. (1999). Varieties of impulsivity. *Psychopharmacology*, 146(4), 348-361. doi:10.1007/PL00005481.
- Frosch, J., & Wortis, S. B. (1954). A contribution to the nosology of the impulse disorders. *The American Journal of Psychiatry*, 111, 132-138.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/615271667?accountid=4485>.
- Funk, R. R., McDermeit, M., Godley, S. H., and Adams, L. (2003). Maltreatment issues by level of adolescent substance abuse treatment: The extent of the problem at intake and relationship to early outcomes. *Child Maltreat*, 8(1), 36-45.

- Galvin, M., Shekhar, A., Simon, J., & Stilwell, B. (1991). Low dopamine-beta-hydroxylase: A biological sequela of abuse and neglect? *Psychiatry Research*, 39(1), 1-11. doi:10.1016/0165-1781(91)90002-7.
- Giaconia, R. M., Reinherz, H. Z., Hauf, A. C., Paradis, A. D., Wasserman, M.S., and Langhammer, D. M. (2000). Comorbidity of substance use and post-traumatic stress disorders in a community sample of adolescents. *Am J Orthopsychiatry*, 70(2), 253-62.
- Gray, M. J., Litz, B. T., Hsu, J. L. & Lombardo, T. W. (2004). *The psychometric properties of the Life Events Checklist*. *Assessment*, 11, 330-341.
- Greco-Gregory, Judeth Marie. Trauma history, dissociation, and female video poker gambling: A correlational and experiential study. Dissertation Abstracts International: Section B: The Sciences and Engineering Vol 62(8-B), 2002, pp. 3801.
- Green, L., Fristoe, N., & Myerson, J. (1994). Temporal discounting and preference reversals in choice between delayed outcomes. *Psychonomic Bulletin & Review*, 1(3), 383-389.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618928858?accountid=4485>.
- Greene, Lisa. 2010. Impulsivity and trauma exposure in adolescents. Dissertation Abstracts International: Section B: The Sciences and Engineering. Vol 70(10-B), pp 6550.
- Hagan, J., Simpson, J., & Gillis, A. R. (1988). Feminist scholarship, relational and instrumental control, and a power-control theory of gender and delinquency. *British Journal of Sociology*, 39(3), 301-336.
 doi:10.2307/590481.
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. (1991). The fagerström test for nicotine dependence: A revision of the fagerström tolerance questionnaire. *British Journal of Addiction*, 86(9), 1119-1127.
 doi:10.1111/j.1360-0443.1991.tb01879.x
- Herrnstein, R.J. (1977). Self-control as response strength. In R.J. Herrnstein (1977). *The matching law*. Cambridge, MA : Harvard University Press.
- Himelein, M. J., & McElrath, J. A. V. (1996). Resilient child sexual abuse survivors: Cognitive coping and illusion. *Child Abuse & Neglect*, 20(8), 747-758. doi:10.1016/0145-2134(96)00062-2

- Howard, M. O., Balster, R. L., Cottler, L. B., Wu, L., & Vaughn, M. G. (2008). Inhalant use among incarcerated adolescents in the United States: Prevalence, characteristics, and correlates of use. *Drug and Alcohol Dependence, 93*(3), 197-209. doi:10.1016/j.drugalcdep.2007.08.023
- Johnson, M. W. & Bickel, W. K. (2002). Within-subject comparisons of real and hypothetical monetary rewards in delayed discounting. *Journal of Experimental Analysis of Behavior, 77*, 129-146.
- Johnson, B. K., & Kenkel, M. B. (1991). Stress, coping, and adjustment in female adolescent incest victims. *Child Abuse & Neglect, 15*(3), 293-305. doi:10.1016/0145-2134(91)90073-M.
- Kausch, O., Rugle, L., & Rowland, D. Y. (2006). Lifetime histories of trauma among pathological gamblers. *The American Journal on Addictions, 15*(1), 35-43. doi:10.1080/10550490500419045.
- Kendall-Tackett, Kathleen A., Williams, L. M., & Finkelhor, D. (2001). In Bull R. (Ed.), *Impact of sexual abuse on children: A review and synthesis of recent empirical studies*. Malden: Blackwell Publishing, Malden. <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619699792?accountid=4485>.
- Killeen, P. R. (2009). An additive-utility model of delay-discounting. In G. J. Madden & W. K. Bickel (Eds.), *Impulsivity: The behavioral and neurological science of discounting*. Washington, DC: American Psychological Association.
- Kilpatrick, D. G., Resnick, H. S., Dansky, B. S., Saunders, B. E., & Best, C. L. (1993). Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology, 61*(6), 984-991. doi:10.1037/0022-006X.61.6.984.
- Kilpatrick DG, Saunders BE. (1997). Prevalence and Consequences of Child Victimization: Results from the National Survey of Adolescents. National Crime Victims Research and Treatment Center, Medical University of South Carolina
- Kirby, K.N., Petry, N.M., & Bickel, W.K. (1999). Heroin addicts have discount rates for delayed rewards than non-drug-using controls. *Journal of Experimental Psychology: General, 128*(1), 78-87.
- Koverola, C., & Foy, D. (1993). Post traumatic stress disorder symptomatology in sexually abused children: Implications for legal proceedings. *Journal of Child Sexual Abuse: Research, Treatment, & Program Innovations for*

Victims, Survivors, & Offenders, 2(4), 119-128.
doi:10.1300/J070v02n04_12.

- Lagorio, C. H., & Madden, G. J. (2005). Delay discounting of real and hypothetical rewards III: Steady-state assessments, forced-choice trials, and all real rewards. *Behavioural Processes*, 69(2), 173-187.
doi:10.1016/j.beproc.2005.02.003.
- Lewandowski, L., Somers, C. L., Yoon, J. S., & Chiodo, L. (2012). The effects of trauma types, cumulative trauma, and PTSD on IQ in two highly traumatized adolescent groups. *Psychological Trauma: Theory, Research, Practice, and Policy*, 4(1), 128-139. doi:10.1037/a0022121.
- Ligezinska, M., Firestone, P., Manion, I. G., McIntyre, J., Ensom, R., & Wells, G. (1996). Childrens emotional and behavioral reactions following the disclosure of extrafamilial sexual abuse: Initial effects. *Child Abuse & Neglect*, 20(2), 111-125. doi:10.1016/0145-2134(95)00125-5.
- Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality*, 1(3), 141-169.
doi:10.1002/per.2410010304.
- Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., & Van Kammen, W. B. (1998). In Jessor R. (Ed.), *Multiple risk factors for multiproblem boys: Co-occurrence of delinquency, substance use, attention deficit, conduct problems, physical aggression, covert behavior, depressed mood, and shy/withdrawn behavior*. New York, NY, US: Cambridge University Press, New York, NY.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619356548?accountid=4485>.
- MacMillan, H. L., Fleming, J. E., Streiner, D. L., Lin, E., Boyle, M. H., Jamieson, E., . . . Beardslee, W. R. (2001). Childhood abuse and lifetime psychopathology in a community sample. *The American Journal of Psychiatry*, 158(11), 1878-1883. doi:10.1176/appi.ajp.158.11.1878.
- Madden, G.J., Bickel, W.K., Jacobs, E.A. (1999). Discounting of delayed rewards in opioid-dependent outpatients. *Experimental and Clinical Psychopharmacology*, 7, 284-293.
- Madden, G.J., Petry, N.M., Badger, G.J., & Bickel, W.K. (1997). Impulsive and self-control choices in opioid-dependent patients and non-drug-using control participants: drug and monetary rewards. *Experimental and Clinical Psychopharmacology*, 5(3), 256-262.

- Mazur, J.A. Nevin, and H. Rachlin (1987.) *Quantitative Analysis of Behavior: Vol. 5. The effect of delay and of intervening events on reinforcement value.* Hillsdale, NJ: Erlbaum, pp. 57-73.
- Medrano, M. A., & Hatch, J. P. (2005). Childhood trauma, sexually transmitted diseases and the perceived risk of contracting HIV in a drug using population. *The American Journal of Drug and Alcohol Abuse*, 31(3), 403-416. doi:10.1081/ADA-200056788.
- Melanko, Shane¹; Leraas, Kristen; Collins, Christine; Fields, Sherecce; Reynolds, Brady. Characteristics of psychopathy in adolescent nonsmokers and smokers: Relations to delay-discounting and self reported impulsivity. *Experimental and Clinical Psychopharmacology*. Vol. 17(4), August 2009, pp. 258-265.
- Merry, S. N., & Andrews, L. K. (1994). Psychiatric status of sexually abused children 12 months after disclosure of abuse. *Journal of the American Academy of Child & Adolescent Psychiatry*, 33(7), 939-944. doi:10.1097/00004583-199409000-00002
- Mitchell, S. H. (1999). Measures of impulsivity in cigarette smokers and nonsmokers. *Psychopharmacology*, 146, 455-464.
- Moeller, F.G., Barrat, E.S., Schmitz, J.M., Swann, A.C. (2001) Psychiatric aspects of impulsivity. *American Journal of Psychiatry*, 158 (2001), pp. 1783–1793.
- Moeller, G. & Dougherty, D. (2002). Impulsivity and substance abuse: What is the connection. *Addictive Disorders and Their Treatment*, 1, 3-10.
- Mongillo, E. A., Briggs-Gowan, M., Ford, J. D., & Carter, A. S. (2009). Impact of traumatic life events in a community sample of toddlers. *Journal of Abnormal Child Psychology: An Official Publication of the International Society for Research in Child and Adolescent Psychopathology*, 37(4), 455-468. doi:10.1007/s10802-008-9283-z
- Mozley, S. L., Miller, M. W., Weathers, F. W., Beckham, J. C., & Feldman, M. E. (2005). Personality assessment inventory (PAI) profiles of male veterans with combat-related posttraumatic stress disorder. *Journal of Psychopathology and Behavioral Assessment*, 27(3), 179-189. doi:10.1007/s10862-005-0634-6
- Mueser, K. T., Goodman, L. B., Trumbetta, S. L., Rosenberg, S. D., Osher, F. C., Vidaver, R., . . . Foy, D. W. (1998). Trauma and posttraumatic stress disorder in severe mental illness. *Journal of Consulting and Clinical Psychology*, 66(3), 493-499. doi:10.1037/0022-006X.66.3.493

- Navalta, C. P., Polcari, A., Webster, D. M., Boghossian, A., & Teicher, M. H. (2006). Effects of childhood sexual abuse on neuropsychological and cognitive function in college women. *The Journal of Neuropsychiatry and Clinical Neurosciences*, *18*(1), 45-53. doi:10.1176/appi.neuropsych.18.1.45
- Oas, P. T. (1985). Impulsivity and delinquent behavior among incarcerated adolescents. *Journal of Clinical Psychology*, *41*(3), 422-424. <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/617058278?accountid=4485>.
- Oates, R. K., OToole, Brian I., Lynch, D. L., & Stern, A. (1994). Stability and change in outcomes for sexually abused children. *Journal of the American Academy of Child & Adolescent Psychiatry*, *33*(7), 945-953. doi:10.1097/00004583-199409000-00003.
- Orsillo, S. M., Weathers, F. W., Litz, B. T., Steinberg, H. R., Huska, J. A., & Keane, T. M. (1996). Current and lifetime psychiatric disorders among veterans with war zone-related posttraumatic stress disorder. *Journal of Nervous and Mental Disease*, *184*(5), 307-313. doi:10.1097/00005053-199605000-00007
- Paolucci, E., Genuis, M. L., & Violato, C. (2001). A meta-analysis of the published research on the effects of child sexual abuse. *Journal of Psychology: Interdisciplinary and Applied*, *135*(1), 17-36. doi:10.1080/00223980109603677
- Patton J.M., Stanford, M.S., and Barratt, E.S. (1995). Factor Structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology*, *51*, 768-774.
- Petry, N.M. (2001). Delay-discounting of money and alcohol in actively using alcoholics, currently abstinent alcoholics, and controls. *Psychopharmacology*, *154*, 243-250.
- Petry, N.M., & Cassarella, T. (1999). Excessive discounting of delayed rewards in substance abusers with gambling problems. *Drug and Alcohol Dependence*, *56*, 25-32.
- Rachlin, H., Rainieri, A., & Cross, D. (1991). Subjective probability and delay. *Journal of the Experimental Analysis of Behavior*, *55*, 233-244.
- Ramiro, L. S., Madrid, B. J., & Brown, D. W. (2010). Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting. *Child Abuse & Neglect*, *34*(11), 842-855. doi:10.1016/j.chiabu.2010.02.012

- Reynolds, B. (2006a). The experiential discounting task is sensitive to cigarette-smoking status and correlates with a measure of delay-discounting. *Behavioral Pharmacology*, 17, 133-142.
- Reynolds, B. (2006b). A review of delay-discounting research with humans: Relations to drug use and gambling. *Behavioral Pharmacology*, 17, 651-667.
- Reynolds, B., Patak, , Michele, & Shroff, P. (2007). Adolescent smokers rate delayed rewards as less certain than adolescent nonsmokers. *Drug and Alcohol Dependence*, 90(2-3), 301-303. doi:10.1016/j.drugalcdep.2007.04.008.
- Richards, J.B., Zhang, L., Mitchell, S.H., & De Witt, H. (1999). Delay or probability discounting in a model of impulsive behavior: effect of alcohol. *Journal of the Experimental Analysis of Behavior*, 71, 121-143.
- Roy, Alec. (2005). Childhood Trauma and Impulsivity: Possible Relevance to Suicidal Behavior. *Archives of Suicide Research*. Vol 9(2), , pp. 147-151.
- Saigh, P. A., Yasik, A. E., Sack, W. H., & Koplewicz, H. S. (1999). In Saigh P. A., Bremner J. D. (Eds.), *Child-adolescent posttraumatic stress disorder: Prevalence, risk factors, and comorbidity*. Needham Heights, MA, US: Allyn & Bacon, Needham Heights, MA. <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619350131?accountid=4485>.
- Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(5), 561-570. doi:10.1097/01.CHI.0000046822.95464.14.
- Scherrer, J. F., Xian, H., Kapp, J. M. K., Waterman, B., Shah, K. R., Volberg, R., & Eisen, S. A. (2007). Association between exposure to childhood and lifetime traumatic events and lifetime pathological gambling in a twin cohort. *Journal of Nervous and Mental Disease*, 195(1), 72-78. doi:10.1097/01.nmd.0000252384.20382.e9.
- Sher, K. J., Walitzer, K. S., Wood, P. K., & Brent, E. E. (1991). Characteristics of children of alcoholics: Putative risk factors, substance use and abuse, and psychopathology. *Journal of Abnormal Psychology*, 100(4), 427-448. doi:10.1037/0021-843X.100.4.427.
- Simons, L., Ducette, J., Kirby, K., Stahler, G., Shipley, T. (2003) Childhood Trauma, Avoidance Coping, and Alcohol and Other Drug Use Among Women in Residential and Outpatient Treatment Programs. *Alcoholism Treatment Quarterly*, Volume 21, Number 4, pp. 37-54.

- Stein, M. B., Hanna, C., Koverola, C., & Torchia, M. (1997). In Yehuda R., McFarlane A. C. (Eds.), *Structural brain changes in PTSD. does trauma alter neuroanatomy?*. New York, NY, US: New York Academy of Sciences, New York, NY.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619147951?accountid=4485>.
- Teicher, M. H., Glod, C. A., Surrey, J., & Swett, C. (1993). Early childhood abuse and limbic system ratings in adult psychiatric outpatients. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 5(3), 301-306.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618419956?accountid=4485>.
- Teicher, M. H., Ito, Y., Glod, C. A., Schiffer, F., & Gelbard, H. A. (1994). In Silk K. R. (Ed.), *Early abuse, limbic system dysfunction, and borderline personality disorder*. Washington, DC, US: American Psychiatric Association, Washington, DC.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618575023?accountid=4485>.
- Teicher, M. H., Dumont, N. L., Ito, Y., Vaituzis, C., Giedd, J. N., & Andersen, S. L. (2004). Childhood neglect is associated with reduced corpus callosum area. *Biological Psychiatry*, 56(2), 80-85.
 doi:10.1016/j.biopsych.2004.03.016.
- Teicher, M. H., & Giller, E. L. (2000). Lack of significant cortisol and growth hormone changes in israeli civilians during the gulf war. *The American Journal of Psychiatry*, 152(4), 652-653.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618662803?accountid=4485>.
- Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., & Navalta, C. P. (2002). Developmental neurobiology of childhood stress and trauma. *Psychiatric Clinics of North America*, 25(2), 397-426.
 doi:10.1016/S0193-953X(01)00003-X.
- Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., Navalta, C. P., & Kim, D. M. (2003). The neurobiological consequences of early stress and childhood maltreatment. *Neuroscience and Biobehavioral Reviews*, 27(1-2), 33-44. doi:10.1016/S0149-7634(03)00007-1
- Vuchinich, R.E., & Simpson, C.A. (1998). Hyperbolic temporal discounting in social drinkers and problem drinkers. *Experimental and Clinical Psychopharmacology*, 6, 292-305.

- Volpicelli, J., Balaraman, G., Hahn, J., Wallace, H., & Bux, D. (1999). The role of uncontrollable trauma in the development of PTSD and alcohol addiction. *Alcohol Research & Health*, 23(4), 256-262.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619537955?accountid=4485>.
- Walton, G., Co, S. J., Milloy, M. -, Qi, J., Kerr, T., & Wood, E. (2011). High prevalence of childhood emotional, physical and sexual trauma among a Canadian cohort of HIV-seropositive illicit drug users. *AIDS Care*, 23(6), 714-721. doi:10.1080/09540121.2010.525618.
- Wasserman, G. A., Jensen, P. S., Ko, S. J., Cocozza, J., Trupin, E., Angold, A., . . . Grisso, T. (2003). Mental health assessments in juvenile justice: Report on the consensus conference. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(7), 751-761.
 doi:10.1097/01.CHI.0000046885.27264.61.
- Wasserman, G. A., McReynolds, L. S., Fisher, P., & Lucas, C. (2003). Psychiatric disorders in incarcerated youths. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(9), 1011-1011.
 doi:10.1097/01.CHI.0000070251.24125.16.
- Watts-English, T., Fortson, B. L., Gibler, N., Hooper, S. R., & DeBellis, M. D. (2006). The psychobiology of maltreatment in childhood. *Journal of Social Issues*, 62(4), 717-736. doi:10.1111/j.1540-4560.2006.00484.x.
- Weathers, F. W., & Keane, T. M. (1993). In Last C. G., Hersen M. (Eds.), *Posttraumatic stress disorder*. New York, NY, US: Plenum Press, New York, NY.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618410113?accountid=4485>.
- Weiss, D. S., & Marmar, C. R. (1996). The Impact of Event Scale - Revised. In J. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399-411). New York: Guilford.
- Wilsnack, Sharon C.1; Wilsnack, Richard W.1; Kristjanson, Arlinda F.1; Vogeltanz-Holm, Nancy D.1; Harris, T. Robert, Koenig, Linda J.; Doll, Lynda S.; O'Leary, Ann; Pequegnat, Willo (2004). Child sexual abuse and alcohol use among women: Setting the stage for risky sexual behavior. From child sexual abuse to adult sexual risk: Trauma, revictimization, and intervention. (pp. 181-200). Washington, DC, US: American Psychological Association. xv, 346 pp.
- Wolfe, V. V., & Birt, J. (1995). The psychological sequelae of child sexual abuse. *Advances in Clinical Child Psychology*, 17, 233-263.

<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618650554?accountid=4485>.

Wolfe, V. V., & Birt, J. (1997). In Mash E. J., Terdal L. G. (Eds.), *Child sexual abuse*. New York, NY, US: Guilford Press, New York, NY.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/619148270?accountid=4485>.

Woolverton, W. L., Myerson, J., & Green, L. (2007). Delay discounting of cocaine by rhesus monkeys. *Experimental and Clinical Psychopharmacology*, 15(3), 238-244. doi:10.1037/1064-1297.15.3.238.

Wu, Nancy S.; Schairer, Laura C.; Dellor, Elinam; Grella, Christine. Childhood trauma and health outcomes in adults with comorbid substance abuse and mental health disorders. *Addictive Behaviors*. Vol 35(1), Jan 2010, pp. 68-71.

Yoon, J. H., Higgins, S. T., Sugarbaker, R. J., Thomas, C. S., & Badger, G. J. (2007). Delay-discounting predicts postpartum relapse to cigarette smoking among pregnant women. *Experimental and Clinical Psychopharmacology*, 15, 176-186.

Young, R. M., Knight, R. G., & Oei, T. P. (1990). The stability of alcohol-related expectancies in social drinking situations. *Australian Journal of Psychology*, 42(3), 321-330. doi:10.1080/00049539008260129.

Zeitlin, S., & Williamson, G. G. (1994). *Coping in young children: Early intervention practices to enhance adaptive behavior and resilience*. Baltimore, MD, US: Paul H Brookes Publishing, Baltimore, MD.
<http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/618571119?accountid=4485>.

Zlotnick, Caron; Shea, Tracie; Recupero, Pat; Bidadi, Kahil; Pearlstein, Teri; Brown, Pamela. (1997). Trauma, dissociation, impulsivity, and self-mutilation among substance abuse patients. *American Journal of Orthopsychiatry*. Vol 67(4), pp. 650-654.

Zuckerman, M. (1999). *Vulnerability to psychopathology: A biosocial model*. Washington, DC: American Psychological Association

Zurbriggen, Elieen L; Freyd, Jennifer J. 2004. The link between child sexual abuse and risky sexual behavior: The role of dissociative tendencies, information-processing effects, and consensual sex decision mechanisms. *Child sexual abuse to adult sexual risk*. (pp 135-157). Washington DC, US: American Psychological Association.

APPENDIX A.

KIRBY, 1999 HYPOTHETICAL-DELAY DISCOUNTING TASK

Order	SIR	LDR	Delay in Days	k at Indifference	k Rank	LDR Size
1	\$54	\$55	117	0.00016	1	M
2	\$55	\$75	61	0.006	5	L
3	\$19	\$25	53	0.006	5	S
4	\$31	\$85	7	0.25	9	L
5	\$14	\$25	19	0.041	7	S
6	\$47	\$50	160	0.0004	2	M
7	\$15	\$35	13	0.1	8	S
8	\$25	\$60	14	0.1	8	M
9	\$78	\$80	162	0.00016	1	L
10	\$40	\$55	62	0.006	5	M
11	\$11	\$30	7	0.25	9	S
12	\$67	\$75	119	0.001	3	L
13	\$34	\$35	186	0.00016	1	S
14	\$27	\$50	21	0.041	7	M
15	\$69	\$85	91	0.0025	4	L
16	\$49	\$60	89	0.0025	4	M
17	\$80	\$85	157	0.0004	2	L
18	\$24	\$35	29	0.016	6	S
19	\$33	\$80	14	0.1	8	L
20	\$28	\$30	179	0.0004	2	S
21	\$34	\$50	30	0.016	6	M
22	\$25	\$30	80	0.0025	4	S
23	\$41	\$75	20	0.041	7	L
24	\$54	\$60	111	0.001	3	M
25	\$54	\$80	30	0.016	6	L
26	\$22	\$25	136	0.001	3	S
27	\$20	\$55	7	0.25	9	M

Table 1. Participants were asked to choose between either the smaller immediate reward (SIR) or the larger delayed reward (LDR) that would be presented in the corresponding delay in days. K at indifference rates were used to calculate indifference points, for each S, M, L reward magnitude, and the geometric mean of the three indifference points provided an estimation of delay-discounting rate for each subject. Participants were given the reward delay choices in the order they are presented in this table.

APPENDIX B.

BARRATT IMPULSIVENESS SCALE (BIS-11)

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and select the number which corresponds with how often you feel you do these things. Do not spend too much time on any statement. Answer quickly and honestly.

	1	2	3
4	Rarely/Never	Occasionally	Often
	Always/Always		Almost
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 4	2	3
19. I act on the spur of the moment.	1 4	2	3
20. I am a steady thinker.	1 4	2	3
21. I change residences.	1 4	2	3
22. I buy things on impulse.	1 4	2	3
23. I can only think about one thing at a time.	1 4	2	3
24. I change hobbies.	1 4	2	3
25. I spend or charge more than I earn.	1 4	2	3
26. I often have extraneous thoughts when thinking.	1 4	2	3
27. I am more interested in the present than the future.	1 4	2	3
28. I am restless at the theater or lectures.	1 4	2	3
29. I like puzzles.	1 4	2	3
30. I am future oriented.	1 4	2	3

APPENDIX C.

BECK DEPRESSION INVENTORY (BDI-II)

My appetite is much greater than usual.	1 4	2	3
I can't concentrate on anything.	1 4	2	3
I am too tired or fatigued to do a lot of the things I used to.	1 4	2	3
I have lost interest in sex completely.	1 4	2	3

APPENDIX D.

LIFE EVENTS CHECKLIST (LEC)

LIFE EVENTS CHECKLIST

Listed below are things that sometimes happen to people. I'll read this aloud and together let's mark the boxes that describe things you've lived through or seen. For each event let's check one or more of the boxes to show if the event : (a) *happened to you* ; (b) *you saw it* happen to someone else; (c) *you learned about it happening* to someone close to you; (d) you're *not sure* if it fits; or (e) *it never happened* to you or anyone close to you. Be sure to think about your *whole life* growing up as you go through the list of events.

Event	<i>Happened to me</i>	<i>Saw it</i>	<i>Heard/ Learned about it</i>	<i>Not Sure</i>	<i>Never</i>
1. Disaster (for example, a flood, hurricane, tornado, or earthquake)					
2. Fire or explosion					
3. Vehicle accident (for example, car, bus, truck, or boat accident; train wreck or plane crash)					
4. Bad accident at school, home, or while playing					
5. Being near dangerous chemicals, leaking gas, or radiation; being made sick from poison					
6. Being slapped, kicked, hit, bit, attacked, or beaten up					
7. Being attacked with a weapon, (for example, belt, bottles, knife, gun, or bomb); or being told you would be hurt with a weapon (but you weren't hurt after all).					
8. Someone touching your body in a way you didn't want to be touched; being made to touch someone's body; someone saying or trying to touch your body (but the touching never happened)					
9. Living in an area where there was fighting in the streets or a war going on					
10. Not having enough food, water, clothing; not having a home; being left alone for many days without food or anyone to take care of you;					
11. Being near dying, hungry, or homeless people; being around kids without any adults to care for them					
12. Being forced to stay someplace against your wishes (kidnapping, being stolen)					
13. Illness or injury that might have caused death					
14. Violent death or dead bodies					
15. Death of someone close to you					
16. Badly hurting someone on purpose or by accident					
17. Any other very bad or scary event or experience or time you thought your life was in danger					

APPENDIX E.
CHILDHOOD TRAUMA QUESTIONNAIRE (CTQ)

Childhood Trauma Questionnaire

Please indicate whether or not any of these things happened or were felt in your life.

1. Got hit so hard I had to see a doctor or go to the hospital.	YES	NO
2. Family hit me so hard that it left me with bruises or marks.	YES	NO
3. I was punished with a belt/board/cord/other hard object.	YES	NO
4. I believe that I was physically abused.	YES	NO
5. Beaten so badly that it was noticed by a teacher/neighbor/doctor.	YES	NO
6. Someone in my family helped me feel important or special.	YES	NO
7. I felt loved.	YES	NO
8. People in my family looked out for each other.	YES	NO
9. People in my family felt close to each other.	YES	NO
10. My family was a source of strength and support.	YES	NO
11. People in my family called me "stupid," "lazy," or "ugly."	YES	NO
12. I thought my parents wished I had never been born.	YES	NO
13. People in my family said hurtful or insulting things to me.	YES	NO
14. I felt that someone in my family hated me.	YES	NO
15. I believe that I was emotionally abused.	YES	NO
16. I didn't have enough to eat.	YES	NO
17. I knew there was someone to take care of me and protect me.	YES	NO
18. My parents were too drunk or high to take care of the family.	YES	NO
19. I had to wear dirty clothes.	YES	NO
20. There was someone to take me to the doctor if I needed it.	YES	NO
21. Someone tried to touch me in a sexual way/made me touch them.	YES	NO
22. Someone threatened me unless I did something sexual.	YES	NO
23. Someone tried to make me do/watch sexual things.	YES	NO
24. Someone molested me.	YES	NO
25. I believe that I was sexually abused.	YES	NO

APPENDIX F.

THE POSTTRAUMATIC STRESS CHECKLIST—CIVILIAN VERSION (PCL-C)

PCL-C

INSTRUCTIONS: Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful experience from the past?	1	2	3	4	5
2. Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	1	2	3	4	5
3. Suddenly <i>acting or feeling</i> as if a stressful experience were happening again (as if you were reliving it)?	1	2	3	4	5
4. Feeling <i>very upset</i> when something reminded you of a stressful experience from the past?	1	2	3	4	5
5. Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience from the past?	1	2	3	4	5
6. Avoiding <i>thinking about</i> or <i>talking about</i> a stressful experience from the past or avoiding <i>having feelings</i> related to it?	1	2	3	4	5
7. Avoiding <i>activities or situations</i> because they reminded you of a stressful experience from the past?	1	2	3	4	5
8. Trouble <i>remembering important parts</i> of a stressful experience from the past?	1	2	3	4	5
9. <i>Loss of interest</i> in activities that you used to enjoy?	1	2	3	4	5
10. Feeling <i>distant or cut off</i> from other people?	1	2	3	4	5
11. Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	1	2	3	4	5
12. Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	1	2	3	4	5
13. Trouble <i>falling or staying asleep</i> ?	1	2	3	4	5
14. Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	1	2	3	4	5
15. Having <i>difficulty concentrating</i> ?	1	2	3	4	5
16. Being " <i>super-alert</i> " or watchful or on guard?	1	2	3	4	5
17. Feeling <i>jumpy</i> or easily startled?	1	2	3	4	5

PCL-C for DSM-IV (11/1/94)

Weathers, Litz, Huska, & Keane

National Center for PTSD - Behavioral Science Division

APPENDIX G.

DRUG ABUSE SCREENING TEST (DAST-20)

Drug Abuse Screening Test (DAST)

Please check the one response to each item that best describes how you have felt over the past 12 months.

1. Have you used drugs other than those required for medical reasons?

- Yes
- No

2. Have you abused prescription drugs?

- Yes
- No

3. Do you abuse more than one drug at a time?

- Yes
- No

4. Can you get through the week without using drugs or alcohol?

- Yes
- No

5. Are you always able to stop using drugs or alcohol when you want to?

- Yes
- No

6. Have you had "blackouts" or "flashbacks" as a result of drug or alcohol use?

- Yes
- No

7. Do you ever feel bad or guilty about your drug or alcohol use?

- Yes
- No

8. Does your spouse (or parents) ever complain about your involvement with drugs or alcohol?

- Yes
- No

9. Has drug or alcohol abuse created problems between you and your spouse or your parents?

- Yes
- No

10. Have you lost friends because of your use of drugs or alcohol?

- Yes
- No

11. Have you neglected your family because of your use of drugs or alcohol?

- Yes
- No

12. Have you been in trouble at work because of your use of drugs or alcohol?

- Yes
- No

13. Have you lost a job because of drug or alcohol abuse?

- Yes
- No

14. Have you gotten into fights when under the influence of drugs or alcohol?

- Yes
- No

15. Have you engaged in illegal activities in order to obtain drugs or alcohol?

- Yes
- No

16. Have you been arrested for possession of illegal drugs or alcohol?

- Yes
- No

17. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs or using alcohol?

- Yes
- No

18. Have you had medical problems as a result of your drug or alcohol use (e.g., memory loss, hepatitis, convulsions, bleeding, etc.)?

- Yes
- No

19. Have you gone to anyone for help for a drug or alcohol problem?

- Yes
- No

20. Have you been involved in a treatment program especially related to drug or alcohol use?

- Yes
- No

APPENDIX H.
TRAUMA CODES

TRAUMA CODE	Percent Reported (Male and Female) n = 521	Men, % (n = 135)	Women % (n = 386)
0. No Trauma Reported	41.46%	40%	41.9%
1. Multiple Forms of Trauma Reported	11.13%	8.15%	12.18%
2. Sexual Abuse, Rape	2.11%	0.74%	2.59%
3. Physical Abuse, Domestic Violence, Intimate Partner Violence	2.69%	1.48%	3.11%
4. Emotional Abuse	0.58%	0.74%	0.52%
5. Neglect	0.20%	0	0.26%
6. Violence, Witnessing violence, threat of violence/death/rape, seeing dead or badly injured bodies	7.3%	6.67%	7.51%
7. Natural Disaster	1.34%	0.74%	1.55%
8. Combat or Civilian wartime violence	1.73%	2.9%	1.55%
9. Illness, Death, Family illness, Death as a result, suicide	9.02%	12.6%	10.36%
10. Accidents (i.e. car accidents)	14.59%	17.04%	13.73%
11. Other	3.65%	4.45%	3.39%

Table 1. Trauma codes reported by participants. Proportions of trauma reported in terms of both males and females together (column 1), and proportions of only males (column 2), and only females (column 3).

APPENDIX I.

INSTRUCTIONAL REVIEW BOARD APPLICATION FOR EXEMPT RESEARCH STATUS

APPROVAL

To: Elias Robles-Sotelo
FAB

From: *for* Mark Roosa, Chair *Sec*
Soc Beh IRB

Date: 04/12/2011

Committee Action: Exemption Granted

IRB Action Date: 04/12/2011

IRB Protocol #: 1104006290

Study Title: Life Events and Decision Making

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.