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# Interrelationships Between Sensation Seeking and Psychopathy

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by

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## ABSTRACT

INTERRELATIONSHIPS BETWEEN SENSATION SEEKING AND PSYCHOPATHY

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Psychopathic and sensation seeking traits are often correlated; however, sensation seeking alone is not inherently pathological. This study seeks to investigate possible moderating variables between individuals who are high on sensation seeking but low on measures of psychopathic or antisocial traits. Specifically, a positive family environment is hypothesized to be a moderating variable in the development of psychopathic traits among high sensation seekers. A college student sample assessed for psychopathy, sensation seeking, and family functioning is used to test this hypothesis. Significant relationships between all three constructs were found. Similar to previous data, sensation seeking was found to correlate with many elements of psychopathy. Poor family environment was also associated with higher levels of psychopathy. Significant family environmental differences between those high in sensation seeking but low in psychopathy and those high in both sensation seeking and psychopathy were not found. Possible reasons and limitations of this study are explored.

This dissertation is dedicated to my wife, Diana.

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# INTRODUCTION

In the more than 70 years since Cleckley (1941/1982) described the psychopathic personality in his seminal work *The Mask of Sanity*, little has changed in the conceptualization of this disorder. Cleckley's psychopath is charming but shallow in his or her demeanor and lacking in psychotic delusions or symptoms of psychosis. They present with little clinical anxiety, and rarely consider suicide. Interpersonally, the psychopath is unreliable and deceitful, unresponsive to social and interpersonal cues, and largely devoid of empathy toward others. Psychopaths are egocentric and demonstrate little insight into their characterological presentation. Emotionally, they display a low capacity for affective response and lack a general ability to feel love or other positive emotion for others. The psychopath is an individual who acts in antisocial ways without remorse. They struggle to learn from mistakes, show lapses in judgment despite consequences, and meander through life without a distinct plan. Finally, the psychopath is prone to extreme or antisocial behavior with or without substance use and maintains a sex life that is lacking in emotional connection.

In formal diagnostic terms, Cleckley's concept of the psychopath has given way to what is now known as Antisocial Personality Disorder (ASPD). According to the American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders - 5 (DSM-5), "the essential feature of Antisocial Personality Disorder is a pervasive pattern of disregard for and violation of the rights of others, occurring since age 15" (2013, p. 659). The DSM-V further describes ASPD diagnosis as belonging to someone who:

(1) does not conform to social norms by engaging in unlawful activities,

(2) is deceitful,

(3) is impulsive,

(4) is prone to aggressive and combative behavior,

(5) lacks regard for the safety of self or others,

(6) has a history of irresponsible actions such as in not being able to maintain a job or honor financial commitments, and

(7) lacks remorse for human suffering, often with rationalizing behavior for antisocial acts.

At least three of these criteria are necessary for formal diagnosis. Additionally, the person must be at least 18 years of age, have evidence of a conduct disorder before the age of 15, and their antisocial behavior must not coincide with a comorbid psychotic disorder.

Critics of the ASPD diagnosis argue that it relies too heavily on the behavioral aspects of this disorder and that ASPD and psychopathic personality are actually two different constructs (Lilienfeld, 1994). Importantly, although ASPD is commonly associated with criminality, it is not at all clear whether illegal or violent acts are essential components of psychopathy (Hall & Benning, 2006). Hall and Benning suggest that there are psychopaths who avoid the consequences of criminal behavior but nonetheless display psychopathic traits. These psychopaths may never be identified as having ASPD.

Although the DSM-V does not formally divide ASPD into categories, much attention has been given to the idea that psychopathy can be split into at least two subtypes. First labeled "primary" and "secondary" psychopaths by Karpman (1941), these descriptors have important distinctions. Primary psychopaths display a complete

lack of empathy, showing no remorse or guilt for their actions and often blaming the victim or rationalizing their behavior in some way. These individuals may never move beyond a primitive level of social functioning. In contrast, secondary psychopaths may engage in the same kind of behaviors as primary psychopaths- however, they may feel some degree of guilt for their actions. The ability to feel guilt related anxiety is typically lacking in primary psychopaths. Researchers have emphasized the importance of accurately assessing psychopathy from both a clinical and a research perspective (Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). Skeem et al. argue, for example, that a primary and secondary distinction allows clinicians and policy makers to make the best possible decisions when considering treatment or incarceration.

Generally, psychopathic personality has been associated with a wide variety of criminal and violent behaviors including sexual assault, stalking, and general aggression (Brown & Forth, 1997; Hare, 1999; Storey, Hart, Meloy, & Reavis, 2008). Similarly, psychopathic traits in adolescents have been connected with histories of violent crime, institutional violence, and overall severity of the offense (Murrie, Cornell, Kaplan, McConville, & Levy-Elkon, 2004). Researchers argue that psychopathic adolescents may demonstrate more proactive aggression, partaking in violent or aggressive acts for personal reward rather than in response to a perceived threat (Fite, Raine, Stouthamer-Loeber, Loeber, & Pardini, 2009). Typically, this type of aggression is associated with higher levels of psychopathy. Psychopathy is also commonly linked to drug abuse, particularly severe use. Fite et al. suggested that due to a lack of anxiety, psychopathic adolescents may feel little fear when trying or abusing drugs.

Of particular interest to the present study are the aforementioned psychopaths who display less criminally violent behavior. Termed "successful psychopaths," or psychopaths who avoid legal consequences, these individuals "achieve personal or professional successes at the expense of family, friends, and coworkers, leaving a swath of broken relationships in their wake" (Hall & Benning, 2006, p. 459). As suggested, the harm inflicted by these individuals may be uniquely different from traditional psychopaths. Recently, Ragatz, Fremouw, and Baker (2012) assessed a sample of white-collar versus traditional criminal offenders for levels of psychopathy. Using Lilienfeld and Widow's (2005) Psychopathic Personality Inventory - Revised, these researchers noted that white-collar offenders tended to be highest on Social Potency and Machiavellian Egocentricity subscales. Ragatz and colleagues surmised that these characteristics could be misconstrued as social competence and self-confidence. Additionally, because white-collar crime is generally underreported to authorities (National Public Survey on White Collar Crime, 2010), it is conceivable that many individuals with psychopathic traits may be functioning outside of the legal system.

Studies assessing non-criminal psychopathy suggest that certain social environments may reward or attract individuals displaying psychopathic traits. Board and Fritzon (2005) completed a study comparing business leaders ($N = 39$) to an inpatient psychiatric ($N = 475$), diagnosed psychopathic ($N = 317$), and mentally ill population ($N = 768$). Samples only included men. Using the Minnesota Multiphasic Personality Inventory Scales for DSM III Personality Disorders, researchers found that business leaders were surprisingly high on narcissistic and histrionic traits. Significantly higher histrionic traits were noted for business leaders compared to the other groups.

Additionally, narcissistic traits for business leaders were within one percentage point of the other three groups. Board and Fritzon suggested that narcissism and histrionic features could be conceptualized as the self-involved, un-empathetic, and manipulative elements of psychopathy. Interestingly, business leaders did not score particularly high on measures associated with ASPD, suggesting that although they had features of psychopathy, they did not display the kind of illegal behavior typical of those with this disorder. Building on Board and Fritzon's work, Wilson and McCarthy (2011) assessed psychopathic features among 903 New Zealand undergraduate students with different academic majors. The authors found that, even when controlling for social desirability, commerce students (analogous to U.S. college and university business majors) had significantly higher levels of psychopathy than other majors, particularly among males but also among female business students.

Regardless of variation, the psychopathic personality represents a significant threat to society. Psychopaths have been associated with significantly higher rates of criminal recidivism for both violent and non-violent offenses (Salekin, Rogers, & Sewell, 1996). Similarly, "successful" psychopaths or individuals with psychopathic features who can avoid legal reprisals may be particularly damaging due to their ability operate within normal society. The present study, in large part, seeks to better define the factors that lead to the development of the disorder, particularly among those who have been able to avoid serious legal consequences.

## REVIEW OF PSYCHOPATHY LITERATURE

There is a growing body of research suggesting that psychopathic traits are relatively stable across development, from childhood to adulthood (Andershed, 2010) and that the psychopath construct can be recognized in children (Salekin, Rosenbaum, & Lee, 2008) above and beyond normal developmental traits (e.g., egocentric focus typically seen in adolescence). In a review of this topic, Andershed (2010) found that most psychopathic features tend to stay constant across development. In researching the etiology of psychopathy, this scholarship assumes that psychopathic features in childhood provide insight into the development of this disorder in adulthood.

Although patterns of psychopathy development may be relatively stable, there are many questions concerning the origins of this disorder. Some researchers and clinicians alike have suggested that psychopath etiology lies primarily in biological or genetic factors (e.g., Blair, Peschardt, Budhani, Mitchell, & Pine, 2006), social or environmental factors (e.g., Farrington, 2006; Farrington, Ullrich, & Salekin, 2010; Porter, 1996), or that it develops out of some combination of these influences (e.g., Paris, 1998). Complicating this issue, much research has focused on the development of antisocial behavior rather than psychopathic personality (Macdonald & Iacono, 2006). The developmental pathways of these two constructs, although similar, may have important differences. For example, emotional detachment in the psychopath may have a different developmental pathway than social deviance in the conduct disordered. Despite differences in conceptualization, by analyzing the body of ASPD and psychopathy research and investigating overlapping themes, one can glean information on the etiological patterns of these disorders.

On one side of the debate, many researchers have suggested that psychopathy can develop from social and environmental factors (Farrington, 2006; Farrington et al., 2010; Porter, 1996). In this view, Porter proposes that psychopathy can develop from genetic and environmental factors. Notably, he refers to Karpman's (1941) concept of primary versus secondary psychopathy, proposing that the development of secondary psychopathy is related to upbringing and familial factors. Porter describes a pathway for secondary psychopathy such that severe neglect and abuse in childhood creates an environment in which emotional inhibition and dissociation is an adaptive coping mechanism. These features continue into adulthood, allowing the individual to withdraw from emotion and act without the burden of anxiety or other negative emotions.

Support for environmental pathways to psychopathy has been found in child development studies. Recently, Fontaine, McCrory, Boivin, Moffitt, and Viding (2011) followed the trajectories of twin children displaying a lack of empathy and unemotional traits with concurrent conduct problems. Using a longitudinal model and a robust sample size of 9578 children, researchers used teacher rating scales to assess antisocial characteristics at ages seven, nine, and 12 years. Results indicated that the most callous and conduct disordered children were associated with higher occurrence rates of individual predictors (e.g., an ADHD diagnosis) as well as familial factors including negative parental feelings toward the child, negative parental discipline, and general disruption in the home. These findings suggest that family factors may play a role in the development of psychopathic traits.

Family disruption, home environment, and social rejection have also been linked to psychopathy. In a large study of parents ($N$ = 1395) of boys at ages eight, 11, or 14,

father absence was the strongest predictor of childhood delinquency (Farrington, Jolliffe, Loeber, Stouthamer-Loeber, & Kalb, 2001). Additional predictors included having a young mother, use of physical punishment, and living in a hostile environment (i.e., bad neighborhood). Although delinquency and conduct problems alone are not indicative of psychopathy, Farrington et al.'s results may provide insight into the types of environment that promote this disorder. In this regard, Farrington et al. (2010) proposes that peer influence can also contribute to child and adolescent offending, suggesting that an antisocial peer group may promote more psychopathic functioning.

Attachment and abuse studies provide further insight. Child abuse has been linked with the development of ASPD in later life (Luntz & Widom, 1994) as well as with higher scores on psychopathy assessments, notably Hare's (1980) Psychopathy Checklist (PCL) and the Psychopathy Checklist-Revised (PCL-R; Weiler & Widom, 1996). Similarly, higher scores on the youth version of the PCL-R (PCL: YV; Forth, Hart, & Hare, 2003) were associated with higher levels of childhood physical abuse in a forensic population of German boys (Krischer & Sevecke, 2008). Problems with caregiver attachment, often associated with neglect or abuse, have also been linked to the development of psychopathic traits. Using a non-clinical sample, Mack, Hackney, and Pyle (2011) found that individuals high in primary and secondary psychopathy demonstrated anxious and avoidant attachment styles indicative of dysfunctional attachment in earlier relationships.

Proponents of a biological explanation for psychopathy suggest that genetic factors underlay the environmental predictors described above. There is strong support for this perspective. Cleckley (1941/1982), although admittedly unsure about the direct

causes of psychopathy, suggested that environmental predictors may be overstated and that underlying biological factors were strong contributors to the development of the psychopathic personality. He cited his personal experience with psychopaths of all social and familial backgrounds, some with childhoods noted by conflict and maladjustment, and others with no notable dysfunction. Similarly, Hare (1970) correctly points out that many who come from dysfunctional home backgrounds do not go on to develop a psychopathic personality, suggesting that a poor family environment cannot be the sole factor in the development of this disorder.

Evidence for a biological explanation for psychopathy largely comes from imaging and physiological marker research. Researchers have long suggested that psychopaths display deficits in their physiological or affective response to fear inducing stimuli. Recently, Benning, Patrick, and Iacono (2005) used a community sample of 355 male twins to assess electrodermal reactivity and startle response in relation to psychopathy self-report scores. Researchers found that only participants who were high on fearlessness dominance traits typical of psychopaths displayed a reduced startle response to fearful stimuli. Additionally, these individuals demonstrated the lowest skin conductance in relation to aversive pictures, even compared to individuals high on antisociality. These findings may suggest that psychopaths are biologically predisposed to misinterpret, or fail to respond to, normally fearful stimuli.

Imaging studies may provide further insight into the biological links to psychopathy. Birbaumer et al.'s (2005) study assessed deficiencies in fear conditioning in 10 psychopaths as defined by the PCL-R. Functional Magnetic Resonance Imaging (fMRI), electrodermal responses, emotional valence, arousal, and contingency ratings

assessed reactivity to aversive stimuli. Controls in the study showed activation in the limbic-prefrontal area, demonstrating a significant physiological response to conditioning following an aversive physical stimulus (i.e., painful pressure). In contrast, psychopaths had no reactivity, suggesting that they were not able to make connections between the conditioned stimulus and the aversive stimuli. Additionally, skin conductance and emotional valence ratings showed no change in relation to aversive stimuli for psychopaths. The authors concluded that psychopaths may display a fundamental inability to anticipate aversive events. In this way, the pain and suffering of another as a direct result of a psychopath's actions may not be foreseen or serve as the aversive or stressful stimulus it would in a non-psychopathic individual.

Other studies expand on Birbaumer et al.'s (2005) research. In a study of six psychopaths scoring higher than 25 on the PCL-R, Deeley et al. (2006) found that psychopaths demonstrated less activation in the fusiform and extrastriate cortices when exposed to emotionally stimulating faces (i.e., photographs of happy and fearful faces). This finding was in comparison to a healthy control group, which showed significantly more activation when viewing emotionally charged photographs. The authors concluded that the lack of emotional reactivity demonstrated by psychopaths may suggest a biological correlate related to their inability to feel empathy for others. More recently, researchers have suggested that psychopathy may be related to deficits in grey matter within the brain. Gregory et al. (2012) conducted a unique study comparing psychopaths carrying an ASPD diagnoses with men who did not meet criteria for psychopathy but nonetheless were diagnosed with ASPD. Structural MRI assessed grey matter in 17 psychopathic ASPD participants and 27 non-psychopathic ASPD diagnosed participants.

Compared to non-psychopathic ASPD participants, psychopaths demonstrated significantly reduced volumes in the frontal lobe, specifically the rostral prefrontal cortex, as well as in the temporal lobes. These areas of the brain are linked to decision-making and emotional processing. The authors suggested that these deficits could explain the lack of moral and ethical foresight and inability to process emotional stimuli typical of psychopaths.

The biological correlates with psychopathy could be indicative of a genetic link to psychopathy, such that psychopaths may be genetically predisposed toward specific brain abnormalities influencing personality and behavior. Evidence for a genetic explanation for psychopathy primarily comes from twin heritability studies. In a study of 483 adult twin pairs Jang, Livesly, Vernon, and Jackson (1996) found that features of psychopathy were among some of the most heritable of personality traits. Specifically, they estimated heritability rates for overall callousness (e.g., contemptuousness, egocentrism, exploitation, interpersonal irresponsibility, lack of empathy, remorselessness, and sadism) to be 56%, conduct problems (e.g., interpersonal violence, juvenile antisocial behavior, addictive behavior, and failure to adopt social norms) at 56%, narcissism at 53%, and sensation seeking at 45%. Following Jang and colleague's early research, Blonigen, Carlson, Kreuger, and Patrick (2003) conducted a twin study specifically assessing the heritability of psychopathic traits. Using a sample of 353 adult male twins who were administered the original Psychopathic Personality Inventory, Blonigen and colleagues found strong correlations for psychopathic traits among monozygotic twins compared to dizygotic twins. Social potency, fearlessness, impulsive nonconformity, and blame externalization had particularly strong associations with correlations ranging from 54% to

57%. Additionally, a recent study assessing ASPD and heritability found evidence of a strong genetic influence, suggesting that the behavioral expression of antisociality is also heritable (Kendler, Aggen, & Patrick, 2012).

Other twin studies have assessed genetic influences in adolescents displaying psychopathic traits. Using a community sample of 398, 16 to 18 year old boys, Taylor, Loney, Bobadilla, Iacono, and McGue (2003) found a strong overall correlation ($r$ = .74) between genetic factors and measures of antisocial personality and detachment. They suggested that their study provides evidence that psychopathy development begins before adulthood and that psychopathy personality traits must be largely influenced by genetic factors. Taylor et al.'s research was elaborated on in a study of 626 pairs of 17-year-old female and male twins (Blonigen, Hicks, Kreuger, Patrick, & Iacono, 2005). Blonigen and colleagues found heritability estimates of 46% and 45% for men and women, respectively, on measures of fearlessness and dominance. Similarly, estimates of impulsive antisociality were 51% and 48% among men and women, respectively. Although genetic correlations were not as high as Taylor et al.'s study, researchers suggested that not only is an antisocial disposition heritable, but so are the core personality features (i.e., fearlessness and dominance) of the psychopath. They conclude that, in line with Karpman's (1941) conceptualization, the development of primary psychopathy is likely to be heavily influenced by genetic factors.

The collective evidence suggests that biological and genetic factors play a role in the development of psychopathy. However, it is not clear how family or social environment influences may influence the development or trajectory of the disorder, particularly at a younger age. Taylor et al. (2003) point out this lack of clarity in their

article discussion, suggesting that because most twin studies have assessed genetic influence on psychopathy traits in adolescence or adulthood, it is unknown what effect early social environment may have on psychopathy development. Additionally, and of particular importance to this literature, the authors question whether factors in the environment may moderate expressions of psychopathy. Notably, some heritability research suggests that family environment does have important influences on genetic expression (Neumann, Wampler, Taylor, Blonigen, & Iacono, 2011). Neumann et al. (2011), using the Cohesion and Support scales of the Family Environment Scale (FES) and the Minnesota Temperament Inventory (MTI), sampled of 315 male twins. They found that in addition to genetic factors, the FES scales were significantly linked to the expression of psychopathic traits in late adolescence.

Ultimately, a biopsychosocial model may best capture the etiology behind psychopathy. The biopsychosocial model contends that psychiatric illness stems from a complex overlay of biological, psychological, and social factors (Engel, 1977). Paris (1998) describes how this model may be applied to psychopathy. He suggests that underlying psychopathy traits (including genetic and biological bases of psychopathy) should only develop in an environment that nurtures pathological development (e.g., a chaotic or abusive home). Although imperfect, due to the unknown degree to which genetic, biological, environmental, and social factors each influence psychopathy, the biopsychosocial model may provide the most inclusive theoretical framework for understanding the development of psychopathy.

**Psychopathy Assessment**

Due to psychopathy's association with chronic antisocial behavior, accurate assessment of psychopathic individuals has become the focus of much research. In response to this movement, noted psychopathy researcher Robert Hare (1980) devised the Psychopathy Checklist. Using all 12 of Cleckley's original psychopath descriptors, Hare's early instrument demonstrated that psychopathic personality assessment could be objective, reliable, and accurate. From this research, Hare refined his assessment creating the Psychopathy Checklist-Revised (PCL-R; Hare, Harpur, Hakstian, Forth, & Hart, 1990). For more than 20 years, the PCL-R has been the most well-known and commonly used assessment in psychopathy research. Consisting of clinical interview, case file information review, and a coding system, the PCL-R assesses for the fundamental features of psychopathy (Hare & Neumann, 2006). These features include: Glibness/Superficial charm; Grandiose sense of self-worth; Need for stimulation/proneness to boredom; Pathological lying; Conning/manipulative; Lack of remorse or guilt; Shallow affect; Callous/Lack of empathy; Parasitic lifestyle; Poor behavior controls; Promiscuous sexual behavior; Early behavior problems; Lack of realistic, long-term goals; Impulsivity; Irresponsibility; Failure to accept responsibility for own actions; Many short-term marital relationships; Juvenile delinquency; Revocation of conditional release; and Criminal versatility.

Within the PCL-R, several dimensional factors have been isolated (Hare & Neumann, 2006). The underlying assumption behind these factors is that they represent the structural components of the psychopathic personality. Early research suggested that a 2 structure model best captured the psychopathic personality (Hare et al., 1990). The first

factor (F1) refers to a characterological disposition toward selfishness, callous attitude, and a lack of remorse for antisocial acts toward others. Factor 2 (F2) captures the psychopathic lifestyle, particularly a tendency toward antisociality, instability, and social deviancy.

Although the two dimensional model of psychopathy remains popular, researchers have questioned whether psychopathy is more complex than what is captured in the F1 and F2 conceptualization. Recently, Hare and colleagues have suggested that at least 4 factors, captured by the PCL-R, best describe the psychopathic personality (Neumann, Hare, & Newman, 2007). These include Interpersonal, Affective, Lifestyle, and Antisocial dimensions. Importantly, of these factors, elements of the Lifestyle factor (i.e., stimulation seeking, impulsivity, irresponsibility, parasitic orientation, and a lack of realistic goals) accounted for the greatest amount of variance. These components, particularly stimulation seeking and impulsivity, are central to this literature and are discussed in the sections below.

The PCL-R remains an excellent tool for psychopathy assessment; however, it can be cumbersome to use. A full PCL-R assessment can take several hours with information coming from case file reviews, clinical interview, as well as formal assessment (Poythress, Edens, & Lilienfeld, 1998). Additionally, in research situations in which file data may be the only available information, the likelihood of accurate assessment may be greatly diminished (Hare & Neumann, 2006). In cases where comprehensive file data is not available, the PCL-R cannot be used at all. Interrater reliability may also be an issue. The PCL-R requires clinical judgment be applied when assessing scores. Some research suggests that in situations such as court evaluations, in which the PCL-R is often used,

assessment findings may be biased toward the desired results of the party or parties providing the funding for the evaluation (Murrie, Boccaccini, Johnson, & Janke, 2008; Murrie et al., 2009).

Due to these issues, researchers who study psychopathy have put great effort into creating accurate self-report assessments that do not rely on case reports or extended clinical interview (Lilienfeld & Fowler, 2006). Self-report assessments have advantages. Typically, interrater reliability increases due to results deriving from objective responses given on a standardized test form. In comparison, assessments such as the PCL-R require clinicians to assess some psychopathic features using clinical judgment. Since self-report measures use objective scoring, clinician's biases should not enter the scoring process. Self-report measures can also reveal response styles that can provide important validity information. Validity scales within a self-report measure can identify if an examinee is attempting to appear more or less psychologically distressed.

The notion of a self-report assessment of psychopathy is not without problems. Based on Cleckley's (1941/1982) description, psychopaths often lie, cheat, and deceive for their own purposes. Thus, it is reasonable to assume that these individuals may not present themselves accurately in a self-report measure (Lilienfeld & Fowler, 2006). Additionally, psychopaths may not have the personal insight into their own deficits to answer some assessment questions. This may be particularly important in terms of affect. Psychopaths who display an inability to understand certain emotions may not be able to respond knowingly about their own or others' emotional states.

Despite the challenges, researchers have made significant strides in self-report measures of psychopathy. Lilienfeld and Andrews's (1996) Psychopathic Personality

Inventory (PPI) is one such example. Lilienfeld and Andrews designed the PPI to focus on the personality elements common to psychopathy, rather than merely measure antisocial behavior. The PPI represented a major step forward in this regard. Previous psychopathy self-report assessments relied on behavioral indicators of psychopathy that did not correlate highly with the unemotional-callous facets of the PCL-R (Lilienfeld & Fowler, 2006). In addition to assessing psychopathic personality constructs, the PPI was designed to measure psychopathy in dimensional rather than taxonic terms, using norms based on clinical and non-clinical or forensic populations. In this way, the PPI could assess individuals who maintained the core features of psychopathy but who had been able to avoid legal issues.

To counteract issues of social desirability (i.e., the desire for a test taker to present themselves in a positive way) construction of PPI test items focused on creating items with responses that could be interpreted as socially acceptable (Lilienfeld & Andrews, 1996). For example, test items may include response options that provide rationalizations for typically antisocial beliefs or attitudes. Additionally, validity scales were added to detect problematic response patterns. The PPI-R's Deviant Responding (DR) Scale assesses for overly negative or irrational responding, or for problems with understanding assessment items. Lilienfeld and Andrews also included the Variable Response Inconsistency (VRIN) Scale. In contrast to DR, the VRIN scale assess for overly virtuous responses patterns. Finally, the Indiscriminate Responding 40 and 15 (IR40 and IR15) scales assess for random or careless responding.

Early use of the PPI showed promise. In a sample of over a thousand college age men and women, Lilienfeld and Andrews (1996) found the PPI significantly correlated

with other popular self-report measures of psychopathy including Hare's (1985) Self-Report Psychopathy Scale-Revised ($r$ = .91), Levonson's (1990) Psychopathy Scale ($r$ = .37), and McKinley and Hathaway's (1944) MMPI Psychopathic deviate scale ($r$ =.29). The assessment also correlated with measures associated with ASPD such as the MMPI ASPD scale ($r$ = .64), but demonstrated enough variance to indicate that the PPI is not merely a measure of antisocial personality. This early study of the PPI indicated that psychopathy traits could be assessed within a non-criminal population since it was initially developed with a college student sample.

Like early research on the PCL-R, factor analyses suggests that the PPI assesses two distinct dimensions of psychopathy (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003; Patrick, Edens, Poythress, Lilienfeld, & Benning, 2006; Uzieblo, Verschuere, & Crombez, 2007). Benning, Patrick, Blonigen, Hicks, and Iacono (2005) described these dimensions as *Fearless Dominance* and *Impulsive Antisociality* or PPI-I and PPI-II, respectively. The PPI-I is defined by coldness, thrill seeking, a dominant social style, narcissism, lack of anxiety, and fearlessness. In contrast, the PPI-II describes more antisocial traits, including aggression, interpersonal isolation, impulsivity, carefree attitude, and poor insight (i.e., externalization of blame). Specific subscales for PPI-I include Social Potency (now termed Social Influence on the PPI-R), Fearlessness, and Stress Immunity (Lilienfeld & Widows, 2005). Corresponding PPI-II subscales include Machiavellian Egocentricity, Impulsive Nonconformity (changed to Rebellious Nonconformity on the PPI-R), Blame Externalization, and Carefree Nonplanfulness. Notably, there is some evidence of a third factor present in the PPI (Benning, et al., 2003). Benning and colleagues found that the subscale, Coldheartedness, which is related

to lack of guilt and inability to feel love, does not load on either PPI-I or PPI-II. Lilienfeld and Widows (2005) suggest that this third factor may be interpreted as a separate dimension of psychopathy.

Studies of concurrent validity, comparing the PPI with the PCL-R, have had mostly positive results. Pothyress, Edens, and Lilienfeld (1998) found the PPI total score correlated positively with PCL-R total ($r$ = .54), Factor 1 ($r$ = .54), and Factor 2 ($r$ = .40) scores in a sample of 50 incarcerated men. Researchers also found that the PPI identified 86% of psychopaths previously identified by the PCL-R. Additionally, unlike other self-report measures of psychopathy and antisocial behavior, PPI total score correlations with the PCL-R indicate that the PPI assesses core psychopathy personality traits in addition to antisociality. In a larger, more recent study of 1603 criminal offenders, the PPI was found to correlate more strongly with the PCL-R total score ($r$ = .43) than other popular psychopathy self-report measures (Poythress, Lilienfeld, Skeem, Douglas, Edens, Epstein, & Patrick, 2010).

More global measures of psychopathology have also sought to capture psychopathic traits. Sellbom, Ben-Porath, Lilienfeld, Patrick, and Graham (2005) found that select Minnesota Multiphasic Personality Inventory-2 (MMPI-2) scales correlated with and in some cases predicted PPI total score. Specifically, the Restructured Clinical (RC) scales RC4 (Antisocial Behavior; $r$ = .52), RC9 (Hypomanic Activation; $r$ = .44), Antisocial Practices ($r$ = .43), Aggressiveness ($r$ = .42), and Disconstraint ($r$ = .55) MMPI-2 scales. Additionally, RC4 and RC9 predicted social deviance whereas low scores on RC7 (Dysfunctional Negative Emotions) and RC2 (Low Positive Emotions) were indicative of affective and social problems relevant to psychopathy. More recently,

Sellbom, Ben-Porath, Patrick, Wygant, Gartland, & Stafford (2011) expanded on Selbom et al.'s (2005) research, finding that psychopathy relevant scales on the MMPI-2-RF were associated with both the Fearless Dominance and Impulsive Antisociality factors on the PPI suggesting that the MMPI-2-RF does capture some of the traits associated with psychopathy and antisocial behavior.

Advances in assessment have also paved the way for the study of psychopathy in women. Traditional psychopathy assessments were designed to assess psychopathy traits in men; however, recent research indicates that psychopathic traits are also present in women (e.g., Gran, 2000; Strand & Belfrage, 2005; Weizmann-Henelius et al., 2010). Weizmann-Henelius et al.'s (2010) confirmatory factor analysis of the PCL-R with a female corrections sample indicated that women tended to fit with a three factor model of psychopathy and that, contrary to prior studies with males, antisocial behavior did not appear to be as strong an indicator of female psychopathy. Additionally, the researchers found a correlation ($r$ = .33) between psychopathy and traits consistent with borderline personality disorder suggesting that psychopathy in women may be associated with more emotional instability.

Strand and Belfrage's (2005) study of a Swedish incarcerated sample had similar findings to Weizmann-Henelius et al.'s research. Using a shorter version of the PCL-R, researchers found that female psychopaths scored higher than their male counterparts on measures of deceitfulness and behavioral control. Male psychopaths scored higher on dimensions of adolescent and adult antisocial behavior. Female psychopaths were also more likely to have a prior borderline personality disorder diagnosis whereas men were more likely to be diagnosed with ASPD. Similarly, Grann (2000), using the PCL-R in a

sample of female and male violent offenders, found that female psychopaths scored higher on measures of promiscuous behavior when compared to male offenders. Sexual promiscuity or sexual impulsivity is often considered a symptom typical of Borderline Personality Disorder (American Psychiatric Association, 2013).

The PPI and PPI-R have also assessed psychopathy among incarcerated female samples. Chapman, Gremore, and Farmer (2003) conducted a psychometric analysis of the PPI using a sample of 168 female inmates. They found good internal consistency for subscale scores ($\alpha$ = .79 to .89), good test-retest reliability with no significant difference between test and retest scores, and acceptable validity for the PPI in comparison to other self-report psychopathy measures. However, researchers noted an apparent issue with PPI Total scores in their forensic sample. In comparison to Hamburger, Lilienfeld, and Hogben's (1996) study using the PPI with an undergraduate sample, Chapman and colleagues did not find a significant PPI mean Total scale score difference between incarcerated women and the undergraduate women studied by Hamurger et al. Chapman et al. speculated that some of the PPI subscales may not be able to differentiate between these populations. Despite these mixed results, more recent studies have demonstrated the effectiveness of the PPI in assessing psychopathy in women. Berardino, Meloy, Sherman, and Jacobs (2005), in a study 105 incarcerated maximum security women, assessed the PPI in comparison to the PCL-R, and found that the PPI reliably discriminated between psychopathic and non-psychopathic women 87% of the time.

These studies have some limitations. Due to low prevalence rates, samples of true female psychopaths (i.e., women scoring above a predetermined psychopathy cut-off score) were rather small ranging from 30 (Weizmann-Henelius et al., 2010) to under five

women (Grann, 2000). Additionally, like the majority of male psychopathy studies, most research on gender and psychopathy are based on forensic samples. In contrast to the PCL-R, the PPI and PPI-R have been used successfully with women in community and college samples. In this regard, Lilienfeld and Andrews (1996) in a study of psychopathy traits in a mixed gender college sample, noted that women were generally lower on all scales of the PPI except for Social Potency and Carefree Nonplanfulness.

Consideration for cultural and ethnic differences and psychopathy has garnered some degree of caution by researchers and clinicians using psychopathy assessments. To date, the vast majority of psychopathy research has been conducted with North American samples (Sullivan & Kosson, 2006). In a review of psychopathy assessment across cultures and ethnicities, Sullivan and Kosson suggested that the current conceptualizations of psychopathy (e.g., those defined by the PCL-R) are generally valid, but may vary substantially across cultural or ethnic groups.

Among African American groups, some studies indicate significantly higher PCL-R scores for African Americans versus Caucasian samples (e.g., Kosson, Smith, & Newman, 1990). However, more recent meta-analyses of ethnicity and PCL-R scores suggest negligible or non-significant differences among African American and European American groups (McCoy & Edens, 2006; Skeem, Edens, Camp, & Colwell, 2004). Among Hispanic and Latino groups, the PCL-R has also been found to be effective in assessing psychopathy (Sullivan, Lopez, Abramowitz, & Kosson, 2006). Largely missing from the available research is information on Asian American, Native American, and other minority groups. Additionally, almost all available research assessing differences in psychopathy by ethnic group has employed the PCL-R (Sullivan & Kosson, 2006).

Differences in psychopathic traits across ethnicities, as assessed by self-report measures, remain a largely unexplored area of research.

Literature on the assessment of psychopathic personality has grown exponentially over the last 30 years. Research suggests that psychopathy is a disorder that can be reliably and objectively assessed through psychological testing. Hare's (1980) PCL and later PCL-R led the way in psychopathy assessment; however, the PCL-R requires significant resources to administer and is limited to correctional or clinical populations. In contrast, self-report measures such as the PPI-R may represent an effective way to assess psychopathic traits across settings and reduce clinician bias. Due to this flexibility, the PPI-R is a promising tool in psychopathy assessment.

**Sensation Seeking and Psychopathy**

Personality research has been interested in sensation seeking for nearly 50 years. Zuckerman (2007) described sensation seeking as a characterological trait defined by one's desire to seek out new and varied situations to satisfy or achieve an optimal level of stimulation. These activities may carry a significant amount of risk and can occur in physical, legal, interpersonal, or financial realms. Zuckerman argued that there are several dimensions related to sensation seeking. To assess these dimensions, he developed the Sensation Seeking Scale-V (SSS-V) assessment. Since conceptualization, the SSS-V has been one of the most popular assessments of sensation seeking.

Factor analyses of the SSS-V have isolated four distinct elements of sensation seeking (Zuckerman, 1994). These factors include: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (DIS), and Boredom Susceptibility (BS). TAS is described as one's desire for high-stimulation activities within the physical realm. In this

scale, it is not the risk that is important but the amount of stimulant reward the person receives in engaging in the activity. ES is related to one's desire for stimulation through mental as well as physical activities. The ES subscale assesses desire for nonconformity, as well as interest in arts and travel. DIS assesses sensation seeking behaviors in the interpersonal realm. High scorers may seek out risky or varied social encounters, multiple sexual partners, or excessive drug and alcohol use. BS assesses one's aversion for monotony. High scorers may feel restricted or restless when in a highly structured setting.

Not surprisingly, researchers have long theorized sensation seeking as a trait associated with psychopathy. Blackburn (1969) was an early proponent of this idea. Using the MMPI and an early version of Zuckerman's Sensation Seeking Scale (SSS), Blackburn found correlations between the SSS and the Psychopathic deviate (Pd) scale ($r$ = .25), Hypomania (Ma; $r$ = .47), Impulsivity (Im; $r$ = .39), and Overt Hostility (OH; $r$ = .28) scales in a sample of 83 male psychiatric inpatients. Zuckerman, Bone, Neary, Mangelsdorff, and Brustman (1972) corroborated Blackburn's findings with the SSS and the MMPI, extending his work by identifying a link between antisocial behavior and sensation seeking. Of particular importance to this study, PPI-R total scores have also been correlated ($r$ = .63) with total scores on Zuckerman's SSS-V suggesting a moderate to strong relationship between psychopathy and sensation seeking (Lilienfeld & Widows, 2005).

Drug abuse, a behavior commonly associated with psychopathy and ASPD, also has correlates with sensation seeking. In a study of 123 high school students, Andrucci, Archer, Pancoast, and Gordon (1989) assessed drug experimentation and sensation seeking using the SSS. They found that total scores on the SSS as well as subscales ES

and DIS were the best predictors of substance use versus non-use. The SSS was also the best predictor of breadth in substance use. The authors surmised that high sensation seekers, by nature, would be most interested in trying a variety of drugs.

Attention Deficit Hyperactivity Disorder (ADHD) and sensation seeking may also be linked, although this research has not been consistent or conclusive (Zuckerman, 2002). In a study of 176 boys aged seven to 12, Russo et al. (1991) found that sensation seeking was associated with conduct problems but that it did not correlate with sensation seeking. In a follow-up study, Russo et al. (1993) replicated their earlier findings suggesting that conduct disorder is related to ADHD but that sensation seeking and ADHD are not related. Other studies suggest that ADHD and sensation seeking may be connected. Antrop, Roeyers, Van Oost, and Buysse (2000) found that ADHD children engage in more stimulation seeking activity when forced to wait for an expected stimulus. Similarly, Shaw and Giambra (1993) assessed college students with histories of ADHD finding that as adults, they reported higher levels of sensation seeking behavior.

A possible connection between ADHD and sensation seeking may have important implications for psychopathy. ADHD has been consistently associated with psychopathy and antisocial behavior such that ADHD may be a risk factor for the development of psychopathy or antisocial personality (Herpertz-Dahlmann, Konrad, & Herpetz, 2007). In a study of 225 adult twins, Simonoff, Elander, Holmshaw, Pickles, Murray, and Rutter (2004) found that ADHD in childhood represented a significant predictor for later antisocial personality. Additionally, childhood ADHD was found to be equally strong in predicting antisocial personality versus childhood conduct disorder.

Despite the apparent connection between sensation seeking and psychopathy, sensation seeking alone is not necessarily indicative of psychopathology (Zuckerman, 1994). Zuckerman believed that the risk involved in a sensation seeking activity is not the primary driving force involved in thrill-seeking activity. For example, he described the sensation seeking driver as someone who drives fast but always remembers to put on his seatbelt. Furthermore, some sensation seekers may be clearly prosocial. Higher sensation seeking scores have been found in decorated firefighters and police officers, mountain climbers, as well as in more antisocial populations (Levonson, 1990). Some research suggests that high levels of sensation seeking may actually be adaptive or socially advantageous. In a study of 399 Israeli war veterans, Neria, Solomon, Ginzburg, and Dekel (2000) found that high sensation seekers showed lower levels of Posttraumatic Stress Disorder symptoms, were more decorated for combat bravery, and had better long-term adjustment versus lower level sensation seekers. Similarly, Raine, Venables, Reynolds, and Mednick (2002) proposed that high levels of stimulation seeking, closely analogous to sensation seeking, would positively correlate with IQ. Using a study of 1795 children, the authors tested for stimulation seeking and IQ at age three and later at age 11. Results indicated that high stimulation seekers scored, on average, 12 points higher on IQ at the 11-year follow-up compared to low stimulation seekers. High stimulation seekers also had better academic scores than low stimulation seekers. Researchers noted that these results were found across all ethnic groups, boys and girls, and were not influenced by parental education or profession. Raine and colleagues surmised that high stimulation seekers may seek out new and stimulant rich environments that encourage cognitive growth.

**Sensation Seeking Origins**

Zuckerman maintains that the development of sensation seeking personality traits is largely influenced by genetic factors (Zuckerman, 1994). A number of studies support this notion. Fulker, Eysenck, and Zuckerman (1980) were among the first to examined sensation seeking development among twins. Using a sample of 422 pairs of adult twins and Zuckerman's Sensation Seeking Scale, Fulker and colleagues found that 58% of the variance found in sensation seeking scores were due to hereditary factors above and beyond environmental influences. When accounting for error, they suspected that hereditary factors actually accounted for up to 69% of the variance. Zuckerman (1994) later pointed out that this finding is impressive when contrasted with personality and genetic research findings suggesting that personality traits are typically heritable in the 40% to 60% range.

Recent studies of sensation seeking and genetics have expanded on Fulker et al.'s (1980) early research. Stoel, Geus, and Boomsma (2006) conducted a sensation seeking heritability study using 9220 twin and sibling participants. They investigated the genetic influences among groups of mono and dizygotic twins and their non-twin siblings. Sensation seeking was measured using a Dutch version of Zuckerman's SSS. Results corroborated earlier studies. Specifically, Stoel and colleagues found sensation seeking heritability estimates of Experience Seeking (ES; 60%), Disinhibition (DIS; 59%), Thrill and Adventure Seeking (TAS; 34%) and Boredom Susceptibility (BS; 48%). Results for female participants showed a pattern that was similar but slightly weaker than that found for men.

Biological correlates have also been isolated in relation to sensation seeking traits. Zuckerman (1994) proposes that the enzyme Monoamine oxidase (MAO), which is involved in the breakdown of neurotransmitters in the brain, is related to the behavioral expression of sensation seeking. Specifically, Zuckerman argues that low levels of MAO are associated with sensation seeking personality. The evidence for this proposition is mixed. For example, Murphy et al. (1977) found a significant negative correlation ($r$ = -.45) between MAO platelet levels for sensation seeking men ($n$ = 30) but not for women ($n$ = 65). Similarly, using the SSS-V, Harlow and Brown (1990) found negative associations between MAO levels and the TAS and sensation seeking total score, but no significant correlations on ES, DIS and BS scales.

Zuckerman (1994) suggests that there may be a genetic link for low MAO levels and resulting sensation seeking traits. In this regard, Sostek, Sostek, Murphy, Martin, and Born (1981) assessed MAO levels in 28 infants and their behavior in the first few days of life. Infants with low levels of MAO demonstrated greater agitation, increased activity and arousal compared to infants with increased MAO function. These behaviors are believed to correspond with later behavioral expressions of sensation seeking. The authors suggest that low MAO levels and concurrent stimulation seeking were likely influenced by genetically related biological factors due to the lack of early social experiences where stimulation seeking behavior could be learned.

The connection between genetic factors and the development of sensation seeking has support; however, it may be important to consider environmental factors as a catalyst for the development of sensation seeking traits. Fulker et al.'s (1980) twin study had suggested genetic influences on sensation seeking demonstrated that heritability

accounted for 58% of the variability. In regard to the remaining 42%, one could speculate that certain social environments could lend themselves to the development of or inhibition of sensation seeking behaviors. Boomsma, de Geus, van Baal, and Koopmans (1999) assessed religiosity's effect on personality in a large Dutch study of 1974 families with twins. Interestingly, Boomsma and colleagues found that of all factors, religiosity had the greatest influence on sensation seeking, particularly the Disinhibition scale. They surmised that a strong religious affiliation suppressed the disinhibition aspect of sensation seeking, even if there was a suggested genetic predisposition toward this trait.

**Statement of the Problem**

Based on the proposed biological and hereditary nature of both sensation seeking and psychopathy, and the correlations between these constructs, it is possible that sensation seeking and psychopathy may result from shared or overlapping developmental underpinnings. However, since high sensation seeking is not inherently pathological, this research posits that an environmental moderator may divert high sensation seekers from developing more psychopathic or antisocial traits. Notably, other studies have assessed differences between high sensation seeking antisocial and prosocial groups (i.e., Goma-i-Freixanet, 1995; Goma-i-Freixanet, 2001); however, no known study has investigated possible moderators to the development of psychopathy among high sensation seekers, particularly the effects of experiences with family. This study proposes positive family functioning as a possible environmental moderator for high sensation seekers, such that a positive family life would be associated with lower psychopathy scores. The following hypotheses are proposed:

*Hypothesis 1*

Regardless of sensation seeking level, positive functioning as indicated by high scores on the Family Environment Scale (FES) Cohesion, Expressiveness, and Moral and Religious Emphasis subscales and low scores on the FES Conflict and Control scales will be associated with lower levels of psychopathy as reflected in scale, factor, and total scores on the Psychopathic Personality Inventory-Revised (PPI-R).

*Hypothesis 2*

Positive family functioning, reflected by high scores on FES Cohesion, Expressiveness, Moral and Religious Emphasis, and low scores on Conflict and Control will moderate psychopathy as reflected in scale, factor, and total scores on the PPI-R.

*Hypothesis 3*

Lower scores on sensation seeking, defined by low versus high median splits on Sensation Seeking Scale-V (SSS-V) Total and subscale scores, will be associated with lower psychopathy scores on the PPI-R.

*Hypothesis 4*

High sensation seekers (defined by a median split of SSS-V Total score) who also have higher levels of psychopathy on the PPI-R (defined by a median split of PPI-R Total score) will have lower levels of family functioning indicated by lower scores on the FES Cohesion, Expressiveness and Moral and Religious Emphasis scales and higher scores on the Conflict and Control scales compared to high sensation seekers who are low on psychopathy.

*Hypothesis 5*

High sensation seekers (defined by a median split of SSS-V Total score) with lower scores on the total PPI-R scale (defined by a median split of PPI-R Total score) will produce higher FES Cohesion, Expressiveness, and Moral and Religious Emphasis scale scores and lower scores on the FES Conflict and Control scale compared to the rest of the sample.

## METHOD

Undergraduate college students at a large Southeastern university made up the sample ($N$ = 312) for this study. A portion of the sample was omitted from analyses for the following reasons: not responding to any portion of the survey ($n$ = 18), not responding to large portions of the survey ($n$ = 9), not responding to gender questions ($n$ = 2), reporting an age beyond the limit of 30 years ($n$ = 4) and inconsistent responding indicated by validity scales on the PPI-R ($n$ = 34) leaving a final sample of 245 participants, 117 men and 128 women. For a full review of sample demographic data, see Table 1. This sample size exceeds the original power analysis for this study, which, based on Cohen's (1988) principles, suggested a sample size of 200 participants with a power of .80 and an alpha of.05 to detect medium to small effect sizes.

An online survey was employed to collect data. Research credit used toward the completion of an introductory psychology class was offered to all participants. Participation was voluntary and alternative research studies or assignments were offered in lieu of taking part in this research. To ensure confidentiality, no identifying information was collected.

Table 1

*Demographics and Breakdown of the Sample*

| Variable | *n* | Percentage |
|---|---|---|
| Gender | | |
| Men | 117 | 47.80 |
| Women | 128 | 52.20 |
| Total | 245 | 100.00 |
| Age | | |
| 18-24 years | 221 | 90.20 |
| 25-30 years | 24 | 9.80 |
| Ethnicity | | |
| Asian | 14 | 5.70 |
| African American | 72 | 29.40 |
| Caucasian | 117 | 47.80 |
| Hispanic or Latino | 14 | 5.70 |
| Multi-ethnic | 11 | 4.50 |
| Other | 12 | 4.90 |
| Missing | 5 | 2.00 |

Table 1 (Continued)

| Variable | *n* | Percentage |
|---|---|---|
| History of Brain Injury | | |
| Yes | 28 | 11.40 |
| No | 215 | 87.80 |
| Missing | 2 | 0.80 |

**Measures**

*Background and Demographics Questionnaire*

The author developed the Background and Demographics Questionnaire (BDQ) for use in this study. Consisting of 16 clinical items and four demographic items (i.e., age, gender, ethnicity, history of brain injury) its purpose is primarily exploratory in nature, examining possible risk factors and trends that may contribute to the development of psychopathic or antisocial traits. Risk factors were identified from available research on psychopathy etiology (see the psychopathy etiology section for an overview of this research). The first three clinical items assess current risk factors (i.e., problems with ADHD) as well as antisocial behavior (i.e., problems with the law). For the remaining items, participants were directed to answer based on their experiences in childhood and adolescence. A Likert scale consisting of four responses ranging from "very much so" to "rarely or not at all" is used. Items assess environmental, social, and biological factors

associated with psychopathy or antisocial behavior. These factors include: familial factors (i.e., whether participant grew up with both parents, degree of parental involvement, whether a close relative had problems with the law, family socioeconomic status), crime level in home neighborhood, history of child abuse, early antisocial behavior (i.e., the degree to which participant got in trouble at home and school, the degree to which the participant spent time with antisocial peers, bullying behavior), and whether the participant often ran away from home as a child. See Appendix for a full copy of the questionnaire.

*Psychopathic Personality Inventory-Revised (PPI-R)*

Psychopathic personality was assessed using the PPI-R. A self-report measure, the PPI and PPI-R has been implemented in a variety of clinical, forensic, and community settings (Lilienfeld & Widows, 2005). It consists of 154 questions with answers based on a true/false Likert response scale ranging from "false," "mostly false," "mostly true," and "true." The PPI-R features eight content scales and four validity scales. Content scales assess a variety of psychopathic traits whereas validity scales provide information on response patterns and possible deviant or overly virtuous responding. For a full description of each scale, see Table 2. Norm data is based on a mixed ethnic and gender sample of 985 community/college participants and 154 offenders. Normed scores corrected for age and gender are provided for both groups.

Table 2

*Description of PPI-R Content and Validity Scales*

| Content Scales | Number of Items | Description |
|---|---|---|
| Machiavellian Egocentricity | 20 | Narcissistic and ruthless attitudes in interpersonal relationships |
| Rebellious Nonconformity | 16 | Reckless lack of concern regarding social norms |
| Blame Externalization | 15 | Tendency to blame others and rationalize one's misbehavior |
| Carefree Nonplanfulness | 19 | Attitude of indifference in planning one's actions |
| Social Influence | 18 | Perceived ability to influence and manipulate others |
| Fearlessness | 14 | Absence of anticipatory anxiety concerning harm and a willingness to participate in risky activities |
| Stress Immunity | 13 | Absence of marked reactions to anxiety-provoking events |

Table 2 (Continued)

| Content Scales | Number of Items | Description |
|---|---|---|
| Coldheartedness | 16 | Propensity toward callousness, guiltlessness, and lack of sentimentality |
| Virtuous Responding | 13 | Positive impression management |
| Deviant Responding | 10 | Tendency to admit bizarre symptoms not indicative of known psychopathology |
| Inconsistent Responding (IR15) | 15 item pairs | Tendency to answer related pairs of items in an inconsistent manner |
| Inconsistent Responding (IR40) | 40 item pairs | Alternative longer inconsistency scale |

*Note.* Description of PPI-R Scales. Adapted from *PPI-R: Psychopathic Personality Inventory-Revised. Professional Manual* (p. 21), by S. O. Lilienfeld and M. R. Widows (Eds.), 2005, Lutz, Florida: Psychology Assessment Resources, Inc.

Based on the community sample, the PPI-R demonstrates good internal consistency across total and content scales with alpha coefficients ranging from .72 to .92

for total scores (Lilienfeld & Widows, 2005). For a full description of internal consistency scores see Table 3. Test-retest stability was also excellent for the community sample ranging from .82 to .94 across subscales after a 26 day test-retest interval (Lilienfeld & Andrews, 1996). The PPI-R also demonstrates good construct and convergent validity with PPI-R total scores correlating well with Levenson's Self-Report Psychopathy Scale total scores ($r$ = .58), and Hare's Self Report Psychopathy Scale total scores ($r$ = .82; Lilienfeld & Widows, 2005). Additionally, the PPI has been correlated with PCL-R total scores ($r$ = .54), as well as with PCL-R Factor 1 ($r$ = .54), and Factor 2 scores ($r$ = .40) in a correctional sample (Poythress et al., 1998).

Table 3

*PPI-R Internal Consistency (α) Coefficients and Corrected Item-Total Correlation Statistics*

| | Community/ College Sample [a] | | Offender Sample [b] | |
|---|---|---|---|---|
| Factor and Individual Scales | α | Median corrected item-total correlation | α | Median corrected item-total correlation |
| Total | .92 | .26 | .84 | .18 |
| Machiavellian Egocentricity (ME) | .84 | .43 | .83 | .39 |
| Rebellious Nonconformity (RN) | .83 | .45 | .74 | .34 |
| Blame Externalization (BE) | .86 | .49 | .80 | .40 |
| Carefree Nonplanfulness (CN) | .80 | .37 | .82 | .41 |
| Social Influence (SOI) | .87 | .49 | .71 | .29 |
| Fearlessness (F) | .87 | .54 | .71 | .32 |
| Stress Immunity (STI) | .86 | .52 | .72 | .35 |
| Coldheartedness (C) | .78 | .37 | .80 | .40 |

Table 3 (Continued)

| | Community/ College Sample [a] | | Offender Sample [b] | |
|---|---|---|---|---|
| Factor and Individual Scales | α | Median corrected item-total correlation | α | Median corrected item-total correlation |
| Virtuous Responding (VR) | .72 | .34 | .24 | .24 |
| Deviant Responding (DR) | .52 | .23 | .29 | .29 |
| Inconsistent Responding (IR15) | .33 | .10 | .40 | .13 |
| Inconsistent Responding (IR40) | .53 | .12 | .57 | .14 |

*Note.* Internal Consistency (α) Coefficients and Corrected Item-Total Correlation Statistics for the PPI-R. Adapted from *PPI-R: Psychopathic Personality Inventory-Revised. Professional Manual* (p. 37), by S. O. Lilienfeld and M. R. Widows (Eds.), 2005, Lutz, Florida: Psychology Assessment Resources, Inc. [a]$N = 985$. [b]$N = 154$.

The PPI-R has also been modified for electronic, online use (Sandler, 2007). An online version of the PPI-R demonstrated good test-retest reliability ($r = .76$ to .93 across content scales) as well and no significant differences compared to the paper version of the

test in a community sample. As such, the online version of the PPI-R will be used for this study.

*Sensation Seeking Scale-V (SSS-V)*

Zuckerman's SSS-V self-report measure is used to collect sensation seeking data (Zuckerman, 1994). Forty items on the SSS-V measure different facets of sensation seeking with 2 possible responses for each item. For example, an item may assess a participant's attitudes toward skydiving. The first response may be similar to, "skydiving sounds exciting" with an opposite response being "I don't understand people who would want to jump out of a plane." The test taker must decide which response best represents his or her beliefs. Norms are based on 410 male and 807 female college students with mean, standard deviation, and *t*-score conversions provided.

The SSS-V is comprised of 4 distinct factors (Zuckerman, 1994). These include Thrill and Adventure Seeking, Disinhibition, Experience Seeking, and Boredom Susceptibility. Scores from each factor make up a total sensation seeking score. For a more detailed description of each factor, see Table 4. Internal reliability for the SSS-V is acceptable with total scores in the .83 to .86 range. Subscale reliability scores were: TAS (.72 to.82), ES (.61to.67), Dis. (.74to.78), and BS (.56 to.65). Test-retest reliabilities for the SSS-V in a Spanish sample have been reported at .90 (men) and .92 (women) at 10 days and .88 (men) and .87 (women) after five weeks.

Table 4

*Zuckerman's (1994) SSS-V Scale Descriptions*

| Scale | Number of Items | Description |
|---|---|---|
| Thrill & Adventure Seeking (TAS) | 10 | Assesses desire to engage in moderate to high-risk physical activities that provide unusual sensations and experiences (i.e., skydiving, mountain climbing, etc.) |
| Experience Seeking (ES) | 10 | Assesses desire to engage in novel activities that stimulate mind and senses (i.e., through arts and music) as well as degree of social nonconformity by assessing connection with similarly minded non-conformist social groups |
| Disinhibition (Dis) | 10 | Assesses desire to engage in social sensation seeking such as through outrageous parties, sexual promiscuity, or social drinking |

Table 4 (Continued)

| Scale | Number of Items | Description |
|---|---|---|
| Boredom Susceptibility (BS) | 10 | Assesses intolerance for boredom or repetitive experiences as well as dislike for individuals suspected of being predictable or boring |

In regard to validity, the SSS-V was modeled after the longer 72 item SSS-IV (Zuckerman, 1994). The SSS-IV has reliably assessed sensation seeking dimensions in both U.S. and British samples (Zuckerman, Eysenck, & Eysenck, 1978). Zuckerman and colleagues factor analyzed the SSS-IV, taking the best items to make the SSS-V. Even with the shortened SSS-V form, the same four dimension structure was present with only the Experience Seeking scale demonstrating a slight decrease in reliability. Since this study, the SSS-V has been used in a variety of settings, successfully assessing sensation seeking among such varied samples as college students, forensic populations, mountain climbers, and military personnel (Zuckerman, 2007).

*Family Environment Scale (FES)*

The FES real form is a 90 item, true/false, self-report measure used to assess current family functioning (Moos, 1990). Ten subscales assess the Relationship, Personal Growth, and System Maintenance dimensions of family environment. Specific Relationship subscales include Cohesion, Expressiveness, and Conflict measures. Personal Growth subscales include Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active-Recreational Orientation, and Moral and Religious Emphasis. Finally, System Maintenance includes Organization and Control subscales.

For the purposes of this study, only the Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control subscales were used. Research suggests that family poor family cohesion and high conflict within the home may be associated with the development of psychopathic features (Farrington et al., 2001). Poor expressiveness, noted by the suppression or denial of emotion within the family, as well as over-control within the family may also be linked to antisocial behavior in adolescents (Slee, 1996). Finally, morality and religiosity has been found to have a significant effect on sensation seeking behavior (Boomsma et al., 1999). For a full description of the Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control scales, see Table 5.

Table 5

*Select Family Environment Scales*

| Subscales | # Items | Description |
|---|---|---|
| Cohesion | 9 | Assesses the degree to which family members are committed , helpful, and supportive of each other |
| Expressiveness | 9 | Assesses the degree to which family members are encouraged to share their thoughts and feelings |
| Conflict | 9 | Assesses the amount of openly expressed anger and conflict in family |
| Moral & Religious Emphasis | 9 | Assesses the importance family places on ethics and religious values |
| Control | 9 | Assess degree to which rules and procedures determine family life |

Over 1000 individuals and 285 families make up the norm group for the FES (Moos, 2002). Measures of internal consistency range from .61 to .78 across subscales. Test-retest reliability at 12 months is also acceptable with subscale scores ranging from .63 for Cohesion to .81 for Organization (Moos, 1990). Content validity was, in part, built into the FES. Conceptually connected items were assessed with correlating items

making up individual subscales. Importantly, the FES has been used to assess family functioning in college samples (e.g., King, 1998) as well as in studies that assess family functioning in relation to personality traits (Weaver & Clum, 1993).

**Proposed analyses**

First, a Principal Component Analyses (PCA) of the Background and Demographics Questionnaire (BDQ) will be conducted to isolate any specific trends or risk factors in the development sensation seeking or psychopathic traits. Results of the PCA will be used to determine whether items can be grouped into a smaller number of subscales. Eigenvalues, scree plots, and proportion of variance accounted for will be used to determine the meaningful factor structure. Additionally, responses to BDQ items will be used to determine possible demographic effects on study analyses.

Next, a series of MANOVAs will be performed to examine the effects of age, gender, and ethnicity on FES, PPI-R, and SSS-V total and subscale scores. Variables that show significant demographic effects will be evaluated for potential inclusion in ANCOVA procedures to control for the effects of these variables in the main analyses.

Finally, Pearson product-moment intercorrelations will be utilized to intercorrelate scores between PPI-R Total, factor, and scale scores with scores from the SSS-V scores (Total and subscales). The findings will be compared with values in the PPI-R manual in similar analyses.

*Analyses for Hypothesis 1*

The relationship between FES Cohesion, Expressiveness, Conflict, Control, and Moral and Religious Emphasis scales and scales on the PPI-R will be evaluated by Pearson product-moment intercorrelations in an intercorrelation matrix calculated

between these two measures. Additionally, a stepwise multiple regression will be used to predict the cumulative and unique contributions of each predictor variable as they account for scale, factor, and total scores on the PPI-R.

*Analyses for Hypothesis 2*

FES Cohesion, Expressiveness, Conflict, Control, and Moral and Religious Emphasis scales scores will be separated using a median split technique. High and low groups from each FES scale will be compared on scale, factor, and total scores of the PPI-R to assess for possible moderation effects.

*Analyses for Hypothesis 3*

Scale and total scores on the SSS-V will be separated using a median split technique. High and low groups from each SSS-V scale will be compared on scale, factor, and total scores of the PPI-R to assess for possible moderation effects.

*Analyses for Hypothesis 4*

Hypothesis four will be evaluated by dividing subjects into high vs. low sensation seeking groups based on a median split of their SSS-V score and high vs. low groups based on a median split of their total score on the PPI-R. This will create four quadrants made up of a high sensation seeking and high PPI-R total score group, a high sensation seeking and low PPI-R Total score group, a low sensation seeking and high PPI-R Total score group, and low sensation seeking and low PPI-R Total score group. The scores on the FES Cohesion, Expressiveness, Conflict, Control, and Moral and Religious Emphasis scales will be compared for subjects on each of these quadrants by individual ANOVAs.

*Analyses for Hypothesis 5*

Hypothesis five will be evaluated similarly to hypotheses four, by dividing subjects into high vs. low sensation seeking groups based on a median split of their SSS-V score and high vs. low groups based on a median split of their total score on the PPI-R. This will create the same four quadrants as in hypothesis three. Using individual ANOVAs, scores on the FES Cohesion, Conflict, Expressiveness, Control, and Moral and Religious Emphasis scales will be compared for subjects in the high sensation seeking and low psychopathy quadrant compared to subjects in the other three quadrants.

## RESULTS

First, descriptive statistics were found for each measure. Table 6 describes means and standard deviations for scores on the PPI-R. Table 7 describes means and standard deviations for scores on the SSS-V. Finally, table 8 describes means and standard deviations for the Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control subscales on the FES.

Table 6

*Means and Standard Deviations for PPI-R Total, Factor, and Subscale Scores*

| Scale | *N* | *M* | *SD* |
|---|---|---|---|
| Total | 244* | 52.39 | 11.63 |
| Machiavellian Egocentricity | 245 | 53.15 | 11.18 |
| Rebellious Nonconformity | 245 | 52.66 | 10.36 |
| Blame Externalization | 245 | 54.17 | 10.24 |
| Carefree Nonplanfullness | 245 | 49.93 | 10.99 |
| Social Influence | 245 | 48.96 | 10.19 |
| Fearlessness | 245 | 49.84 | 10.33 |

Table 6 (Continued)

| Scale | *N* | *M* | *SD* |
|---|---|---|---|
| Stress Immunity | 244* | 49.41 | 10.51 |
| Coldheartedness | 245 | 51.78 | 12.30 |
| Self-Centered Impulsivity | 245 | 53.64 | 11.05 |
| Fearless Dominance | 244* | 49.13 | 11.22 |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance score could not be included due to missing responses.

Table 7

*Means and Standard Deviations for SSS-V Total and Subscale Scores*

| Scale | *N* | *M* | *SD* |
|---|---|---|---|
| Total | 245 | 45.63 | 10.82 |
| Thrill and Adventure Seeking | 245 | 45.43 | 11.13 |
| Experience Seeking | 245 | 49.03 | 8.89 |
| Disinhibition | 245 | 45.88 | 10.56 |
| Boredom Susceptibility | 245 | 47.07 | 8.87 |

Table 8

*Means and Standard Deviations for FES Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control Subscale Scores*

| Scale | *N* | *M* | *SD* |
|---|---|---|---|
| Cohesion | 245 | 47.64 | 17.07 |
| Expressiveness | 245 | 46.76 | 13.96 |
| Conflict | 245 | 52.78 | 12.82 |
| Moral and Religious Emphasis | 245 | 53.26 | 12.15 |
| Control | 245 | 53.03 | 12.34 |

Next, a Principal Component Analyses (PCA) of the Background and Demographics Questionnaire response set was conducted based on 16 items answered on a Likert format. Results of the PCA were used to determine that the 16 clinical items could not be grouped into a smaller number of meaningful subscales. In general, Eigenvalue and scree plots indicated that the items did not factor into meaningful clusters and the proportion of variance accounted for by factors derived by this procedure was limited. Table 9 shows the eigenvalues and proportion of variance accounted for by the exploratory PCA conducted on the 16 items.

Table 9

*PCA Results for the Background and Demographics Questionnaire*

| Component and Items | Item Load | Eigen Value | % of Var. |
|---|---|---|---|
| Component #1 | | 3.95 | 24.69 |
| I have had problems with ADHD or ADD. | .40 | | |
| I have gotten into trouble with the law. | .61 | | |
| I got into a lot of trouble. | .76 | | |
| I received a lot of detentions/suspensions in school. | .68 | | |
| I hung out with friends who got into a lot of trouble. | .66 | | |
| I often skipped school. | .64 | | |
| I would sometimes have to bully or manipulate others. | .65 | | |
| I often ran away from home. | .61 | | |
| Component #2 | | 2.51 | 15.68 |
| When I was growing up, I was subjected to child abuse. | -.64 | | |
| My parents were involved and supportive. | .83 | | |
| My family had enough money to buy luxuries/essentials. | .60 | | |
| I received a lot of attention and care in my family. | .85 | | |

Table 9 (Continued)

| Component and Items | Item Load | Eigen Value | % of Var. |
|---|---|---|---|
| Component #3 | .47 | 1.36 | 8.50 |
| I am a religious or spiritual person. | .51 | | |
| One of my parents was absent during most of childhood. | .58 | | |
| Close family member who often got in trouble -w- law. | .66 | | |
| I lived in a neighborhood with a lot of crime. | | | |

*Note*. Some items were shortened for formatting purposes.

Based on the PCA findings, it was determined that demographic variables were most appropriately presented as individual demographic variables. The endorsement frequencies on each of the Likert format response points are presented in Table 10.

Table 10

*Background and Demographics Questionnaire Results*

| | Response Percentages | | | |
|---|---|---|---|---|
| Questions: | Very Much So | Moderately So | Somewhat | Not at All |
| I am a religious or spiritual person. | 20.00 | 28.20 | 30.60 | 21.20 |
| I have had problems with ADHD or ADD.* | 5.30 | 9.40 | 18.00 | 66.90 |
| I have gotten into trouble with the law.* | 0.40 | 5.70 | 19.20 | 74.30 |
| One of my parents was absent during most of my childhood.** | 15.90 | 11.40 | 14.70 | 57.90 |
| I was subjected to child abuse.** | 1.20 | 4.50 | 10.60 | 82.90 |
| I had a close family member who would often get in trouble with the law.* | 10.20 | 9.80 | 19.60 | 60.00 |
| My family had enough money to buy luxuries as well as the essentials.* | 20.80 | 31.80 | 31.80 | 15.10 |
| I received a lot of attention and care in my family.* | 51.80 | 26.90 | 17.60 | 3.30 |

Table 10 (Continued)

| Questions: | Response Percentages | | | |
|---|---|---|---|---|
| | Very Much So | Moderately So | Somewhat | Not at All |
| I lived in a neighborhood with a lot of crime.** | 3.70 | 10.20 | 22.40 | 63.70 |
| I got into a lot of trouble.** | 2.00 | 10.20 | 26.10 | 60.80 |
| I received a lot of detentions and/or suspensions in school.*** | 1.60 | 5.30 | 16.70 | 75.10 |
| I hung out with friends who got in a lot of trouble.* | 2.40 | 11.00 | 34.30 | 51.80 |
| I often skipped school.** | 4.10 | 6.10 | 27.30 | 61.60 |
| I would sometimes have to bully or manipulate others to get what I wanted.* | 1.60 | 4.90 | 14.70 | 78.40 |
| I often ran away from home. | 0.00 | 2.90 | 7.30 | 89.80 |

*Note.* *Indicates one missing response. **Indicates two missing responses. ***Indicates 3 missing responses. Percentages taken from total sample ($N$ = 245).

Next, a series of MANOVAs were performed to examine the effects of age, gender, history of brain injury, and ethnicity on PPI-R Total Score, SSS-V Total Score, and FES scale scores. Demographic effects were evaluated for potential inclusion in ANCOVA procedures to control for the effects of these variables in the main analyses. Table 11 presents the results of the analyses of the effects of age, gender, ethnicity, and history of brain injury on PPI – R Total scores. The results of this analysis demonstrate significant effects for the variables of gender [$F(1,240) = 4.20, p < .05$] and history of brain injury [$F(1,240) = 10.84, p < .001$]. Thus, the covariates of gender and brain injury were used in main analyses in which PPI-R scores were the dependent measure.

Table 11

*Main Effects of Age, Gender, Ethnicity, and History of Brain Injury on PPI-R Total Score*

| Variable | *SS* | *df* | *MS* | *F* |
|---|---|---|---|---|
| Age | 0.52 | 1 | 0.52 | 0 .00 |
| Gender | 540.80 | 1 | 540.80 | 4.20* |
| Ethnicity | 1057.51 | 5 | 211.50 | 1.63 |
| Brain Injury Hx. | 1403.00 | 1 | 1403.00 | 10.84*** |

*Note.* $N = 244$. One participant's score not used. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 12 presents the results of a similar analysis of the effects of potential covariates on Total SSS-V scores, with consistent non-significant effects found for all potential covariates.

Table 12

*Main Effects of Age, Gender, Ethnicity, and History of Brain Injury on SSS-V Total Score*

| Variable | *SS* | *df* | *MS* | *F* | *p* |
|---|---|---|---|---|---|
| Age | 0.07 | 1 | 0.07 | 0.00 | *ns* |
| Gender | 66.81 | 1 | 66.81 | 0.59 | *ns* |
| Ethnicity | 393.49 | 5 | 78.70 | 0.70 | *ns* |
| Brain Injury Hx. | 134.68 | 1 | 134.68 | 1.20 | *ns* |

*Note.* $N = 245$.

Table 13 presents the results of a similar analysis of the effects of potential covariates on FES scale scores. The results of this analysis demonstrate significant effects for ethnicity [$F(5,240) = 3.46, p < .01$] on Moral and Religious Emphasis scale scores.

Post hoc analyses using the Tukey HSD test indicated that of the six groups (African Americans, Caucasian, Hispanic or Latino, Multi-ethnic, or Other), a significant difference ($p \leq .001$) was found between the African American ($M = 59.13$, $SE = 1.72$) and Caucasian ($M = 49.04$, $SE = 1.72$) groups. Therefore, the variable of ethnicity was used as a covariate in analyses in which the Moral and Religious Emphasis scale score was used as an outcome variable, specifically for hypotheses four and five. No other significant effects were found for other potential covariates on FES scales.

Table 13

*Main Effects for Ethnicity on FES Scale Scores*

| FES Scale | *SS* | *df* | *MS* | *F* |
|---|---|---|---|---|
| Cohesion | 1758.69 | 5 | 351.74 | 1.29 |
| Expressiveness | 1064.70 | 5 | 212.94 | 1.09 |
| Conflict | 832.19 | 5 | 166.44 | 1.07 |
| Moral and Religious Emphasis | 2171.19 | 5 | 434.24 | 3.46** |
| Control | 549.16 | 5 | 109.83 | 0.73 |

*Note.* $N = 245$. $*p \leq .05$, $**p \leq .01$, $***p \leq .001$.

Table 14 presents a comparison of PPI-R mean scale scores for participants who did and did not report a history of brain injury for each of the PPI-R scales and subscales. Significant effects for history of brain injury were noted for seven PPI-R scales, including PPI-R Total score, Machiavellian Egocentricity, Rebellious Non-conformity, Social Influence, Fearlessness, Self-centered Impulsivity, and Fearless Dominance.

Table 14

*PPI-R Scale Score Differences Between Brain Injured and Non-Brain Injured Participants*

| PPI-R Scales | | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total Score | B. Injury | 28 | 59.54 | 15.01 | 3.56*** | 0.62 |
| | No Injury | 214 | 51.39 | 10.83 | | |
| Machiavellian | B. Injury | 28 | 58.21 | 14.76 | 2.59** | 0.45 |
| Egocentricity | No Injury | 215 | 52.45 | 10.52 | | |
| Rebellious Non- | B. Injury | 28 | 56.36 | 10.49 | 2.02* | 0.40 |
| Conformity | No Injury | 215 | 52.17 | 10.32 | | |
| Blame | B. Injury | 28 | 57.50 | 11.50 | 1.79 | 0.34 |
| Externalization | No Injury | 215 | 53.85 | 9.99 | | |

Table 14 (Continued)

| PPI-R Scales | | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Carefree | B. Injury | 28 | 51.36 | 11.78 | 0.70 | 0.14 |
| Nonplanfullness | No Injury | 215 | 49.80 | 10.94 | | |
| Social Influence | B. Injury | 28 | 52.75 | 13.61 | 2.19* | 0.38 |
| | No Injury | 215 | 48.33 | 9.48 | | |
| Fearlessness | B. Injury | 28 | 56.71 | 9.29 | 3.86*** | 0.80 |
| | No Injury | 215 | 48.90 | 10.17 | | |
| Stress Immunity | B. Injury | 28 | 51.21 | 11.80 | 1.07 | 0.20 |
| | No Injury | 214 | 48.99 | 10.19 | | |
| Self-Centered | B. Injury | 28 | 58.57 | 13.67 | 2.51* | 0.45 |
| Impulsivity | No Injury | 215 | 53.04 | 10.58 | | |
| Fearless Dominance | B. Injury | 28 | 55.21 | 13.71 | 3.20** | 0.58 |
| | No Injury | 214 | 48.18 | 10.53 | | |
| Coldheartedness | B. Injury | 28 | 53.89 | 14.60 | 0.97 | 0.18 |
| | No Injury | 215 | 51.49 | 12.04 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance score could not be included in this analysis due to missing responses. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 15 compares the mean scale scores for the SSS-V and FES scales for participants with and without a history of brain injury. This table demonstrates significant effects for history brain injury on SSS-V Thrill and Adventure Seeking and Disinhibition scales, as well as SSS-V Total scores. No significant effects were found for history of brain injury on any FES scale scores.

Table 15

*SSS-V and FES Mean Scale Score Differences Between Brain Injured and Non-Brain Injured Participants*

| SSS-V Scales | | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | B. Injury | 28 | 51.46 | 7.17 | 3.06** | 0.70 |
| | No Injury | 215 | 44.91 | 11.03 | | |
| Thrill/Adv. | B. Injury | 28 | 50.82 | 8.84 | 2.76** | 0.60 |
| Seeking | No Injury | 215 | 44.72 | 11.27 | | |
| Experience | B. Injury | 28 | 50.39 | 7.34 | 0.85 | 0.18 |
| Seeking | No Injury | 215 | 48.87 | 9.11 | | |
| Disinhibition | B. Injury | 28 | 51.70 | 6.22 | 3.18** | 0.75 |
| | No Injury | 215 | 45.10 | 10.82 | | |

Table 15 (Continued)

| SSS-V Scales | | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Boredom | B. Injury | 28 | 59.54 | 9.44 | 1.52 | 1.40 |
| Susceptibility | No Injury | 215 | 46.85 | 8.73 | | |
| FES Scales | | | | | | |
| Cohesion | B. Injury | 28 | 44.75 | 17.15 | -0.90 | -0.18 |
| | No Injury | 215 | 47.85 | 17.06 | | |
| Expressiveness | B. Injury | 28 | 43.25 | 14.52 | -1.44 | -0.28 |
| | No Injury | 215 | 47.27 | 13.89 | | |
| Conflict | B. Injury | 28 | 56.96 | 11.54 | 1.80 | 0.37 |
| | No Injury | 215 | 52.41 | 12.82 | | |
| MR Emphasis | B. Injury | 28 | 53.93 | 13.64 | 0.31 | 0.06 |
| | No Injury | 215 | 53.17 | 12.03 | | |
| Control | B. Injury | 28 | 56.57 | 13.03 | 1.60 | 0.31 |
| | No Injury | 215 | 52.61 | 12.21 | | |

*Note.* $*p \leq .05$, $**p \leq .01$, $***p \leq .001$.

Table 16 shows the effects of gender on PPI-R Total, factor, and subscale scores. These results show no significant effects for gender on any of the PPI-R mean scores. Table 17 shows the effects of gender on SSS-V and FES scale scores. The results of these *t*-tests, assessing differences between men and women on mean scale scores, showed consistent non-significant differences by gender.

Table 16

*PPI-R Scale and Factor Mean Score Differences Between Male and Female Participants*

| PPI-R Scales | Sex | *n* | *M* | *SD* | *t* | *p* | Cohen's *d* |
|---|---|---|---|---|---|---|---|
| Total Score | M | 116 | 52.13 | 10.46 | -0.32 | *ns* | -0.04 |
| | F | 128 | 52.62 | 12.62 | | | |
| Machiavellian | M | 117 | 53.18 | 10.40 | 0.04 | *ns* | 0.01 |
| Egocentricity | F | 128 | 53.12 | 11.88 | | | |
| Rebellious Non- | M | 117 | 52.49 | 8.89 | -0.25 | *ns* | -0.03 |
| Conformity | F | 128 | 52.81 | 11.58 | | | |
| Blame | M | 117 | 53.68 | 10.03 | -0.73 | *ns* | -0.09 |
| Externalization | F | 128 | 54.63 | 10.44 | | | |

Table 16 (Continued)

| PPI-R Scales | Sex | *n* | *M* | *SD* | *T* | *p* | Cohen's *d* |
|---|---|---|---|---|---|---|---|
| Social Influence | M | 117 | 49.08 | 10.41 | 0.18 | *ns* | 0.02 |
| | F | 128 | 48.84 | 10.03 | | | |
| Fearlessness | M | 117 | 48.91 | 9.37 | -1.34 | *ns* | -0.17 |
| | F | 128 | 50.68 | 11.10 | | | |
| Stress Immunity | M | 116 | 49.45 | 10.63 | 0.05 | *ns* | 0.01 |
| | F | 128 | 49.38 | 10.43 | | | |
| Self-Centered | M | 117 | 53.36 | 9.66 | -0.39 | *ns* | -0.05 |
| Impulsivity | F | 128 | 53.91 | 12.21 | | | |
| Fearless | M | 116 | 48.77 | 11.16 | -0.48 | *ns* | -0.06 |
| Dominance | F | 128 | 49.46 | 11.30 | | | |
| Coldheartedness | M | 117 | 51.95 | 11.98 | 0.21 | *ns* | 0.03 |
| | F | 128 | 51.63 | 12.63 | | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance score could not be included in this analysis due to missing responses. *ns* = non-significant at $p \leq .05$.

Table 17

*SSS-V and FES Mean Scale Score Differences Between Male and Female Participants*

| SSS-V Scales | Sex | *n* | *M* | *SD* | *T* | *p* | Cohen's *d* |
|---|---|---|---|---|---|---|---|
| Total | M | 117 | 44.74 | 11.80 | -1.23 | *ns* | -0.16 |
| | F | 128 | 46.44 | 9.82 | | | |
| Thrill/Adventure | M | 117 | 44.38 | 10.96 | -1.42 | *ns* | -0.18 |
| Seeking | F | 128 | 46.40 | 11.24 | | | |
| Experience | M | 117 | 49.47 | 8.69 | 0.74 | *ns* | 0.09 |
| Seeking | F | 128 | 48.63 | 9.09 | | | |
| Disinhibition | M | 117 | 45.57 | 10.88 | -0.43 | *ns* | -0.06 |
| | F | 128 | 46.16 | 10.29 | | | |
| Boredom | M | 117 | 46.26 | 9.00 | -1.37 | *ns* | -0.17 |
| Susceptibility | F | 128 | 47.81 | 8.72 | | | |
| FES Scales | | | | | | | |
| Cohesion | M | 117 | 49.66 | 14.39 | 1.78 | *ns* | 0.23 |
| | F | 128 | 45.79 | 19.07 | | | |
| Expressiveness | M | 117 | 47.01 | 13.43 | 0.27 | *ns* | 0.03 |
| | F | 128 | 46.53 | 14.48 | | | |

Table 17 (Continued)

| FES Scales | Sex | *n* | *M* | *SD* | *T* | *p* | Cohen's *d* |
|---|---|---|---|---|---|---|---|
| MR Emphasis | M | 117 | 53.44 | 12.40 | 0.23 | *ns* | 0.03 |
| | F | 128 | 53.09 | 11.97 | | | |
| Control | M | 117 | 51.58 | 11.02 | -1.76 | *ns* | -0.23 |
| | F | 128 | 54.35 | 13.34 | | | |

*Note*. *ns* = Non-significant at $p \leq .05$.

As a final preliminary analysis, Pearson product-moment intercorrelations were conducted to examine the relationship between PPI-R Total, factor, and subscale scores and scores from Total and subscale scores of the SSS-V. These were compared with comparable values in the PPI-R manual for similar analyses. Table 18 describes the results. Pearson product-moment correlation coefficients presented in bold were found for the current data sample. Correlations presented within parentheses were derived from the PPI-R manual.

Table 18

*Pearson Product-Moment Correlation Coefficients between SSS-V and PPI-R Scales as Compared to Lilienfeld and Widows (2005)*

| PPI-R Scales | Sensation Seeking Scales | | | | |
|---|---|---|---|---|---|
| | Total | Thrill/Adv. Seeking | Experience Seeking | Disinhibition | Boredom Susceptibility |
| Total | **.60**** | **.34**** | **.39**** | **.49**** | **.47**** |
| | (.63**) | (.42**) | (.38**) | (.48**) | (.52**) |
| Machiavellian | **.32**** | **.05** | **.15*** | **.32**** | **.41**** |
| Egocentricity | (.40**) | (.10) | (.16**) | (.46**) | (.47**) |
| Rebellious | **.59**** | **.32**** | **.55**** | **.46**** | **.39**** |
| Nonconformity | (.63**) | (.33**) | (.55**) | (.42**) | (.53**) |
| Blame | **.15*** | **-.03** | **.08** | **.11** | **.27**** |
| Externalization | (.20**) | (-.03) | (.13) | (.24**) | (.29**) |
| Carefree | **.22**** | **.06** | **.11** | **.20**** | **.25**** |
| Nonplanfulness | (.36**) | (.14) | (.19*) | (.31**) | (.44**) |
| Social Influence | **.31**** | **.19**** | **.21**** | **.28**** | **.15*** |
| | (.24**) | (.24**) | (.12) | (.15) | (.16) |
| Fearlessness | **.68**** | **.68**** | **.44**** | **.43**** | **.33**** |
| | (.60**) | (.72**) | (.29**) | (.28**) | (.31**) |

Table 18 (Continued)

| PPI-R Scales | Sensation Seeking Scales | | | | |
|---|---|---|---|---|---|
| | Total | Thrill/Adv. Seeking | Experience Seeking | Disinhibition | Boredom Susceptibility |
| Stress Immunity | **.15*** | **.20**** | **.07** | **.11** | **.01** |
| | (.07) | (.21*) | (.02) | (.02) | (-.15) |
| Self-Centered | **.45**** | **.13*** | **.31**** | **.38**** | **.46**** |
| Impulsivity | (.52**) | (.18*) | (.34**) | (.48**) | (.57**) |
| Fearless | **.51**** | **.47**** | **.32**** | **.36**** | **.23**** |
| Dominance | (.44**) | (.55**) | (.21*) | (.22*) | (.18*) |
| Coldheartedness | **.18**** | **.00** | **.04** | **.24**** | **.21**** |
| | (.36**) | (.15) | (.30**) | (.29**) | (.18) |

*Note.* Bolded correlations indicate SSS-V and PPI-R relationships found in the present study ($n = 245$). Correlations within parentheses indicate original SSS-V and PPI-R correlations described in Lilienfeld and Widow's (2005) PPI-R Manual using a college/community sample ($n = 122$). *$p \leq .05$, **$p \leq .01$, **$p \leq .001$.

*Main Results*

For the first hypothesis, the relationship between FES Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control scales and scales on the PPI-R were evaluated by Pearson product-moment correlations in an intercorrelation matrix. Additionally, a stepwise multiple regression predicted the cumulative and unique contributions of each predictor variable as they account for scale scores on the PPI-R. Table 19 presents the Pearson product-moment correlation coefficients between FES and PPI-R scale scores for the total sample. Correlation coefficients that significantly deviated from zero values are denoted by the use of asterisk.

Table 19

*Pearson Product-Moment Correlation Coefficients Between FES and PPI-R Scale and Factor Scores*

| | FES Scales | | | | |
|---|---|---|---|---|---|
| PPI-R Scales | Cohesion | Expressiveness | Conflict | MRE | Control |
| Total | -.21** | -.02 | .27** | -.13* | .03 |
| Machiavellian Egocentricity | -.18** | -.06 | .24** | -.07 | .07 |

Table 19 (Continued)

| | FES Scales | | | | |
|---|---|---|---|---|---|
| PPI-R Scales | Cohesion | Expressiveness | Conflict | MRE | Control |
| Rebellious Nonconformity | -.28** | -.10 | .28** | -.12 | -.01 |
| Blame Externalization | -.32** | -.26** | .40** | .02 | .22** |
| Carefree Nonplanfullness | -.15* | -.047 | .22** | -.05 | .00 |
| Social Influence | .06 | .12 | .01 | .02 | .04 |
| Fearlessness | -.13* | .04 | .16* | -.18** | .02 |
| Stress Immunity | .18** | .18** | -.19** | -.02 | -.12 |
| Self-Centered Impulsivity | -.32** | -.16* | .39** | -.08 | .10 |
| Fearless Dominance | .04 | .15* | .00 | -.08 | -.02 |
| Coldheartedness | -.11 | .02 | .11 | -.15* | -.11 |

*Note.* ($N = 245$). MRE stands for Moral and Religious Emphasis. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

The results of a stepwise multiple regression of FES scale scores, SSS-V Total and subscale scores and history of brain injury on PPI Total, factor, and subscale scores is presented in Table 20. Additionally, this table presents the predictor variables accounting for a significant amount of variance in stepwise multiple regressions, including the order of inclusion of predictor variables, the amount of variance accounted for by each predictor, and the cumulative amount of variance accounted for by all predictors for each PPI-R outcome measure.

Table 20

*Stepwise Multiple Regression of FES Scores, SSS-V Scores, and History of Brain Injury on PPI-R Scale Scores*

| PPI-R Scales | *B* | *SE* | B | *F* | *R* | Adj.$R^2$ |
|---|---|---|---|---|---|---|
| Total Score (DV) | | | | | | |
| Step 1: SSS Total | 0.65 | 0.06 | 0.61 | 139.60*** | .61 | .37 |
| Step 2: FES Conflict | 0.16 | 0.05 | 0.17 | 78.60*** | .63 | .39 |
| Step 3: SSS Boredom Sus. | 0.23 | 0.08 | 0.18 | 56.64*** | .65 | .41 |
| Step 4: Brain Injury Hx. | -3.66 | 1.83 | -0.10 | 44.01*** | .65 | .42 |

Table 20 (Continued)

| PPI-R Scales | *B* | *SE* | B | *F* | *R* | Adj.$R^2$ |
|---|---|---|---|---|---|---|
| Machiavellian Egocentricity | | | | | | |
| Step 1: SSS Boredom Sus. | 0.52 | 0.07 | 0.41 | 49.47*** | .41 | .17 |
| Step 2: FES Conflict | 0.17 | 0.05 | 0.19 | 31.11*** | .45 | .20 |
| Step 3: SSS Disinhibition | 0.15 | 0.07 | 0.14 | 22.76*** | .47 | .21 |
| Rebellious Nonconformity | | | | | | |
| Step 1: SSS Total | 0.57 | 0.05 | 0.60 | 132.71*** | .59 | .35 |
| Step 2: FES Cohesion | -0.29 | 0.03 | -0.21 | 79.83*** | .63 | .39 |
| Step 3: SSS ES | 0.27 | 0.08 | 0.23 | 59.27*** | .65 | .41 |
| Blame Externalization | | | | | | |
| Step 1: FES Conflict | 0.32 | 0.05 | 0.40 | 45.08*** | .16 | .15 |
| Step 2: SSS Boredom Sus. | 0.26 | 0.07 | 0.22 | 31.39*** | .21 | .20 |
| Step 3: FES Expressiveness | -0.12 | 0.04 | -0.16 | 23.71*** | .23 | .22 |
| Carefree Nonplanfullness | | | | | | |
| Step 1: SSS Boredom Sus. | 0.31 | 0.08 | 0.25 | 16.73*** | .25 | .06 |
| Step 2: FES Conflict | 0.16 | 0.05 | 0.19 | 13.18*** | .31 | .10 |
| Social Influence | | | | | | |
| Step 1: SSS Total | 0.29 | 0.06 | 0.31 | 25.27*** | .31 | .09 |

Table 20 (Continued)

| PPI-R Scales | *B* | *SE* | B | *F* | *R* | Adj.$R^2$ |
|---|---|---|---|---|---|---|
| Fearlessness | | | | | | |
| Step 1: SSS Total | 0.65 | 0.05 | 0.68 | 209.52*** | .68 | .46 |
| Step 2: SSS TAS | 0.38 | 0.05 | 0.41 | 152.91*** | .75 | .56 |
| Step 3: Brain Injury Hx. | -3.04 | 1.41 | -0.09 | 105.06*** | .75 | .56 |
| Stress Immunity | | | | | | |
| Step 1: SSS TAS | 0.19 | 0.06 | 0.20 | 10.21*** | .20 | .04 |
| Step 2: FES Conflict | -0.17 | 0.05 | -0.21 | 10.92*** | .29 | .08 |
| Self-Centered Impulsivity | | | | | | |
| Step 1: SSS Boredom Susc. | 0.58 | 0.07 | 0.46 | 66.48*** | .46 | .21 |
| Step 2: FES Conflict | 0.29 | 0.05 | 0.33 | 57.81*** | .57 | .32 |
| Step 3: SSS-V Total | 0.21 | 0.07 | 0.21 | 43.12*** | .59 | .34 |
| Step 4: FES Cohesion | -0.09 | 0.04 | -0.14 | 34.00*** | .60 | .35 |
| Fearless Dominance | | | | | | |
| Step 1: SSS Total | 0.53 | 0.06 | 0.35 | 84.28*** | .51 | .26 |
| Step 2: SSS TAS | 0.24 | 0.07 | 0.24 | 49.37*** | .54 | .29 |
| Coldheartedness | | | | | | |
| Step 1: SSS Disinhibition | 0.28 | 0.07 | 0.24 | 14.71*** | .24 | .06 |

*Note*. Thrill and Adventure Seeking (TAS), Experience Seeking (ES). Non-significant FES and SSS-V variables were excluded. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

For hypothesis two, participants were divided into high versus low FES scale membership on each of the FES scales, and the effects of FES group classification were examined for each scale on PPI-R Total, factor, and subscale mean scores. The results varied in that some FES scale scores had a significant effect on PPI-R mean scores whereas others had no significant effect. For example, high and low FES Control groups showed no differences on PPI-R Total, factor, and subscale scores, whereas high and low groups for Conflict were significantly different on PPI-R Total, Machiavellian Egocentricity, Rebellious Non-conformity, Blame Externalization, Carefree Nonplanfulness, Fearlessness, Stress Immunity, Self-Centered Impulsivity, and Coldheartedness factor and scale scores. Tables 21 through 24 show findings for high versus low FES scale membership on PPI-R Total, factor, and subscale scores. The FES Control subscale is not included in tabular form due to no significant effects for membership in high versus low Control groups on any of the PPI-R scale.

Table 21

*PPI-R Mean Scale Score Differences on High vs. Low FES Cohesion Groups*

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low Coh. | 140 | 54.41 | 11.97 | 3.22** | 0.42 |
| | High Coh. | 104 | 49.66 | 10.60 | | |
| Machiavellian | Low Coh. | 141 | 55.21 | 11.93 | 3.43** | 0.45 |
| Egocentricity | High Coh. | 104 | 50.36 | 9.43 | | |
| Rebellious | Low Coh. | 141 | 54.99 | 10.43 | 4.25*** | 0.55 |
| Non-conformity | High Coh. | 104 | 49.49 | 9.43 | | |
| Blame | Low Coh. | 141 | 56.85 | 9.90 | 4.99*** | 0.65 |
| Externalization | High Coh. | 104 | 50.54 | 9.59 | | |
| Carefree | Low Coh. | 141 | 51.40 | 11.08 | 2.46* | 0.32 |
| Nonplanfulness | High Coh. | 104 | 47.94 | 10.60 | | |
| Social | Low Coh. | 141 | 48.38 | 9.96 | -1.04 | -0.13 |
| Influence | High Coh. | 104 | 49.74 | 10.50 | | |
| Fearlessness | Low Coh. | 141 | 50.70 | 10.20 | 1.52 | 0.20 |
| | High Coh. | 104 | 48.67 | 10.44 | | |
| Stress | Low Coh. | 140 | 47.72 | 10.02 | -2.96** | -0.38 |
| Immunity | High Coh. | 104 | 51.68 | 10.76 | | |

Table 21 (Continued)

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low Coh. | 141 | 56.73 | 10.70 | 5.37*** | 0.70 |
| Impulsivity | High Coh. | 104 | 49.46 | 10.14 | | |
| Fearless | Low Coh. | 140 | 48.54 | 11.48 | -0.95 | -0.12 |
| Dominance | High Coh. | 104 | 49.92 | 10.87 | | |
| Coldheartedness | Low Coh. | 141 | 52.97 | 12.61 | 1.77 | 0.23 |
| | High Coh. | 104 | 50.16 | 11.73 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Cohesion scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 22

*PPI-R Mean Scale Score Differences on High vs. Low FES Conflict Groups*

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low Conflict | 126 | 49.10 | 10.58 | -4.78*** | -0.61 |
| | High Conflict | 118 | 55.91 | 11.70 | | |
| Machiavellian | Low Conflict | 126 | 50.29 | 9.98 | -4.27*** | -0.54 |
| Egocentricity | High Conflict | 119 | 56.18 | 11.62 | | |
| Rebellious | Low Conflict | 126 | 50.00 | 10.21 | -4.27*** | -0.55 |
| Nonconformity | High Conflict | 119 | 55.47 | 9.80 | | |
| Blame | Low Conflict | 126 | 50.78 | 10.05 | -5.67*** | -0.72 |
| Externalization | High Conflict | 119 | 57.76 | 9.19 | | |
| Carefree | Low Conflict | 126 | 47.33 | 10.65 | -3.92*** | -0.50 |
| Nonplanfullness | High Conflict | 119 | 52.68 | 10.71 | | |
| Social | Low Conflict | 126 | 48.76 | 10.20 | -0.31 | -0.04 |
| Influence | High Conflict | 119 | 49.16 | 10.23 | | |
| Fearlessness | Low Conflict | 126 | 48.40 | 10.14 | -2.27* | -0.29 |
| | High Conflict | 119 | 51.36 | 10.35 | | |
| Stress | Low Conflict | 126 | 50.76 | 11.32 | 2.09* | 0.27 |
| Immunity | High Conflict | 118 | 47.97 | 9.39 | | |

Table 22 (Continued)

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low Conflict | 126 | 49.52 | 10.22 | -6.51*** | -0.83 |
| Impulsivity | High Conflict | 119 | 58.02 | 10.21 | | |
| Fearless | Low Conflict | 126 | 48.95 | 11.09 | -0.26 | -0.03 |
| Dominance | High Conflict | 118 | 49.32 | 11.40 | | |
| Coldheartedness | Low Conflict | 126 | 49.75 | 11.30 | -2.69* | -0.34 |
| | High Conflict | 119 | 53.92 | 12.99 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Conflict scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 23

*PPI-R Mean Scale Score Differences on High vs. Low FES Expressiveness Groups*

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low Exp. | 131 | 52.80 | 12.83 | 0.60 | 0.08 |
| | High Exp. | 113 | 51.91 | 10.08 | | |
| Machiavellian | Low Exp. | 132 | 54.04 | 11.76 | 1.35 | 0.17 |
| Egocentricity | High Exp. | 113 | 52.11 | 10.41 | | |
| Rebellious | Low Exp. | 132 | 53.83 | 10.86 | 1.93 | 0.25 |
| Non-conformity | High Exp. | 113 | 51.28 | 9.61 | | |
| Blame | Low Exp. | 132 | 56.59 | 10.50 | 4.13*** | 0.53 |
| Externalization | High Exp. | 113 | 51.35 | 9.19 | | |
| Carefree | Low Exp. | 132 | 50.73 | 10.72 | 1.24 | 0.16 |
| Nonplanfulness | High Exp. | 113 | 48.99 | 11.27 | | |
| Social | Low Exp. | 132 | 47.73 | 10.68 | -2.04* | -0.26 |
| Influence | High Exp. | 113 | 50.38 | 9.44 | | |
| Fearlessness | Low Exp. | 132 | 49.50 | 10.55 | -0.55 | -0.07 |
| | High Exp. | 113 | 50.23 | 10.09 | | |
| Stress | Low Exp. | 131 | 47.86 | 10.47 | -2.5* | -0.32 |
| Immunity | High Exp. | 113 | 51.20 | 10.31 | | |

Table 23 (Continued)

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low Exp. | 132 | 55.58 | 11.29 | 3.00** | 0.39 |
| Impulsivity | High Exp. | 113 | 51.39 | 10.35 | | |
| Fearless | Low Exp. | 131 | 47.71 | 11.93 | -2.15* | -0.28 |
| Dominance | High Exp. | 113 | 50.78 | 10.14 | | |
| Coldheartedness | Low Exp. | 132 | 51.39 | 13.02 | -0.53 | -0.07 |
| | High Exp. | 113 | 52.23 | 11.45 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Expressiveness scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 24

*PPI-R Mean Scale Score Differences on High vs. Low FES Moral and Religious Emphasis Groups*

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low MRE | 152 | 53.44 | 11.22 | 1.83 | 0.24 |
| | High MRE | 92 | 50.65 | 12.13 | | |
| Machiavellian | Low MRE | 152 | 54.17 | 11.06 | 1.84 | 0.24 |
| Egocentricity | High MRE | 93 | 51.47 | 11.23 | | |
| Rebellious | Low MRE | 152 | 53.51 | 10.16 | 1.66 | 0.22 |
| Non-conformity | High MRE | 93 | 51.26 | 10.58 | | |
| Blame | Low MRE | 152 | 54.18 | 9.83 | 0.01 | 0.00 |
| Externalization | High MRE | 93 | 54.16 | 10.93 | | |
| Carefree | Low MRE | 152 | 50.89 | 10.37 | 1.76 | 0.23 |
| Nonplanfulness | High MRE | 93 | 48.35 | 11.82 | | |
| Social | Low MRE | 152 | 48.38 | 10.37 | -1.13 | -0.15 |
| Influence | High MRE | 93 | 49.89 | 9.88 | | |
| Fearlessness | Low MRE | 152 | 50.79 | 9.93 | 1.86 | 0.24 |
| | High MRE | 93 | 48.28 | 10.81 | | |
| Stress | Low MRE | 152 | 48.90 | 10.61 | -0.97 | -0.13 |
| Immunity | High MRE | 92 | 50.25 | 10.33 | | |

Table 24 (Continued)

| PPI-R Scales | FES Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low MRE | 152 | 54.68 | 9.95 | 1.89 | 0.24 |
| Impulsivity | High MRE | 93 | 51.95 | 12.51 | | |
| Fearless | Low MRE | 152 | 49.11 | 11.38 | -0.03 | -0.00 |
| Dominance | High MRE | 92 | 49.16 | 11.05 | | |
| Coldheartedness | Low MRE | 152 | 53.39 | 12.61 | 2.66** | 0.17 |
| | High MRE | 93 | 49.14 | 11.35 | | |

*Note.* One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Moral and Religious Emphasis scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Tables 25 through 29 examine the effects of high versus low FES scale group classification on PPI-R scale and factor mean scores controlling for the effects of gender and history of brain injury. In general, findings presented in Tables 25 through 29 illustrate a pattern in which gender was typically not significant in terms of its effects as a covariate. In contrast, history of brain injury was a significant covariate effecting multiple FES group classifications on multiple PPI-R scale and factor scores. For example, for

high versus low FES Cohesion groups, history of brain injury was a significant covariate for PPI-R Total score, Machiavellian Egocentricity, Social Influence, Fearlessness, and Fearless Dominance factor and scale scores. In addition, the FES Control scale, when divided into high versus low groups, showed no mean difference between PPI-R Total and subscale scores using standard *t*-tests; however, significant effects were found when gender and history of brain injury were used as covariates.

Table 25

*ANCOVA Results of High vs. Low FES Cohesion Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H Coh. (140) | Corrected Md. | 2799.95 | 3 | 7.42*** | .09 |
| | L Coh. (102) | Intercept | 22559.33 | 1 | 179.42*** | |
| | | Gender | 57.55 | 1 | 0.46 | |
| | | Brain Injury | 1321.39 | 1 | 10.51*** | |
| | | Cohesion Grp. | 1112.21 | 1 | 8.85** | |
| | | Error | 29925.60 | 238 | | |

Table 25 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Machiavellian | H Coh. (141) | Corrected Md. | 2062.41 | 3 | 5.79*** | .07 |
| Egocentricity | L Coh. (102) | Intercept | 20581.78 | 1 | 173.37*** | |
| | | Gender | 6.47 | 1 | 0.06 | |
| | | Brain Injury | 586.28 | 1 | 4.94* | |
| | | Cohesion Grp. | 1236.31 | 1 | 10.41*** | |
| | | Error | 28373.59 | 239 | | |
| Rebellious | H Coh. (141) | Corrected Md. | 2105.16 | 3 | 6.96*** | .08 |
| Nonconformity | L Coh. (102) | Intercept | 17878.76 | 1 | 177.42*** | |
| | | Gender | 23.74 | 1 | 0.24 | |
| | | Brain Injury | 250.16 | 1 | 2.48 | |
| | | Cohesion Grp. | 1658.69 | 1 | 16.46*** | |
| | | Error | 24083.81 | 239 | | |
| Blame | H Coh. (141) | Corrected Md. | 2463.14 | 3 | 8.61*** | .10 |
| Externalization | L Coh. (102) | Intercept | 17709.53 | 1 | 185.64*** | |
| | | Gender | 67.15 | 1 | 0.70 | |
| | | Brain Injury | 161.97 | 1 | 1.70 | |
| | | Cohesion Grp. | 2087.47 | 1 | 21.88*** | |
| | | Error | 22800.48 | 239 | | |

Table 25 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Carefree | H Coh. (141) | Corrected Md. | 700.39 | 3 | 1.94 | .02 |
| Nonplanfullness | L Coh. (102) | Intercept | 14473.79 | 1 | 120.51*** | |
| | | Gender | 0.37 | 1 | 0.00 | |
| | | Brain Injury | 20.66 | 1 | 0.17 | |
| | | Cohesion Grp. | 637.92 | 1 | 5.31* | |
| | | Error | 28705.46 | 239 | | |
| Social Influence | H Coh. (141) | Corrected Md. | 613.00 | 3 | 2.03 | .03 |
| | L Coh. (102) | Intercept | 18130.11 | 1 | 197.70*** | |
| | | Gender | 0.39 | 1 | 0.00 | |
| | | Brain Injury | 539.41 | 1 | 5.35* | |
| | | Cohesion Grp. | 129.10 | 1 | 1.28 | |
| | | Error | 24113.05 | 239 | | |
| Fearlessness | H Coh. (141) | Corrected Md. | 1922.05 | 3 | 6.37*** | .07 |
| | L Coh. (102) | Intercept | 20154.18 | 1 | 200.36*** | |
| | | Gender | 275.12 | 1 | 2.74 | |
| | | Brain Injury | 1427.69 | 1 | 14.19*** | |
| | | Cohesion Grp. | 147.80 | 1 | 1.47 | |
| | | Error | 24040.47 | 239 | | |

Table 25 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Stress Immunity | H Coh. (140) | Corrected Md. | 992.51 | 3 | 3.15* | .04 |
| | L Coh. (102) | Intercept | 16364.96 | 1 | 155.68*** | |
| | | Gender | 3.13 | 1 | 0.03 | |
| | | Brain Injury | 217.22 | 1 | 2.07 | |
| | | Cohesion Grp. | 863.24 | 1 | 8.21** | |
| | | Error | 25018.61 | 238 | | |
| Self-Centered | H Coh. (141) | Corrected Md. | 3613.01 | 3 | 11.01*** | .12 |
| Impulsivity | L Coh. (102) | Intercept | 19471.75 | 1 | 178.04*** | |
| | | Gender | 46.05 | 1 | 0.42 | |
| | | Brain Injury | 441.59 | 1 | 4.04 | |
| | | Cohesion Grp. | 2828.80 | 1 | 25.87*** | |
| | | Error | 26138.22 | 239 | | |
| Fearless | H Coh. (140) | Corrected Md. | 1468.23 | 3 | 4.09** | .05 |
| Dominance | L Coh. (102) | Intercept | 20490.09 | 1 | 171.32*** | |
| | | Gender | 81.43 | 1 | 0.68 | |
| | | Brain Injury | 1345.69 | 1 | 11.25*** | |
| | | Cohesion Grp. | 154.14 | 1 | 1.29 | |
| | | Error | 28465.76 | 238 | | |

Table 25 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H Coh. (141) | Corrected Md. | 576.33 | 3 | 1.26 | .02 |
| | L Coh. (102) | Intercept | 16642.35 | 1 | 109.49*** | |
| | | Gender | 1.20 | 1 | 0.01 | |
| | | Brain Injury | 85.44 | 1 | 0.56 | |
| | | Cohesion Grp. | 429.96 | 1 | 2.83 | |
| | | Error | 36329.30 | 239 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Cohesion scores were separated using a median split technique. High scores (H), Low scores (L). *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 26

*ANCOVA Results of High vs. Low FES Conflict Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H Con (124) | Corrected Md. | 4147.71 | 3 | 11.51*** | .13 |
| | L Con (118) | Intercept | 23794.97 | 1 | 198.17*** | |
| | | Gender | 0.76 | 1 | 0.01 | |
| | | Brain Injury | 1201.03 | 1 | 10.00** | |
| | | Conflict Grp. | 2459.96 | 1 | 20.49*** | |
| | | Error | 28577.85 | 238 | | |
| Machiavellian | H Con (124) | Corrected Md. | 2763.81 | 3 | 7.96*** | .09 |
| Egocentricity | L Con (119) | Intercept | 21897.69 | 1 | 189.13*** | |
| | | Gender | 11.90 | 1 | 0.10 | |
| | | Brain Injury | 549.49 | 1 | 4.75* | |
| | | Conflict Grp. | 1937.71 | 1 | 16.74*** | |
| | | Error | 27672.19 | 239 | | |

Table 26 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H Con (124) | Corrected Md. | 2112.16 | 3 | 6.99*** | .08 |
| Nonconformity | L Con (119) | Intercept | 19356.01 | 1 | 192.14*** | |
| | | Gender | 0.93 | 1 | 0.01 | |
| | | Brain Injury | 258.98 | 1 | 2.57 | |
| | | Conflict Grp. | 1665.68 | 1 | 16.54*** | |
| | | Error | 24076.81 | 239 | | |
| Blame Extern- | H Con (124) | Corrected Md. | 3005.91 | 3 | 10.76*** | .12 |
| alization | L Con (119) | Intercept | 19239.67 | 1 | 206.59*** | |
| | | Gender | 1.06 | 1 | 0.01 | |
| | | Brain Injury | 153.63 | 1 | 1.65 | |
| | | Conflict Grp. | 2630.24 | 1 | 28.24*** | |
| | | Error | 22257.71 | 239 | | |
| Carefree | H Con (124) | Corrected Md. | 1752.48 | 3 | 5.05** | .06 |
| Nonplan- | L Con (119) | Intercept | 15190.14 | 1 | 131.28*** | |
| fullness | | Gender | 35.27 | 1 | 0.31 | |
| | | Brain Injury | 8.30 | 1 | 0.07 | |
| | | Conflict Grp. | 1690.01 | 1 | 14.61*** | |
| | | Error | 27653.37 | 239 | | |

Table 26 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social | H Con (124) | Corrected Md. | 489.27 | 3 | 1.61 | .02 |
| Influence | L Con (119) | Intercept | 18001.59 | 1 | 177.52*** | |
| | | Gender | 0.54 | 1 | 0.01 | |
| | | Brain Injury | 465.73 | 1 | 4.59* | |
| | | Conflict Grp. | 5.37 | 1 | 0.05 | |
| | | Error | 24236.78 | 239 | | |
| Fearlessness | H Con (124) | Corrected Md. | 2096.64 | 3 | 7.00*** | .08 |
| | L Con (119) | Intercept | 20826.05 | 1 | 208.56*** | |
| | | Gender | 199.56 | 1 | 2.0 | |
| | | Brain Injury | 1385.64 | 1 | 13.88*** | |
| | | Conflict Grp. | 322.39 | 1 | 3.23 | |
| | | Error | 23865.88 | 239 | | |
| Stress | H Con (124) | Corrected Md. | 581.69 | 3 | 1.82 | .02 |
| Immunity | L Con (118) | Intercept | 15836.12 | 1 | 148.21*** | |
| | | Gender | 25.49 | 1 | 0.24 | |
| | | Brain Injury | 185.31 | 1 | 1.73 | |
| | | Conflict Grp. | 452.42 | 1 | 4.23* | |
| | | Error | 25429.43 | 238 | | |

Table 26 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H Con (124) | Corrected Md. | 4813.89 | 3 | 15.38*** | .16 |
| Impulsivity | L Con (119) | Intercept | 21243.83 | 1 | 203.60*** | |
| | | Gender | 3.82 | 1 | 0.04 | |
| | | Brain Injury | 407.81 | 1 | 3.91* | |
| | | Conflict Grp. | 4029.59 | 1 | 38.62*** | |
| | | Error | 24937.43 | 239 | | |
| Fearless | H Con (124) | Corrected Md. | 1314.09 | 3 | 3.64* | .04 |
| Dominance | L Con (118) | Intercept | 20366.00 | 1 | 169.36*** | |
| | | Gender | 86.90 | 1 | 0.72 | |
| | | Brain Injury | 1236.68 | 1 | 10.28** | |
| | | Conflict Grp. | 1.745E-5 | 1 | 0.00 | |
| | | Error | 610780.00 | 238 | | |

Table 26 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldhearted | H Con (124) | Corrected Md. | 1185.21 | 3 | 2.64* | .03 |
| -ness | L Con (119) | Intercept | 17370.68 | 1 | 116.23*** | |
| | | Gender | 28.13 | 1 | 0.19 | |
| | | Brain Injury | 64.91 | 1 | 0.43 | |
| | | Conflict Grp. | 1038.84 | 1 | 6.95** | |
| | | Error | | 239 | | |

*Note*. One participant's scores not used due to missing responses. Median split used for Conflict scale. High scores (H), Low scores (L). *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 27

*ANCOVA Results of High vs. Low FES Control Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H Cont.(154) | Corrected Md. | 1690.31 | 3 | 4.32** | .05 |
| | L Cont.(88) | Intercept | 24345.60 | 1 | 186.70*** | |
| | | Gender | 46.51 | 1 | 0.36 | |
| | | Brain Injury | 1667.24 | 1 | 12.79*** | |
| | | Control Group | 2.56 | 1 | 0.02 | |
| | | Error | 31035.25 | 238 | | |
| Machiavellian | H Cont.(154) | Corrected Md. | 826.13 | 3 | 2.22 | .03 |
| Egocentricity | L Cont.(89) | Intercept | 22420.05 | 1 | 180.97*** | |
| | | Gender | 1.96 | 1 | 0.02 | |
| | | Brain Injury | 823.90 | 1 | 6.65* | |
| | | Control Group | 0.03 | 1 | 0.00 | |
| | | Error | 29609.87 | 239 | | |

Table 27 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H Cont.(154) | Corrected Md. | 473.48 | 3 | 1.47 | .02 |
| Nonconformity | L Cont.(89) | Intercept | 19680.94 | 1 | 182.92*** | |
| | | Gender | 20.77 | 1 | 0.19 | |
| | | Brain Injury | 450.83 | 1 | 4.19* | |
| | | Control Group | 27.01 | 1 | 0.25 | |
| | | Error | 25715.48 | 239 | | |
| Blame | H Cont.(154) | Corrected Md. | 865.02 | 3 | 2.82* | .03 |
| Externalization | L Cont.(89) | Intercept | 20412.41 | 1 | 199.95*** | |
| | | Gender | 3.67 | 1 | 0.04 | |
| | | Brain Injury | 294.81 | 1 | 2.89 | |
| | | Control Group | 489.35 | 1 | 4.80* | |
| | | Error | 24398.60 | 239 | | |
| Carefree | H Cont.(154) | Corrected Md. | 68.98 | 3 | 0.19 | .00 |
| Nonplanfullness | L Cont.(89) | Intercept | 15668.74 | 1 | 127.45*** | |
| | | Gender | 3.74 | 1 | 0.03 | |
| | | Brain Injury | 56.88 | 1 | 0.46 | |
| | | Control Group | 6.52 | 1 | 0.05 | |
| | | Error | 29336.87 | 239 | | |

Table 27 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H Cont.(154) | Corrected Md. | 529.72 | 3 | 1.74 | .02 |
| | L Cont.(89) | Intercept | 18093.89 | 1 | 178.72*** | |
| | | Gender | .20 | 1 | 0.00 | |
| | | Brain Injury | 465.42 | 1 | 4.60* | |
| | | Control Group | 45.81 | 1 | 0.45 | |
| | | Error | 24196.33 | 239 | | |
| Fearlessness | H Cont.(154) | Corrected Md. | 1785.46 | 3 | 5.88*** | .07 |
| | L Cont.(89) | Intercept | 20876.93 | 1 | 206.38*** | |
| | | Gender | 273.59 | 1 | 2.71 | |
| | | Brain Injury | 1576.18 | 1 | 15.58*** | |
| | | Control Group | 11.21 | 1 | 0.11 | |
| | | Error | 24177.06 | 239 | | |
| Stress Immunity | H Cont.(154) | Corrected Md. | 238.08 | 3 | 0.73 | .01 |
| | L Cont.(88) | Intercept | 15237.59 | 1 | 140.71*** | |
| | | Gender | 23.21 | 1 | 0.21 | |
| | | Brain Injury | 138.87 | 1 | 1.28 | |
| | | Control Group | 108.81 | 1 | 1.01 | |
| | | Error | 25773.05 | 238 | | |

Table 27 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H Cont.(154) | Corrected Md. | 827.69 | 3 | 2.28 | .03 |
| Impulsivity | L Cont.(89) | Intercept | 22229.55 | 1 | 183.69*** | |
| | | Gender | 12.66 | 1 | 0.11 | |
| | | Brain Injury | 746.50 | 1 | 6.17* | |
| | | Control Group | 43.40 | 1 | 0.36 | |
| | | Error | 28923.62 | 239 | | |
| Fearless | H Cont.(154) | Corrected Md. | 1316.93 | 3 | 3.65* | .04 |
| Dominance | L Cont.(88) | Intercept | 20193.20 | 1 | 167.94*** | |
| | | Gender | 90.76 | 1 | 0.76 | |
| | | Brain Injury | 1256.90 | 1 | 10.45*** | |
| | | Control Group | 2.84 | 1 | 0.02 | |
| | | Error | 28617.05 | 238 | | |

Table 27 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H Cont.(154) | Corrected Md. | 607.62 | 3 | 1.33 | .02 |
| | L Cont.(89) | Intercept | 17181.16 | 1 | 113.13*** | |
| | | Gender | 7.71 | 1 | 0.05 | |
| | | Brain Injury | 171.29 | 1 | 1.13 | |
| | | Control Group | 461.25 | 1 | 3.04 | |
| | | Error | 36298.01 | 239 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Control scores were separated using a median split technique. High scores (H), Low scores (L). *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 28

*ANCOVA Results of High vs. Low FES Expressiveness Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H Exp. (129) | Corrected Md. | 1702.41 | 3 | 4.35** | .05 |
| | L Exp. (113) | Intercept | 24477.83 | 1 | 187.79*** | |
| | | Gender | 43.18 | 1 | 0.33 | |
| | | Brain Injury | 1643.58 | 1 | 12.61*** | |
| | | Exp. Group | 14.66 | 1 | 0.11 | |
| | | Error | 31023.15 | 238 | | |
| Machiavellian | H Exp. (130) | Corrected Md. | 997.96 | 3 | 2.70* | .03 |
| Egocentricity | L Exp. (113) | Intercept | 22341.22 | 1 | 181.38*** | |
| | | Gender | 1.57 | 1 | 0.01 | |
| | | Brain Injury | 784.65 | 1 | 6.37* | |
| | | Exp. Group | 171.86 | 1 | 1.40 | |
| | | Error | 29438.04 | 239 | | |

Table 28 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H Exp. (130) | Corrected Md. | 800.95 | 3 | 2.51 | .03 |
| Nonconformity | L Exp. (113) | Intercept | 19643.99 | 1 | 184.93*** | |
| | | Gender | 11.14 | 1 | 0.11 | |
| | | Brain Injury | 397.95 | 1 | 3.75 | |
| | | Exp. Group | 354.48 | 1 | 3.34 | |
| | | Error | 25388.01 | 239 | | |
| Blame | H Exp. (130) | Corrected Md. | 2098.58 | 3 | 7.22*** | .08 |
| Externalization | L Exp. (113) | Intercept | 19340.10 | 1 | 199.54*** | |
| | | Gender | 39.06 | 1 | 0.40 | |
| | | Brain Injury | 264.31 | 1 | 2.72 | |
| | | Exp. Group | 1722.91 | 1 | 17.78*** | |
| | | Error | 23165.03 | 239 | | |
| Carefree | H Exp. (130) | Corrected Md. | 256.60 | 3 | 0.70 | .01 |
| Nonplanfullness | L Exp. (113) | Intercept | 15513.68 | 1 | 127.20*** | |
| | | Gender | 2.50 | 1 | 0.02 | |
| | | Brain Injury | 48.40 | 1 | 0.40 | |
| | | Exp. Group | 194.13 | 1 | 1.59 | |
| | | Error | 29149.26 | 239 | | |

Table 28 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H Exp. (130) | Corrected Md. | 1037.50 | 3 | 3.49* | .04 |
| | L Exp. (113) | Intercept | 18361.78 | 1 | 185.26*** | |
| | | Gender | 1.57 | 1 | 0.02 | |
| | | Brain Injury | 538.54 | 1 | 5.43* | |
| | | Exp. Group | 553.59 | 1 | 5.59* | |
| | | Error | 23688.56 | 239 | | |
| Fearlessness | H Exp. (130) | Corrected Md. | 1845.41 | 3 | 6.10*** | .07 |
| | L Exp. (113) | Intercept | 21209.38 | 1 | 210.18*** | |
| | | Gender | 265.29 | 1 | 2.63 | |
| | | Brain Injury | 1597.09 | 1 | 15.83*** | |
| | | Exp. Group | 71.15 | 1 | 0.71 | |
| | | Error | 24117.11 | 239 | | |
| Stress Immunity | H Exp. (129) | Corrected Md. | 979.16 | 3 | 3.10* | .04 |
| | L Exp. (113) | Intercept | 15949.33 | 1 | 151.64*** | |
| | | Gender | 9.37 | 1 | 0.09 | |
| | | Brain Injury | 162.40 | 1 | 1.54 | |
| | | Exp. Group | 849.89 | 1 | 8.08** | |
| | | Error | 25031.97 | 238 | | |

Table 28 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H Exp. (130) | Corrected Md. | 1793.50 | 3 | 5.11** | .06 |
| Impulsivity | L Exp. (113) | Intercept | 21678.21 | 1 | 185.32*** | |
| | | Gender | 22.12 | 1 | 0.19 | |
| | | Brain Injury | 677.78 | 1 | 5.79* | |
| | | Exp. Group | 1009.21 | 1 | 8.63** | |
| | | Error | 27957.81 | 239 | | |
| Fearless | H Exp. (129) | Corrected Md. | 2102.95 | 3 | 6.00*** | .07 |
| Dominance | L Exp. (113) | Intercept | 20775.74 | 1 | 177.67*** | |
| | | Gender | 96.61 | 1 | 0.82 | |
| | | Brain Injury | 1360.91 | 1 | 11.64*** | |
| | | Exp. Group | 788.86 | 1 | 6.75* | |
| | | Error | 27831.04 | 238 | | |

Table 28 (Continued)

| PPI-R Scale | FES Scale (*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H Exp. (130) | Corrected Md. | 200.67 | 3 | 0.44 | .01 |
| | L Exp. (113) | Intercept | 17896.87 | 1 | 116.53*** | |
| | | Gender | 2.86 | 1 | 0.02 | |
| | | Brain Injury | 149.10 | 1 | 0.98 | |
| | | Exp. Group | 54.30 | 1 | 0.35 | |
| | | Error | 36704.96 | 239 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Expressiveness scores were split using a median split technique. High scores (H), Low scores (L). *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 29

*ANCOVA Results of High vs. Low FES Moral and Religious Emphasis Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H MRE(150) | Corrected Md. | 2264.28 | 3 | 5.90*** | .07 |
| | L MRE(92) | Intercept | 24934.86 | 1 | 194.82*** | |
| | | Gender | 36.56 | 1 | 0.29 | |
| | | Brain Injury | 1828.96 | 1 | 14.29*** | |
| | | MRE Group | 576.53 | 1 | 4.51* | |
| | | Error | 30461.27 | 238 | | |
| Machiavellian | H MRE(150) | Corrected Md. | 1339.57 | 3 | 3.67* | .04 |
| Egocentricity | L MRE(93) | Intercept | 22913.62 | 1 | 188.21*** | |
| | | Gender | 0.52 | 1 | 0.00 | |
| | | Brain Injury | 935.01 | 1 | 7.68** | |
| | | MRE Group | 513.46 | 1 | 4.22* | |
| | | Error | 29096.43 | 239 | | |

Table 29 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H MRE(150) | Corrected Md. | 804.69 | 3 | 2.53 | .03 |
| Nonconformity | L MRE(93) | Intercept | 20209.33 | 1 | 190.28*** | |
| | | Gender | 8.87 | 1 | 0.08 | |
| | | Brain Injury | 506.88 | 1 | 4.77* | |
| | | MRE Group | 358.22 | 1 | 3.37 | |
| | | Error | 25384.27 | 239 | | |
| Blame | H MRE(150) | Corrected Md. | 382.95 | 3 | 1.23 | .02 |
| Externalization | L MRE(93) | Intercept | 19990.43 | 1 | 192.03*** | |
| | | Gender | 43.87 | 1 | 0.42 | |
| | | Brain Injury | 347.16 | 1 | 3.34 | |
| | | MRE Group | 7.28 | 1 | 0.07 | |
| | | Error | 24880.66 | 239 | | |
| Carefree | H MRE(150) | Corrected Md. | 490.86 | 3 | 1.35 | .02 |
| Nonplanfullness | L MRE(93) | Intercept | 15975.90 | 1 | 132.05*** | |
| | | Gender | 4.19 | 1 | 0.04 | |
| | | Brain Injury | 89.24 | 1 | 0.74 | |
| | | MRE Group | 428.39 | 1 | 3.54 | |
| | | Error | 28914.99 | 239 | | |

Table 29 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H MRE(150) | Corrected Md. | 605.72 | 3 | 2.00 | .02 |
| | L MRE(93) | Intercept | 17865.32 | 1 | 177.02*** | |
| | | Gender | 1.76 | 1 | 0.02 | |
| | | Brain Injury | 439.79 | 1 | 4.36* | |
| | | MRE Group | 121.81 | 1 | 1.21 | |
| | | Error | 24120.34 | 239 | | |
| Fearlessness | H MRE(150) | Corrected Md. | 2244.61 | 3 | 7.54*** | .09 |
| | L MRE(93) | Intercept | 21418.74 | 1 | 215.83*** | |
| | | Gender | 241.57 | 1 | 2.43 | |
| | | Brain Injury | 1704.63 | 1 | 17.18*** | |
| | | MRE Group | 470.36 | 1 | 4.74* | |
| | | Error | 23717.91 | 239 | | |
| Stress Immunity | H MRE(150) | Corrected Md. | 257.69 | 3 | 0.79 | .01 |
| | L MRE(92) | Intercept | 15421.25 | 1 | 142.52*** | |
| | | Gender | 8.35 | 1 | 0.08 | |
| | | Brain Injury | 102.68 | 1 | 0.95 | |
| | | MRE Group | 128.41 | 1 | 1.19 | |
| | | Error | 25753.44 | 238 | | |

Table 29 (Continued)

| PPI-R Scale | FES Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H MRE(150) | Corrected Md. | 1339.67 | 3 | 3.76* | .05 |
| Impulsivity | L MRE(93) | Intercept | 22550.62 | 1 | 189.70*** | |
| | | Gender | 18.89 | 1 | 0.16 | |
| | | Brain Injury | 879.90 | 1 | 7.40** | |
| | | MRE Group | 555.37 | 1 | 4.67* | |
| | | Error | 28411.65 | 239 | | |
| Fearless | H MRE(150) | Corrected Md. | 1314.76 | 3 | 3.65* | .04 |
| Dominance | L MRE(92) | Intercept | 20370.11 | 1 | 169.40*** | |
| | | Gender | 87.65 | 1 | 0.73 | |
| | | Brain Injury | 1249.61 | 1 | 10.39*** | |
| | | MRE Group | 0.67 | 1 | 0.01 | |
| | | Error | 28619.23 | 238 | | |

Table 29 (Continued)

| PPI-R Scale | FES Scale($n$) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H MRE(150) | Corrected Md. | 1266.28 | 3 | 2.83* | .03 |
| | L MRE(93) | Intercept | 18276.23 | 1 | 122.56*** | |
| | | Gender | 7.68 | 1 | 0.05 | |
| | | Brain Injury | 216.08 | 1 | 1.45 | |
| | | MRE Group | 1119.92 | 1 | 7.51** | |
| | | Error | 35639.35 | 239 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. Moral and Religious Emphasis (MRE) scores were separated using a median split technique. H denotes high scores; L denotes low scores on MRE. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

For hypothesis three, scale and total score distributions on the SSS-V were separated using a median split technique. High and low groups from each SSS-V scale were compared on each scale, factor, and Total scores of the PPI-R to assess for possible effects. Tables 30 through 34 present the effects of membership in high versus low total SSS-V score groups on PPI-R total and subscale mean scores. The results of these analyses showed significant effects for SSS-V group membership on PPI-R Total, Machiavellian Egocentricity, Rebellious Nonconformity, Carefree Nonplanfullness, Social Influence, Fearlessness, Stress Immunity, Self-Centered Impulsivity, and Fearless Dominance scale and factor scores. In general, participants classified in the high SSS-V group tended to produce higher scores on PPI-R scales. For example, the PPI-R mean Total score for participants classified in the low SSS-V group was 46.63, whereas the PPI-R mean total score for participants in the high SSS-V group was 58.36, [$t(242) = 9.13, p < .001$].

Table 30

*PPI-R Mean Scale Score Differences on High vs. Low SSS-V Total Score Groups*

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| PPI Total | Low Total | 124 | 46.63 | 9.69 | -9.13*** | -1.17 |
| | High Total | 120 | 58.36 | 10.40 | | |
| Machiavellian | Low Total | 124 | 50.23 | 10.03 | -4.29*** | -0.55 |
| Egocentricity | High Total | 121 | 56.14 | 11.53 | | |
| Rebellious | Low Total | 124 | 47.70 | 8.41 | -8.65*** | -1.10 |
| Nonconformity | High Total | 121 | 57.74 | 9.72 | | |
| Blame | Low Total | 124 | 53.23 | 9.99 | -1.47 | -0.19 |
| Externalization | High Total | 121 | 55.14 | 10.45 | | |
| Carefree | Low Total | 124 | 47.35 | 10.96 | -3.82*** | -0.49 |
| Nonplanfulness | High Total | 121 | 52.57 | 10.42 | | |
| Social | Low Total | 124 | 46.31 | 9.85 | -4.26*** | -0.54 |
| Influence | High Total | 121 | 51.67 | 9.86 | | |
| Fearlessness | Low Total | 124 | 44.00 | 8.19 | -10.91*** | -1.40 |
| | High Total | 121 | 55.82 | 8.76 | | |
| Stress | Low Total | 124 | 47.77 | 11.01 | -2.50* | -0.32 |
| Immunity | High Total | 120 | 51.10 | 9.71 | | |

Table 30 (Continued)

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low Total | 124 | 49.54 | 10.34 | -6.34*** | -0.81 |
| Impulsivity | High Total | 121 | 57.85 | 10.17 | | |
| Fearless | Low Total | 124 | 44.24 | 10.00 | -7.71*** | -0.99 |
| Dominance | High Total | 120 | 54.18 | 10.14 | | |
| Coldhearted | Low Total | 124 | 50.32 | 11.89 | -1.89 | -0.24 |
| -ness | High Total | 121 | 53.27 | 12.58 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Total scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 31

*PPI-R Mean Scale Score Differences on High vs. Low SSS-V Thrill and Adventure Seeking Groups*

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low TAS | 126 | 49.78 | 11.30 | -3.72*** | -0.48 |
| | High TAS | 118 | 55.18 | 11.36 | | |
| Machiavellian | Low TAS | 127 | 52.94 | 10.88 | -0.30 | -0.04 |
| Egocentricity | High TAS | 118 | 53.37 | 11.53 | | |
| Rebellious | Low TAS | 127 | 50.51 | 9.35 | -3.44*** | -0.44 |
| Non-conformity | High TAS | 118 | 54.97 | 10.92 | | |
| Blame | Low TAS | 127 | 54.56 | 9.58 | 0.61 | 0.08 |
| Externalization | High TAS | 118 | 53.75 | 10.93 | | |
| Carefree | Low TAS | 127 | 50.06 | 11.41 | 0.18 | 0.02 |
| Nonplanfullness | High TAS | 118 | 49.80 | 10.57 | | |
| Social Influence | Low TAS | 127 | 47.76 | 9.73 | -1.91 | -0.24 |
| | High TAS | 118 | 50.24 | 10.56 | | |
| Fearlessness | Low TAS | 127 | 44.35 | 8.58 | -10.32*** | -1.3 |
| | High TAS | 118 | 55.74 | 8.68 | | |
| Stress Immunity | Low TAS | 126 | 47.92 | 9.81 | -2.31* | -0.30 |
| | High TAS | 118 | 51.00 | 11.02 | | |

Table 31 (Continued)

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered | Low TAS | 127 | 52.99 | 10.90 | -0.96 | -0.12 |
| Impulsivity | High TAS | 118 | 54.35 | 11.21 | | |
| Fearless | Low TAS | 126 | 45.20 | 10.29 | -6.06*** | -0.78 |
| Dominance | High TAS | 118 | 53.33 | 10.67 | | |
| Coldheartedness | Low TAS | 127 | 51.89 | 11.95 | 0.15 | 0.02 |
| | High TAS | 118 | 51.66 | 12.72 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Thrill and Adventure Seeking (TAS) scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 32

*PPI-R Mean Scale Score Differences on High vs. Low SSS-V Experience Seeking Groups*

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low ES | 154 | 49.47 | 10.61 | -5.43*** | -0.71 |
| | High ES | 90 | 57.39 | 11.64 | | |
| Machiavellian | Low ES | 154 | 51.83 | 10.31 | -2.42* | -0.31 |
| Egocentricity | High ES | 91 | 55.37 | 12.25 | | |
| Rebellious Non- | Low ES | 154 | 48.82 | 8.61 | -8.60*** | -1.12 |
| conformity | High ES | 91 | 59.15 | 9.85 | | |
| Blame | Low ES | 154 | 53.75 | 9.80 | -0.84 | -0.11 |
| Externalization | High ES | 91 | 54.89 | 10.95 | | |
| Carefree Non- | Low ES | 154 | 49.18 | 11.91 | -1.38 | -0.19 |
| planfullness | High ES | 91 | 51.19 | 9.15 | | |
| Social Influence | Low ES | 154 | 47.58 | 10.11 | -2.78** | -0.37 |
| | High ES | 91 | 51.27 | 9.98 | | |
| Fearlessness | Low ES | 154 | 46.66 | 9.41 | -6.84*** | -0.90 |
| | High ES | 91 | 55.22 | 9.59 | | |
| Stress Immunity | Low ES | 154 | 48.96 | 10.53 | -0.87 | -0.12 |
| | High ES | 90 | 50.18 | 10.48 | | |

Table 32 (Continued)

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered Imp. | Low ES | 154 | 51.33 | 10.81 | -4.42*** | -0.59 |
| | High ES | 91 | 57.56 | 10.37 | | |
| Fearless Dominance | Low ES | 154 | 46.68 | 10.62 | -4.66*** | -0.61 |
| | High ES | 90 | 53.33 | 11.02 | | |
| Coldheartedness | Low ES | 154 | 51.82 | 12.54 | 0.07 | 0.01 |
| | High ES | 91 | 51.70 | 11.96 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Experience Seeking (ES) scores were separated using a median split technique.

*$p \leq .05$, **$p \leq .01$, ***$p \leq .01$.

Table 33

*PPI-R Mean Scale Score Differences on High vs. Low SSS-V Boredom Susceptibility Groups*

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low BS | 134 | 48.01 | 10.18 | -7.12*** | -0.91 |
| | High BS | 110 | 57.72 | 11.07 | | |
| Machiavellian | Low BS | 134 | 49.74 | 9.28 | -5.56*** | -0.70 |
| Egocentricity | High BS | 111 | 57.26 | 11.91 | | |
| Rebellious Non- | Low BS | 134 | 49.24 | 9.73 | -6.08*** | -0.78 |
| conformity | High BS | 111 | 56.78 | 9.60 | | |
| Blame | Low BS | 134 | 52.24 | 10.49 | -3.31*** | -0.43 |
| Externalization | High BS | 111 | 56.50 | 9.45 | | |
| Carefree Non- | Low BS | 134 | 47.37 | 10.92 | -4.13*** | -0.53 |
| planfullness | High BS | 111 | 53.02 | 10.30 | | |
| Social Influence | Low BS | 134 | 47.90 | 9.57 | -1.78 | -0.23 |
| | High BS | 111 | 50.23 | 10.81 | | |
| Fearlessness | Low BS | 134 | 46.73 | 9.46 | -5.47*** | -0.70 |
| | High BS | 111 | 53.59 | 10.12 | | |
| Stress Immunity | Low BS | 134 | 49.12 | 10.83 | -0.48 | -0.06 |
| | High BS | 110 | 49.76 | 10.13 | | |

Table 33 (Continued)

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered Imp. | Low BS | 134 | 49.55 | 10.64 | -6.96*** | -0.90 |
| | High BS | 111 | 58.59 | 9.43 | | |
| Fearless Dominance | Low BS | 134 | 46.96 | 10.13 | -3.42*** | -0.44 |
| | High BS | 110 | 51.78 | 11.94 | | |
| Coldheartedness | Low BS | 134 | 49.87 | 11.81 | -2.70** | -0.35 |
| | High BS | 111 | 54.08 | 12.54 | | |

*Note*. One participant's PPI-R Total and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Boredom Susceptibility (BS) scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 34

*PPI-R Mean Scale Score Differences on High vs. Low SSS-V Disinhibition Groups*

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Total | Low Dis. | 122 | 47.44 | 10.15 | -7.33*** | -0.94 |
| | High Dis. | 122 | 57.34 | 10.91 | | |
| Machiavellian | Low Dis. | 123 | 50.11 | 9.90 | -4.42*** | -0.57 |
| Egocentricity | High Dis. | 122 | 56.20 | 11.59 | | |
| Rebellious | Low Dis. | 123 | 48.49 | 8.99 | -6.90*** | -0.88 |
| Nonconformity | High Dis. | 122 | 56.86 | 9.97 | | |
| Blame | Low Dis. | 123 | 52.88 | 10.26 | -2.00* | -0.26 |
| Externalization | High Dis. | 122 | 55.48 | 10.09 | | |
| Carefree Non- | Low Dis. | 123 | 48.24 | 11.24 | -2.44* | -0.31 |
| planfullness | High Dis. | 122 | 51.63 | 10.50 | | |
| Social Influence | Low Dis. | 123 | 46.89 | 9.90 | -3.24*** | -0.41 |
| | High Dis. | 122 | 51.03 | 10.11 | | |
| Fearlessness | Low Dis. | 123 | 46.04 | 9.58 | -6.21*** | -0.79 |
| | High Dis. | 122 | 53.66 | 9.65 | | |
| Stress Immunity | Low Dis. | 123 | 48.30 | 10.82 | -1.66 | -0.21 |
| | High Dis. | 122 | 50.52 | 10.10 | | |

Table 34 (Continued)

| PPI-R Scales | SSS Scale | *n* | *M* | *SD* | *t* | Cohen's *d* |
|---|---|---|---|---|---|---|
| Self-Centered Imp. | Low Dis. | 123 | 49.94 | 10.43 | -5.60*** | -0.71 |
| | High Dis. | 122 | 57.39 | 10.41 | | |
| Fearless | Low Dis. | 122 | 45.75 | 10.27 | -4.92*** | -0.63 |
| Dominance | High Dis. | 122 | 52.51 | 11.15 | | |
| Coldheartedness | Low Dis. | 123 | 49.29 | 12.29 | -3.24*** | -0.41 |
| | High Dis. | 122 | 54.29 | 11.84 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Disinhibition scores were separated using a median split technique. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Tables 35 through 39 examine the effects of high versus low SSS-V group classification on PPI-R scale mean scores controlling for the effects of gender and history of brain injury. In general, findings presented in Tables 35 through 39 illustrate a pattern in which gender was typically not significant in terms of its effects is a covariate, whereas history of brain injury was a significant covariate. Specifically, history of brain injury had

an effect on SSS-V group classification on PPI-R scores for the variables of Total score, Machiavellian Egocentricity, Fearlessness, and Fearless Dominance.

Table 35

*ANCOVA Results of High vs. Low SSS-V Total Score Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total | H Total(122) | Corrected Md. | 9334.49 | 3 | 31.66*** | .29 |
| | L Total(120) | Intercept | 21309.30 | 1 | 216.82*** | |
| | | Gender | 0.61 | 1 | 0.01 | |
| | | Brain Injury | 685.35 | 1 | 6.97** | |
| | | Total Group | 7646.74 | 1 | 77.80*** | |
| | | Error | 23391.06 | 238 | | |
| Machiavellian | H Total(122) | Corrected Md. | 2681.21 | 3 | 7.70*** | .09 |
| Egocentricity | L Total(121) | Intercept | 20873.67 | 1 | 179.75*** | |
| | | Gender | 1.59 | 1 | 0.01 | |
| | | Brain Injury | 463.52 | 1 | 3.99* | |
| | | Total Group | 1855.11 | 1 | 15.98*** | |
| | | Error | 27754.79 | 239 | | |

Table 35 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H Total(122) | Corrected Md. | 6298.20 | 3 | 25.23*** | .24 |
| Nonconformity | L Total(121) | Intercept | 17345.17 | 1 | 208.41*** | |
| | | Gender | 1.39 | 1 | 0.02 | |
| | | Brain Injury | 72.96 | 1 | 0.88 | |
| | | Total Group | 5851.73 | 1 | 70.31*** | |
| | | Error | 19890.76 | 239 | | |
| Blame | H Total(122) | Corrected Md. | 484.93 | 3 | 1.56 | .02 |
| Externalization | L Total(121) | Intercept | 19414.11 | 1 | 187.26*** | |
| | | Gender | 36.60 | 1 | 0.35 | |
| | | Brain Injury | 274.64 | 1 | 2.65 | |
| | | Total Group | 109.26 | 1 | 1.05 | |
| | | Error | 24778.69 | 239 | | |
| Carefree | H Total(122) | Corrected Md. | 1640.15 | 3 | 4.71** | .06 |
| Nonplanfullness | L Total(121) | Intercept | 14427.52 | 1 | 124.19*** | |
| | | Gender | 15.02 | 1 | 0.13 | |
| | | Brain Injury | 1.66 | 1 | 0.01 | |
| | | Total Group | 1577.68 | 1 | 13.58*** | |
| | | Error | 27765.70 | 239 | | |

Table 35 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H Total(122) | Corrected Md. | 2161.33 | 3 | 7.63*** | .09 |
| | L Total(121) | Intercept | 16617.36 | 1 | 176.01*** | |
| | | Gender | 2.35 | 1 | 0.03 | |
| | | Brain Injury | 231.27 | 1 | 2.45 | |
| | | Total Group | 1677.42 | 1 | 17.77*** | |
| | | Error | 22564.73 | 239 | | |
| Fearlessness | H Total(122) | Corrected Md. | 9442.98 | 3 | 45.54*** | .36 |
| | L Total(121) | Intercept | 18079.70 | 1 | 261.57*** | |
| | | Gender | 115.95 | 1 | 1.68 | |
| | | Brain Injury | 632.52 | 1 | 9.15** | |
| | | Total Group | 7668.73 | 1 | 110.95*** | |
| | | Error | 16519.54 | 239 | | |
| Stress Immunity | H Total(122) | Corrected Md. | 861.13 | 3 | 2.72* | .03 |
| | L Total(120) | Intercept | 14664.55 | 1 | 138.77*** | |
| | | Gender | 0.65 | 1 | 0.01 | |
| | | Brain Injury | 44.46 | 1 | 0.42 | |
| | | Total Group | 731.86 | 1 | 6.93** | |
| | | Error | 25150.00 | 238 | | |

Table 35 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H Total(122) | Corrected Md. | 4516.35 | 3 | 14.26*** | .15 |
| Impulsivity | L Total(121) | Intercept | 19930.80 | 1 | 188.76*** | |
| | | Gender | 1.63 | 1 | 0.02 | |
| | | Brain Injury | 312.63 | 1 | 2.96 | |
| | | Total Group | 3732.06 | 1 | 35.35*** | |
| | | Error | 25234.96 | 239 | | |
| Fearless | H Total(122) | Corrected Md. | 6947.25 | 3 | 23.78*** | .23 |
| Dominance | L Total(120) | Intercept | 17818.46 | 1 | 184.49*** | |
| | | Gender | 18.96 | 1 | 0.20 | |
| | | Brain Injury | 522.27 | 1 | 5.41* | |
| | | Total Group | 5633.16 | 1 | 58.33*** | |
| | | Error | 22986.73 | 238 | | |

Table 35 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldhearted | H Total(122) | Corrected Md. | 628.15 | 3 | 1.40 | .02 |
| -ness | L Total(121) | Intercept | 16952.92 | 1 | 111.69*** | |
| | | Gender | 9.74 | 1 | 0.06 | |
| | | Brain Injury | 67.82 | 1 | 0.45 | |
| | | Total Group | 481.78 | 1 | 3.17 | |
| | | Error | 36277.48 | 239 | | |

*Note*. One participant's Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Total scores were separated using a median split technique. H denotes high Total scores, L denotes low Total scores. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 36

*ANCOVA Results of High vs. Low SSS-V Thrill and Adventure Seeking Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total | H TAS(125) | Corrected Md. | 3176.32 | 3 | 8.53*** | .10 |
| | L TAS(117) | Intercept | 24577.88 | 1 | 197.96*** | |
| | | Gender | 0.02 | 1 | 0.00 | |
| | | Brain Injury | 1353.87 | 1 | 10.91*** | |
| | | TAS Group | 1488.56 | 1 | 11.99*** | |
| | | Error | 29549.23 | 238 | | |
| Machiavellian | H TAS(126) | Corrected Md. | 826.90 | 3 | 2.23 | .03 |
| Egocentricity | L TAS(117) | Intercept | 22610.06 | 1 | 182.51*** | |
| | | Gender | 1.50 | 1 | 0.01 | |
| | | Brain Injury | 812.74 | 1 | 6.56* | |
| | | TAS Group | 0.79 | 1 | 0.01 | |
| | | Error | 29609.10 | 239 | | |

Table 36 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H TAS(126) | Corrected Md. | 1534.64 | 3 | 4.96** | .06 |
| Nonconformity | L TAS(117) | Intercept | 19965.33 | 1 | 193.55*** | |
| | | Gender | 5.37 | 1 | 0.05 | |
| | | Brain Injury | 308.47 | 1 | 2.99 | |
| | | TAS Group | 1088.17 | 1 | 10.55*** | |
| | | Error | 24654.32 | 239 | | |
| Blame | H TAS(126) | Corrected Md. | 472.95 | 3 | 1.52 | .02 |
| Externalization | L TAS(117) | Intercept | 20011.36 | 1 | 192.92*** | |
| | | Gender | 69.54 | 1 | 0.67 | |
| | | Brain Injury | 374.93 | 1 | 3.62 | |
| | | TAS Group | 97.29 | 1 | 0.94 | |
| | | Error | 24790.66 | 239 | | |
| Carefree | H TAS(126) | Corrected Md. | 69.10 | 3 | 0.19 | .00 |
| Nonplanfullness | L TAS(117) | Intercept | 15741.23 | 1 | 128.24*** | |
| | | Gender | 0.91 | 1 | 0.01 | |
| | | Brain Injury | 62.73 | 1 | 0.51 | |
| | | TAS Group | 6.63 | 1 | 0.05 | |
| | | Error | 29336.76 | 239 | | |

Table 36 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H TAS(126) | Corrected Md. | 846.54 | 3 | 2.82* | .03 |
| | L TAS(117) | Intercept | 18070.94 | 1 | 180.86*** | |
| | | Gender | 5.63 | 1 | 0.06 | |
| | | Brain Injury | 399.29 | 1 | 4.00* | |
| | | TAS Group | 362.63 | 1 | 3.63 | |
| | | Error | 23879.52 | 239 | | |
| Fearlessness | H TAS(126) | Corrected Md. | 8876.86 | 3 | 41.39*** | .34 |
| | L TAS(117) | Intercept | 21105.77 | 1 | 295.24*** | |
| | | Gender | 1.23 | 1 | 0.02 | |
| | | Brain Injury | 957.48 | 1 | 13.39*** | |
| | | TAS Group | 7102.61 | 1 | 99.35*** | |
| | | Error | 17085.66 | 239 | | |
| Stress Immunity | H TAS(125) | Corrected Md. | 685.06 | 3 | 2.15 | .03 |
| | L TAS(117) | Intercept | 15600.08 | 1 | 146.60 | |
| | | Gender | 2.23 | 1 | 0.02 | |
| | | Brain Injury | 77.25 | 1 | 0.73 | |
| | | TAS Group | 555.79 | 1 | 5.22* | |
| | | Error | 25326.06 | 238 | | |

Table 36 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H TAS(126) | Corrected Md. | 837.44 | 3 | 2.31 | .03 |
| Impulsivity | L TAS(117) | Intercept | 22231.74 | 1 | 183.77*** | |
| | | Gender | 13.62 | 1 | 0.11 | |
| | | Brain Injury | 722.37 | 1 | 5.97* | |
| | | TAS Group | 53.14 | 1 | 0.44 | |
| | | Error | 28913.88 | 239 | | |
| Fearless | H TAS(125) | Corrected Md. | 5016.59 | 3 | 15.97*** | .17 |
| Dominance | L TAS(117) | Intercept | 20375.54 | 1 | 194.62*** | |
| | | Gender | 1.59 | 1 | 0.02 | |
| | | Brain Injury | 854.16 | 1 | 8.16** | |
| | | TAS Group | 3702.50 | 1 | 35.37*** | |
| | | Error | 24917.40 | 238 | | |

Table 36 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldhearted | H TAS(126) | Corrected Md. | 154.37 | 3 | 0.34 | .00 |
| -ness | L TAS(117) | Intercept | 17843.67 | 1 | 116.04*** | |
| | | Gender | 1.55 | 1 | 0.01 | |
| | | Brain Injury | 146.39 | 1 | 0.95 | |
| | | TAS Group | 8.00 | 1 | 0.05 | |
| | | Error | 36751.26 | 239 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Thrill and Adventure Seeking (TAS) scores were separated using a median split technique. H denotes high TAS scores, L denotes low TAS scores. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 37

*ANCOVA Results of High vs. Low SSS-V Experience Seeking Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H ES(152) | Corrected Md. | 5161.76 | 3 | 14.86*** | .16 |
| | L ES(90) | Intercept | 24582.28 | 1 | 212.26*** | |
| | | Gender | 50.75 | 1 | .44 | |
| | | Brain Injury | 1466.85 | 1 | 12.67*** | |
| | | ES Group | 3474.01 | 1 | 30.00*** | |
| | | Error | 27563.80 | 238 | | |
| Machiavellian | H ES(152) | Corrected Md. | 1511.25 | 3 | 4.16** | .05 |
| Egocentricity | L ES(91) | Intercept | 22588.68 | 1 | 186.65*** | |
| | | Gender | 3.12 | 1 | .03 | |
| | | Brain Injury | 766.25 | 1 | 6.33* | |
| | | ES Group | 685.14 | 1 | 5.66* | |
| | | Error | 28924.75 | 239 | | |

Table 37 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H ES(152) | Corrected Md. | 6479.88 | 3 | 26.19*** | .25 |
| Nonconformity | L ES(91) | Intercept | 19917.54 | 1 | 241.53*** | |
| | | Gender | 21.54 | 1 | 0.26 | |
| | | Brain Injury | 319.42 | 1 | 3.87* | |
| | | ES Group | 6033.41 | 1 | 73.16*** | |
| | | Error | 19709.08 | 239 | | |
| Blame | H ES(152) | Corrected Md. | 422.97 | 3 | 1.36 | .02 |
| Externalization | L ES(91) | Intercept | 20002.14 | 1 | 192.45*** | |
| | | Gender | 46.29 | 1 | 0.45 | |
| | | Brain Injury | 330.57 | 1 | 3.18 | |
| | | ES Group | 47.30 | 1 | 0.46 | |
| | | Error | 24840.65 | 239 | | |
| Carefree | H ES(152) | Corrected Md. | 266.73 | 3 | 0.73 | .01 |
| Nonplanfullness | L ES(91) | Intercept | 15730.43 | 1 | 129.02*** | |
| | | Gender | 1.51 | 1 | 0.01 | |
| | | Brain Injury | 50.81 | 1 | 0.42 | |
| | | ES Group | 204.26 | 1 | 1.68 | |
| | | Error | 29139.12 | 239 | | |

Table 37 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H ES(152) | Corrected Md. | 1294.83 | 3 | 4.40** | .05 |
| | L ES(91) | Intercept | 18056.72 | 1 | 184.18*** | |
| | | Gender | 1.95 | 1 | 0.02 | |
| | | Brain Injury | 434.78 | 1 | 4.44* | |
| | | ES Group | 810.92 | 1 | 8.27** | |
| | | Error | 23431.23 | 239 | | |
| Fearlessness | H ES(152) | Corrected Md. | 5877.92 | 3 | 23.32*** | .23 |
| | L ES(91) | Intercept | 21087.55 | 1 | 250.94*** | |
| | | Gender | 292.45 | 1 | 3.48 | |
| | | Brain Injury | 1369.21 | 1 | 16.29*** | |
| | | ES Group | 4103.67 | 1 | 48.83*** | |
| | | Error | 20084.60 | 239 | | |
| Stress Immunity | H ES(152) | Corrected Md. | 243.61 | 3 | 0.75 | .01 |
| | L ES(90) | Intercept | 15610.04 | 1 | 144.18*** | |
| | | Gender | 7.32 | 1 | 0.07 | |
| | | Brain Injury | 114.84 | 1 | 1.06 | |
| | | ES Group | 114.34 | 1 | 1.06 | |
| | | Error | 25767.51 | 238 | | |

Table 37 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H ES(152) | Corrected Md. | 2888.15 | 3 | 8.57*** | .10 |
| Impulsivity | L ES(91) | Intercept | 22197.00 | 1 | 197.49*** | |
| | | Gender | 32.50 | 1 | 0.29 | |
| | | Brain Injury | 671.06 | 1 | 5.97* | |
| | | ES Group | 2103.86 | 1 | 18.72*** | |
| | | Error | 26863.16 | 239 | | |
| Fearless | H ES(152) | Corrected Md. | 3875.58 | 3 | 11.80*** | .13 |
| Dominance | L ES(90) | Intercept | 20396.70 | 1 | 186.29*** | |
| | | Gender | 96.19 | 1 | 0.88 | |
| | | Brain Injury | 1106.22 | 1 | 10.10** | |
| | | ES Group | 2561.49 | 1 | 23.40*** | |
| | | Error | 26058.41 | 238 | | |
| Coldheartedness | H ES(152) | Corrected Md. | 147.95 | 3 | 0.32 | .00 |
| | L ES(91) | Intercept | 17843.47 | 1 | 116.02*** | |
| | | Gender | 3.20 | 1 | 0.02 | |
| | | Brain Injury | 142.00 | 1 | 0.92 | |
| | | ES Group | 1.58 | 1 | 0.01 | |
| | | Error | 36757.68 | 239 | | |

Table 37 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H ES(152) | Corrected Md. | 147.95 | 3 | 0.32 | .00 |
| | L ES(91) | Intercept | 17843.47 | 1 | 116.02*** | |
| | | Gender | 3.20 | 1 | 0.02 | |
| | | Brain Injury | 142.00 | 1 | 0.92 | |
| | | ES Group | 1.58 | 1 | 0.01 | |
| | | Error | 36757.68 | 239 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Experience Seeking (ES) scores were separated using a median split technique. H denotes high ES scores, L denotes low ES scores. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 38

*ANCOVA Results of High vs. Low SSS-V Boredom Susceptibility Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H BS(132) | Corrected Md. | 7177.11 | 3 | 22.29*** | .22 |
| | L BS(110) | Intercept | 25168.51 | 1 | 234.46*** | |
| | | Gender | 20.63 | 1 | 0.19 | |
| | | Brain Injury | 1280.41 | 1 | 11.93*** | |
| | | BS Group | 5489.37 | 1 | 51.14*** | |
| | | Error | 25548.44 | 238 | | |
| Machiavellian | H BS(132) | Corrected Md. | 4211.55 | 3 | 12.79*** | .14 |
| Egocentricity | L BS(111) | Intercept | 23005.44 | 1 | 209.66*** | |
| | | Gender | 49.04 | 1 | 0.45 | |
| | | Brain Injury | 622.18 | 1 | 5.67* | |
| | | BS Group | 3385.45 | 1 | 30.85*** | |
| | | Error | 26224.45 | 239 | | |

Table 38 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H BS(132) | Corrected Md. | 3813.76 | 3 | 13.58*** | .15 |
| Nonconformity | L BS(111) | Intercept | 20348.97 | 1 | 217.36*** | |
| | | Gender | 23.57 | 1 | 0.25 | |
| | | Brain Injury | 295.74 | 1 | 3.16 | |
| | | BS Group | 3367.29 | 1 | 35.97*** | |
| | | Error | 22375.20 | 239 | | |
| Blame | H BS(132) | Corrected Md. | 1296.10 | 3 | 4.31** | .05 |
| Externalization | L BS(111) | Intercept | 20196.19 | 1 | 201.39*** | |
| | | Gender | 5.13 | 1 | 0.05 | |
| | | Brain Injury | 271.63 | 1 | 2.71 | |
| | | BS Group | 920.43 | 1 | 9.18** | |
| | | Error | 23967.51 | 239 | | |
| Carefree | H BS(132) | Corrected Md. | 1979.50 | 3 | 5.75*** | .07 |
| Nonplanfullness | L BS(111) | Intercept | 15987.44 | 1 | 139.32*** | |
| | | Gender | 59.66 | 1 | 0.52 | |
| | | Brain Injury | 23.73 | 1 | 0.21 | |
| | | BS Group | 1917.03 | 1 | 16.71*** | |
| | | Error | 27426.35 | 239 | | |

Table 38 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H BS(132) | Corrected Md. | 828.90 | 3 | 2.76* | .03 |
| | L BS(111) | Intercept | 18184.05 | 1 | 181.86*** | |
| | | Gender | 2.86 | 1 | 0.03 | |
| | | Brain Injury | 430.93 | 1 | 4.31* | |
| | | BS Group | 344.99 | 1 | 3.45 | |
| | | Error | 23897.15 | 239 | | |
| Fearlessness | H BS(132) | Corrected Md. | 4287.21 | 3 | 15.76*** | .17 |
| | L BS(111) | Intercept | 21466.46 | 1 | 236.70*** | |
| | | Gender | 77.53 | 1 | 0.86 | |
| | | Brain Injury | 1315.60 | 1 | 14.51*** | |
| | | BS Group | 2512.96 | 1 | 27.71*** | |
| | | Error | 2167531 | 239 | | |
| Stress Immunity | H BS(132) | Corrected Md. | 169.75 | 3 | 0.52 | .01 |
| | L BS(110) | Intercept | 15643.16 | 1 | 144.07*** | |
| | | Gender | 2.67 | 1 | 0.03 | |
| | | Brain Injury | 115.06 | 1 | 1.06 | |
| | | BS Group | 40.48 | 1 | 0.37 | |
| | | Error | 25841.37 | 238 | | |

Table 38 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H BS(132) | Corrected Md. | 5507.26 | 3 | 18.10*** | .19 |
| Impulsivity | L BS(111) | Intercept | 22700.03 | 1 | 223.78*** | |
| | | Gender | 24.05 | 1 | 0.24 | |
| | | Brain Injury | 541.59 | 1 | 5.34* | |
| | | BS Group | 4722.97 | 1 | 46.56*** | |
| | | Error | 24244.06 | 239 | | |
| Fearless | H BS(132) | Corrected Md. | 2655.86 | 3 | 7.72*** | .09 |
| Dominance | L BS(110) | Intercept | 20661.87 | 1 | 180.27*** | |
| | | Gender | 14.38 | 1 | 0.13 | |
| | | Brain Injury | 1082.18 | 1 | 9.44** | |
| | | BS Group | 1341.77 | 1 | 11.71*** | |
| | | Error | 27278.13 | 238 | | |

Table 38 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H BS(132) | Corrected Md. | 1240.06 | 3 | 2.77* | .03 |
| | L BS(111) | Intercept | 18038.33 | 1 | 120.88*** | |
| | | Gender | 42.49 | 1 | 0.29 | |
| | | Brain Injury | 94.60 | 1 | 0.63 | |
| | | BS Group | 1093.69 | 1 | 7.33** | |
| | | Error | 35665.57 | 239 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Boredom Susceptibility (BS) scores were separated using a median split technique. H denotes high BS scores, L denotes low BS scores. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table 39

*ANCOVA Results of High vs. Low SSS-V Disinhibition Groups on PPI-R Scale Scores with Gender and History of Brain Injury as Covariates*

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Total Score | H Dis.(121) | Corrected Md. | 6715.33 | 3 | 20.48*** | .21 |
| | L Dis.(121) | Intercept | 543.52 | 1 | 169.68*** | |
| | | Gender | 113.61 | 1 | 1.04 | |
| | | Brain Injury | 547.19 | 1 | 5.01* | |
| | | Dis. Group | 5027.58 | 1 | 46.00*** | |
| | | Error | 26010.22 | 238 | | |
| Machiavellian | H Dis.(122) | Corrected Md. | 2657.36 | 3 | 7.62*** | .09 |
| Egocentricity | L Dis.(121) | Intercept | 18628.50 | 1 | 160.28*** | |
| | | Gender | 13.28 | 1 | 0.11 | |
| | | Brain Injury | 326.19 | 1 | 2.81 | |
| | | Dis. Group | 1831.25 | 1 | 15.76*** | |
| | | Error | 27778.64 | 239 | | |

Table 39 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Rebellious | H Dis.(122) | Corrected Md. | 4391.07 | 3 | 16.05*** | .17 |
| Nonconformity | L Dis.(121) | Intercept | 15153.37 | 1 | 166.15*** | |
| | | Gender | 46.81 | 1 | 0.51 | |
| | | Brain Injury | 34.44 | 1 | 0.38 | |
| | | Dis. Group | 3944.60 | 1 | 43.25*** | |
| | | Error | 21797.89 | 239 | | |
| Blame | H Dis.(122) | Corrected Md. | 645.04 | 3 | 2.09 | .03 |
| Externalization | L Dis.(121) | Intercept | 17922.89 | 1 | 174.00*** | |
| | | Gender | 57.17 | 1 | 0.60 | |
| | | Brain Injury | 200.80 | 1 | 1.95 | |
| | | Dis. Group | 269.37 | 1 | 2.62 | |
| | | Error | 24618.60 | 239 | | |
| Carefree | H Dis.(122) | Corrected Md. | 707.89 | 3 | 1.97 | .02 |
| Nonplanfullness | L Dis.(121) | Intercept | 13513.73 | 1 | 112.54*** | |
| | | Gender | 0.01 | 1 | 0.00 | |
| | | Brain Injury | 2.61 | 1 | 0.02 | |
| | | Dis. Group | 645.42 | 1 | 5.38* | |
| | | Error | 28697.97 | 239 | | |

Table 39 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Social Influence | H Dis.(122) | Corrected Md. | 1370.32 | 3 | 4.67** | .06 |
| | L Dis.(121) | Intercept | 15374.89 | 1 | 157.33*** | |
| | | Gender | 6.55 | 1 | 0.07 | |
| | | Brain Injury | 210.61 | 1 | 2.16 | |
| | | Dis. Group | 886.41 | 1 | 9.07** | |
| | | Error | 23355.73 | 239 | | |
| Fearlessness | H Dis.(122) | Corrected Md. | 4561.98 | 3 | 16.98*** | .18 |
| | L Dis.(121) | Intercept | 16729.27 | 1 | 186.83*** | |
| | | Gender | 359.16 | 1 | 4.01* | |
| | | Brain Injury | 690.86 | 1 | 7.72** | |
| | | Dis. Group | 2787.72 | 1 | 31.13*** | |
| | | Error | 21400.54 | 239 | | |
| Stress Immunity | H Dis.(121) | Corrected Md. | 386.42 | 3 | 1.20 | .02 |
| | L Dis.(121) | Intercept | 13886.87 | 1 | 128.98*** | |
| | | Gender | 12.42 | 1 | 0.12 | |
| | | Brain Injury | 51.61 | 1 | 0.48 | |
| | | Dis. Group | 257.15 | 1 | 2.39 | |
| | | Error | 25624.70 | 238 | | |

Table 39 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Centered | H Dis.(122) | Corrected Md. | 3679.46 | 3 | 11.24*** | .12 |
| Impulsivity | L Dis.(121) | Intercept | 17617.53 | 1 | 161.50*** | |
| | | Gender | 62.01 | 1 | 0.57 | |
| | | Brain Injury | 211.51 | 1 | 1.94 | |
| | | Dis. Group | 2895.16 | 1 | 26.54*** | |
| | | Error | 26071.86 | 239 | | |
| Fearless | H Dis.(121) | Corrected Md. | 3569.85 | 3 | 10.74*** | .12 |
| Dominance | L Dis.(121) | Intercept | 16382.91 | 1 | 147.90*** | |
| | | Gender | 145.80 | 1 | 1.32 | |
| | | Brain Injury | 553.75 | 1 | 5.00* | |
| | | Dis. Group | 2255.76 | 1 | 20.36*** | |
| | | Error | 26364.14 | 238 | | |

Table 39 (Continued)

| PPI-R Scale | SSS Scale(*n*) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Coldheartedness | H Dis.(122) | Corrected Md. | 1533.74 | 3 | 3.45* | .04 |
| | L Dis.(121) | Intercept | 14743.22 | 1 | 99.62*** | |
| | | Gender | 0.04 | 1 | 0.00 | |
| | | Brain Injury | 8.62 | 1 | 0.06 | |
| | | Dis. Group | 1387.37 | 1 | 9.37** | |
| | | Error | 35371.89 | 239 | | |

*Note*. One participant's PPI-R Total, Stress Immunity, and Fearless Dominance scores could not be included in this analysis due to missing responses. SSS-V Disinhibition scores were separated using a median split technique. H denotes high Disinhibition scores, L denotes low Disinhibition scores. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Hypothesis four was evaluated by dividing subjects into high vs. low sensation seeking groups based on a median split of their SSS-V Total score and high vs. low groups based on a median split of their Total score on the PPI-R. This created four quadrants made up of a high sensation seeking and high PPI-R Total score group, a high sensation seeking and low PPI-R Total score group, a low sensation seeking and high PPI-R Total score group, and low sensation seeking and low PPI-R Total score group.

Table 40 shows the number of participants classified into high versus low PPI-R and SSS-V Total score groups based upon median split techniques used with both variables. The results of a Chi-square analysis show significant [$X^2(1, N = 244) = 47.75$, $p < .001$] differences in the number of participants assigned to these resulting quadrants, with subjects more frequently assigned to the high SSS-V/high PPI-R group and to the low SSS-V/low PPI-R group in comparison to subjects in the two remaining classification categories.

Table 40

*PPI-R and SSS-V Total Score Group Descriptions and Chi Square Results*

| | PPI-R High Total Score | PPI-R Low Total Score | Total |
|---|---|---|---|
| SSS-V High Total Score | $n = 91$ | $n = 33$ | 124 |
| SSS-V Low Total Score | $n = 35$ | $n = 85$ | 120 |
| | | | N = 245* |

| Chi-Square | Value | *df* | *p* | *r* |
|---|---|---|---|---|
| $X^2$ | 47.75 | 1 | $p \leq .001$ | .44 |

*Note.* *One participant's PPI-R Total score could not be included in this analysis due to missing responses.

To further evaluate hypothesis four, the scores on the FES Cohesion, Expressiveness, Conflict, Control and Moral and Religious Emphasis scales were compared for subjects on each of these four quadrants by individual ANOVAs. Table 41 shows the effects of classification into high versus low PPI-R Total score and SSS-V Total score subgroups on FES scale mean scores for each of the five FES scales. Results suggest a significant main effect [$F(3,240) = 4.37$, $p \leq .01$] on the FES Conflict Scale. A post hoc comparison using the Tukey HSD test demonstrated that subjects classified into the low PPI-R Total score/low SSS-V Total score group ($M = 49.03$, $SD = 11.95$) produce significantly lower Conflict scale mean score then subjects in the high PPI-R/high SSS-V group ($M = 55.40$, SD 13.09). A significant main effect [$F(3,240) = 3.57$, $p \leq .05$] was also found for PPI-R/SSS-V group membership on the Moral and Religious Emphasis subscale of the FES. A subsequent post hoc Tukey HSD test showed that individuals classified into the low PPI-R Total score/low SSS-V Total score ($M = 56.15$, SD 11.60) group produced a higher mean score on the Moral and Religious Emphasis scale then did subjects in the high PPI-R/high SS S-V group ($M = 50.69$, SD 12.53). No other main effects were noted.

Table 41

*The Effects of PPI-R and SSS-V High vs. Low Groupings on FES Scale Mean Scale Scores*

| | PPI-R and SSS-V Groups | | | | | |
|---|---|---|---|---|---|---|
| FES Scales | High PPI-R/ High SSS-V (n = 85) | High PPI-R/ Low SSS-V (n = 33) | Low PPI-R/ High SSS-V (n = 35) | Low PPI-R/ Low SSS-V (n = 91) | *F* | $R^2$ |
| Cohesion: | 45.31 | 49.52 | 47.34 | 49.43 | 0.10 | .01 |
| | (17.82) | (16.59) | (17.95) | (16.17) | | |
| Express: | 46.42 | 49.42 | 49.60 | 45.15 | 1.31 | .02 |
| | (15.47) | (12.09) | (13.85) | (13.05) | | |
| Conflict: | 55.40[a] | 53.21 | 55.09 | 49.03[b] | 4.37** | .05 |
| | (13.09) | (12.04) | (12.89) | (11.95) | | |
| MRE: | 50.69[c] | 54.12 | 50.91 | 56.15[d] | 3.57* | .04 |
| | (12.53) | (11.40) | (12.11) | (11.60) | | |

Table 41 (Continued)

| | PPI-R and SSS-V Groups | | | | | |
|---|---|---|---|---|---|---|
| FES Scales | High PPI-R/ High SSS-V (n = 85) | High PPI-R/ Low SSS-V (n = 33) | Low PPI-R/ High SSS-V (n = 35) | Low PPI-R/ Low SSS-V (n = 91) | *F* | $R^2$ |
| Control: | 52.65 (13.16) | 52.67 (11.34) | 54.91 (12.21) | 52.66 (12.08) | 0.33 | .00 |

*Note*. Standard Deviations appear in parentheses below means. One participant's PPI-R Total score could not be calculated for these analyses creating a total sample of 244 participants. For FES scales with significant effects, mean scores denoted by superscript letter indicate significance between individual scale groups as shown in subsequent tests. Conflict group[a] vs. Conflict group[b] showed a significant effect [$F(3, 240) = 4.37$, $p \leq .01$, $r = .25$], as did Moral and Religious Emphasis group[c] vs. Moral and Religious Emphasis group[d] [$F(3, 240) = 3.57$, $p \leq .05$, $r = -.22$]. $^{*}p \leq .05$, $^{**}p \leq .01$, $^{***}p \leq .001$.

Table 42 presents the results of analysis of the effects of PPI-R Total score/SSS-V Total score group classification on individual FES scales with gender, and brain injury status used as potential covariates. Ethnicity was also included as a potential covariate for the Moral and Religious Emphasis scale due to main effects found on this scale in preliminary analyses. The potential covariates were not significant for main effects on the FES scales. Conflict mean scores differences were still significantly different between groups; however, when ethnicity was added as a covariate for the Moral and Religious Emphasis scale, the significant main effect found in the previous ANOVA was no longer present.

Table 42

*The Effects of PPI-R and SSS-V High vs. Low Groupings on FES Mean Scale Scores with History of Brain Injury and Gender as Covariates*

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Cohesion | HPHS ($n$ = 85) | Corrected Md. | 1762.06 | 5 | 1.22 | .03 |
| | HPLS ($n$ = 31) | Intercept | 12591.57 | 1 | 43.41*** | |
| | LPHS ($n$ = 35) | Gender | 825.02 | 1 | 2.84 | |
| | LPLS ($n$ = 91) | Brain Injury | 200.82 | 1 | 0.69 | |
| | | Group | 611.76 | 3 | 0.70 | |
| | | Error | 68459.51 | 236 | | |
| Express- | HPHS ($n$ = 85) | Corrected Md. | 1543.51 | 5 | 1.60 | .03 |
| iveness | HPLS ($n$ = 31) | Intercept | 8516.51 | 1 | 44.00*** | |
| | LPHS ($n$ = 35) | Gender | 52.79 | 1 | 0.27 | |
| | LPLS ($n$ = 91) | Brain Injury | 660.33 | 1 | 3.41 | |
| | | Group | 1088.58 | 3 | 1.88 | |
| | | Error | 45674.99 | 236 | | |

Table 42 (Continued)

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Conflict | HPHS ($n$ = 85) | Corrected Md. | 2784.92 | 5 | 3.65** | .07 |
| | HPLS ($n$ = 31) | Intercept | 17133.33 | 1 | 112.19*** | |
| | LPHS ($n$ = 35) | Gender | 406.86 | 1 | 2.66 | |
| | LPLS ($n$ = 91) | Brain Injury | 274.66 | 1 | 1.80 | |
| | | Group | 1756.49 | 3 | 3.83** | |
| | | Error | 36040.43 | 236 | | |
| Moral and | HPHS ($n$ = 84) | Corrected Md. | 1751.45 | 6 | 1.99 | .05 |
| Religious | HPLS ($n$ = 31) | Intercept | 15068.67 | 1 | 102.83*** | |
| Emphasis | LPHS ($n$ = 34) | Gender | 9.95 | 1 | 0.07 | |
| | LPLS ($n$ = 89) | Brain Injury | 147.58 | 1 | 1.01 | |
| | | Ethnicity[a] | 169.92 | 1 | 1.16 | |
| | | Group | 1426.53 | 3 | 3.25* | |
| | | Error | 33850.40 | 231 | | |

Table 42 (Continued)

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Control | HPHS ($n$ = 85) | Corrected Md. | 1012.52 | 5 | 1.34 | .03 |
| | HPLS ($n$ = 31) | Intercept | 17452.19 | 1 | 115.23*** | |
| | LPHS ($n$ = 35) | Gender | 518.39 | 1 | 3.42 | |
| | LPLS ($n$ = 91) | Brain Injury | 393.55 | 1 | 2.60 | |
| | | Group | 84.81 | 3 | 0.19 | |
| | | Error | 35743.42 | 236 | | |

*Note*. Groups were created using median splits of PPI-R and SSS-V total scores creating 4 groups: High PPI-R total score/High SSS-V total score (HPHS), High PPI-R total score/Low SSS-V total score (HPLS), Low PPI-R total score/High SSS-V total score (LPHS), and Low PPI-R/Low SSS-V total score (LPLS). [a]Ethnicity was added as a covariate in this analysis due to potential demographic effects found on the Moral and Religious Emphasis Scale.*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

As an additional analysis, to evaluate the extent to which findings might change by using extreme scores, rather than using a median split for SSS-V and PPI-R Total scores, scores were separated into top and bottom thirds, excluding participant data falling in the middle. This created four PPI-R/SSS-V groups based on only the highest and lowest participant scores. The same series of ANOVAs were run with no significant main effects found between groups; however, power was substantially reduced with high PPI-R/high SSS-V, high PPI-R/low SSS-V, low PPI-R/high SSS-V, and low PPI-R/low SSS-V Total score groups represented by only 50, 13, six, and 53 participants respectively. Due to this issue and lack of significance, this data is not presented in tabular form.

Hypothesis five was evaluated similarly to hypotheses four, by dividing subjects into high vs. low sensation seeking groups based on a median split of their SSS-V Total score and high vs. low PPI-R Total groups. This created the same four quadrants as in hypothesis three. However, as the low PPI-R/high SSS-V Total score group is the main focus of this analysis; the other three groups were collapsed to form a second group. Using individual ANOVAs, scores on the FES Cohesion, Conflict, Expressiveness, Moral and Religious Emphasis, and Control scales among the low PPI-R/ high SSS-V Total score group were compared with the combined FES scores of the rest of the sample.

Table 43 presents the main effects for the high SSS-V/low PPI-R Total score group versus all other quadrants on mean scale scores for the FES Cohesion, Expressiveness, Conflict, Moral and Religious Emphasis, and Control scales. Results of these analyses consistently showed non-significant differences on FES scale mean scores related to PPI-R and SSS-V classification.

Table 43

*Mean Differences Between High SSS-V and Low PPI-R Total Score Group compared to Remainder of Sample*

| FES Scale | Group (*n*) | *M* | *SD* | *F* | *p* | $R^2$ |
|---|---|---|---|---|---|---|
| Cohesion | HSLP (35) | 47.77 | 16.97 | 0.02 | *ns* | .00 |
| | ROS (209) | 47.34 | 17.95 | | | |
| Expressiveness | HSLP (35) | 46.34 | 13.96 | 1.63 | *ns* | .01 |
| | ROS (209) | 49.60 | 13.85 | | | |
| Conflict | HSLP (35) | 52.28 | 12.73 | 1.45 | *ns* | .01 |
| | ROS (209) | 55.09 | 12.89 | | | |
| Moral/Religious | HSLP (35) | 53.61 | 12.16 | 1.48 | *ns* | .01 |
| Emphasis | ROS (209) | 50.91 | 12.11 | | | |
| Control | HSLP (35) | 52.66 | 12.36 | 1.00 | *ns* | .00 |
| | ROS (209) | 54.91 | 12.21 | | | |

*Note*. HSLP stands for High SSS-V Total score and Low PPI-R Total score group. ROS stands for remainder of sample. Groups were devised using a median split of PPI-R and SSS-V total scores creating 4 groups. HSLP was compared to the combined scores of the 3 remaining groups. $p \leq .05$.

Table 44 presents the same analyses controlling for the potential effects of the covariates of gender and history of brain injury. Ethnicity was also included as a potential covariate for the Moral and Religious Emphasis scale due to main effects found on this scale in preliminary analyses. The covariates were not shown to have a significant effect in any of these analyses. Therefore, the results from table 44 are comparable to those displayed in table 43.

Table 44

*Mean Differences Between the High SSS-V and Low PPI-R Total Score Group Compared to the Remainder of Sample using History of Brain Injury, Gender, and Ethnicity as Covariates*

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Cohesion | HSLP (35) | Corrected Md. | 1155.03 | 3 | 1.33 | .02 |
| | ROS (207) | Intercept | 12265.68 | 1 | 42.27*** | |
| | | Gender | 903.84 | 1 | 3.12 | |
| | | Brain Injury | 300.80 | 1 | 1.04 | |
| | | Group | 4.73 | 1 | 0.02 | |
| | | Error | 69066.54 | 238 | | |

Table 44 (Continued)

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Expressiveness | HSLP (35) | Corrected Md. | 894.42 | 3 | 1.53 | .02 |
| | ROS (207) | Intercept | 9197.45 | 1 | 47.25*** | |
| | | Gender | 53.58 | 1 | 0.28 | |
| | | Brain Injury | 550.88 | 1 | 2.83 | |
| | | Group | 439.49 | 1 | 2.26 | |
| | | Error | 46324.08 | 238 | | |
| Conflict | HSLP (35) | Corrected Md. | 1131.38 | 3 | 2.38 | .03 |
| | ROS (207) | Intercept | 18573.66 | 1 | 117.27*** | |
| | | Gender | 471.98 | 1 | 2.98 | |
| | | Brain Injury | 502.96 | 1 | 3.18 | |
| | | Group | 102.95 | 1 | 0.65 | |
| | | Error | 37693.96 | 238 | | |
| Moral and | HSLP (34) | Corrected Md. | 603.48 | 4 | 1.00 | .01 |
| Religious | ROS (207) | Intercept | 14621.05 | 1 | 97.34*** | |
| Emphasis | | Gender | 30.61 | 1 | 0.20 | |
| | | Brain Injury | 70.27 | 1 | 0.47 | |
| | | Ethnicity[a] | 305.51 | 1 | 2.03 | |
| | | Group | 278.56 | 1 | 1.85 | |
| | | Error | 34998.37 | 233 | | |

Table 44 (Continued)

| FES Scale | Groups (n) | Source | *SS* | *df* | *F* | $R^2$ |
|---|---|---|---|---|---|---|
| Control | HSLP (35) | Corrected Md. | 997.79 | 3 | 2.21 | .03 |
| | ROS (207) | Intercept | 17809.07 | 1 | 118.53*** | |
| | | Gender | 510.49 | 1 | 3.40 | |
| | | Brain Injury | 384.09 | 1 | 2.56 | |
| | | Group | 70.08 | 1 | 0.47 | |
| | | Error | 35758.14 | 238 | | |

*Note*. HSLP stands for High SSS-V Total score and Low PPI-R Total score group. ROS stands for remainder of sample. HSLP was compared to ROS using an ANCOVA procedure with gender and history of brain injury as covariates. [a]Ethnicity was added as a covariate in this analysis due to potential demographic effects found on the Moral and Religious Emphasis Scale. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

# DISCUSSION

Psychopathic and sensation seeking traits are often reported to be substantially correlated (Blackman, 1969; Daderman, 1999; Lilienfeld & Widows, 2005; Zuckerman et al., 1972). However, these constructs differ in that sensation seeking is not inherently related to pathological behavior (Zuckerman, 1994). Many individuals present with high levels of sensation seeking while functioning in psychologically healthy or even prosocial ways (Levonson, 1990), suggesting that psychopathic versus non-psychopathic sensation seekers may have different etiological pathways. Current research suggests that psychopathy may develop from a biological predisposition (Jang, Livesly, Vernon, & Jackson, 1996) as well as from social and familial factors (Farrington et al., 2001; Fontaine et al., 2011). As such, the biopsychosocial model has been postulated as a theory to describe psychopathy development (Paris, 1998). Paris suggests that it is a combination of biological predisposition with environmental factors that lead to the development of psychopathic traits. Using the biopsychosocial model, he argues that environmental factors may trigger an underlying predisposition toward psychopathic traits.

Drawing from Paris's (1998) biopsychosocial theory of psychopathy development, this study posits that a positive family environment may serve as a moderating variable in the development of psychopathic or antisocial personality traits, particularly among those who are already high in sensation seeking. Specifically, it is hypothesized that:

(1) Regardless of sensation seeking level, positive family functioning, reflected by Family Environment Scale (FES) scores, will be associated with lower levels of

psychopathy, as reflected by scale, factor, and total scores on the Psychopathic Personality Inventory-Revised (PPI-R).

(2) Positive family functioning, reflected by FES scale scores, will moderate psychopathy as reflected by scale, factor, and total scores on the PPI-R.

(3) Lower levels of sensation seeking, reflected by low scale and total scores on the Sensation Seeking Scale-V (SSS-V), will be associated with lower levels of psychopathy, as reflected by scale, factor, and total scores on the PPI-R.

(4) High sensation seekers who also have higher levels of psychopathy will have lower levels of family functioning compared to those with high sensation seeking and low levels of psychopathy.

(5) High sensation seekers with low levels of psychopathy will have lower levels of family functioning compared to the rest of the sample.

To investigate these hypotheses, the present study collected survey data from 245 college students. Measures included the Cohesion, Conflict, Expressiveness, and Moral and Religious Emphasis scales of the Family Environment Scale (FES), the Psychopathic Personality Inventory-Revised (PPI-R), and the Sensation Seeking Scale (SSS-V). Individual scores were derived for each of the FES Scales. The PPI-R provided a total score, reflecting overall levels of psychopathy, factor scores (Self-Centered Impulsivity, Fearless Dominance, and Coldheartedness scales) suggesting psychopathic personality trends, and scale scores (Machiavellian Egocentricity, Rebellious Nonconformity, Blame Externalization, Carefree Nonplanfulness, Social Influence, Fearlessness, Stress Immunity) assessing specific psychopathic traits. Similarly, the SSS-V provides a Total score, as well as individual Thrill and Adventure Seeking, Experience Seeking,

Disinhibition, and Boredom Susceptibility trait scores. Finally, a Demographics and Background Questionnaire (DBQ) was used to assess personal history for each participant. Items for this scale included 4 demographics questions (e.g., age, sex, ethnicity, history of brain injury) and 16 personal background questions (i.e., school background, legal history, neighborhood environment).

Prior to examining the main hypotheses, preliminary analyses were used to assess general trends in the data. First, a Principal Component Analyses (PCA) assessed the 16 background questions of the DBQ for factor structure. No meaningful factors were found; however, analyses of individual items, particularly demographic items, provided useful data. Notably, 90 percent of respondents related being between 18 and 24 years of age, women and men accounted for 52 and 48 percent of the sample respectively, and 11 percent of respondents endorsed a history of brain injury. From the clinical items, 16 percent reported a history of child abuse, 25 percent related past or present legal problems, and 36 percent endorsed growing up in a neighborhood with a lot of crime.

Next, a series of MANOVAs were used to assess for possible demographic effects on the PPI-R, SSS-V, and the select FES scales. Results indicated significant demographic effects for history of brain injury, and to a lesser extent, gender on PPI-R Total, factor, and subscale scores. Ethnicity was also found to have a weak, but significant effect on the Moral and Religious Emphasis scale with no effect on any other FES scales used in this study. Follow up analyses indicated a significant difference between participants identifying as African American versus Caucasian, with African American participants reporting higher scores on the Moral and Religious Emphasis scale.

Differences in morality and religiosity among different ethnic groups have been suggested in prior research. Chatters, Taylor, Bullard, and Jackson (2010) found that individuals who identified themselves as African American or Caribbean Black were more likely to be associated with a church and have higher levels of religiosity overall compared to Caucasian Americans. Differences in morality development among different ethnic groups may also be present. Woods and Jagers (2003) argue that for African American groups, morality development largely comes from communal values passed on by the larger group. This is in contrast to more individualistic cultures which may pass on morality through smaller family groups. Regardless, for the purposes of this study, Ethnicity was included as a possible covariate variable on analyses in which Moral and Religious Emphasis was used as an outcome variable, specifically for analyses assessing hypotheses four and five.

In regard to gender, a weak main effect was noted between psychopathic traits and gender with no gender effect found on SSS-V scores. This finding corresponds to previous research (e.g., Forth, Brown, Hart, & Hare, 1996; Lillienfeld and Andrews, 1996) suggesting that men tend to score higher on measures of psychopathy and antisocial personality. However, gender differences on individual PPI-R scale and factor were nonsignificant, suggesting that for many specific traits, male and female participants were similar. Other studies using a college population have had mixed findings in this regard. Some have had notable differences (e.g., Lillienfeld & Andrews, 1996), whereas others found no significant differences (Hamburger, Lilienfeld, & Hogben, 1996). Additional research into gender differences between psychopathic traits among non-clinical or forensic samples is necessary.

The effects of brain injury on PPI-R and SSS-V scores are intriguing. Although this type of injury and its relationship with psychopathy were not considered in the study's original hypotheses, the results suggest that brain trauma may be a separate risk factor for the development of psychopathic traits. Multiple significant relationships between a positive history of brain injury and PPI-R scale and factor scores were found, notably, correlations between brain injury and PPI-R Total score, Fearlessness, and Fearless Dominance scale and factor scores. A history of brain injury was also related to higher scores on several SSS-V scales including SSS-V Total score, Thrill and Adventure Seeking, and Disinhibition.

Analogous to the present study, brain injury has been linked to psychopathic traits in other research, including general aggressive behavior (Baguley, Cooper, & Femingham, 2006), impulsive aggressive behavior (Greve, Sherwin, Stanford, Mathias, Love, & Ramzinski, 2001), inability to foresee consequences and impaired social functioning (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999) as well as high levels of sensation seeking (O'Jile, Ryan, Parks-Levy, Betz, & Gouvier, 2004). Although this research suggests a connection between psychopathy, sensation seeking, and brain injury, it may be difficult to determine causality between these variables. In a meta-analysis of studies assessing sensation seeking and personal injury, Turner, McClure and Pirozzo (2004) found that regardless of sensation seeking scale used, individuals who are high in sensation seeking were at an increased risk of sustaining injury, including head trauma. As such, it is impossible to tell, based on correlational data, whether sensation seeking led to brain injury or whether sensation seeking and/or psychopathy traits developed as a result of brain injury. Additionally, differences between head trauma type

and location (e.g., head impact versus tumor, frontal lobe versus occipital lobe) may have markedly different effects on psychological functioning. For example, although injuries to the frontal lobe have been associated with increased aggression and violence (Grafman, Schwab, Warden, Pridgen, Brown, & Salazar, 1996), psychotic symptoms (e.g., hallucinations) without changes in personality have been noted in individuals with injuries to their occipital lobe (Anderson & Rizzo, 1993). The present study did not differentiate between types of trauma and it is, therefore, impossible to isolate what type of trauma may be related to sensation seeking or psychopathy. Despite the limitations in inferring causality, the study does suggest a substantial and intriguing link between head trauma and psychological characteristics related to psychopathy and sensation seeking.

For a final preliminary analysis, the relationship between PPI-R and SSS-V was assessed by Pearson product-moment intercorrelations between these two measures. This analysis attempted to replicate Lilienfeld and Widow's (2005) study in which they found the PPI-R and SSS-V to be highly correlated on multiple scales. Results of the current study were remarkably similar to Lilienfeld and Widow's research. Of the 55 possible correlations between Total, factor, and subscale scores on the PPI-R and the SSS-V, the current study found analogous correlations in all but eight relationships when compared to Lilienfeld and Widow's findings. In particular, strong and markedly similar correlational values were found for relationships between PPI-R Total score and SSS-V Total score, Rebellious Nonconformity and Experience Seeking, and Fearlessness and Thrill and Adventure Seeking.

In relation to hypothesis one, which postulated that a positive family environment would be associated with lower levels of psychopathy regardless of sensation seeking, the

results appear to support this hypothesis. A positive family environment, depicted by low FES scores on Conflict, and high scores on Cohesion and Moral and Religious Emphasis Scales, was significantly correlated with lower PPI-R Total scores. When broken down by FES and PPI-R scale, high Cohesion scores had a moderate effect on Blame Externalization and Self-Centered Impulsivity as well as weak but significant effects on five other PPI-R scales. This finding corresponds with prior research on family cohesion and its effect on externalizing problems (Neumann et al., 2011). Neumann and colleagues used a longitudinal study of late adolescent to early adult twins to study the effects of cohesion and antisocial behavior. They found poor family cohesion, partially measured by the FES Cohesion scale, to be associated with higher levels of externalizing problems. Externalizing problems were defined as behavioral or antisocial acts often seen in adolescents with Conduct Disorder. Similarly, in a study of anxious, conduct disordered, and non-disordered adolescent groups, Haddad, Barocas, and Hollenbeck (1991) found low Cohesion and high Conflict, as measured by FES scales, to be significantly related to the Conduct Disorder group when compared to the other groups. These findings suggest that high family cohesiveness may protect against the development of some psychopathic traits.

High scores on the FES Expressiveness scale, noted by a willingness to share thoughts and feelings within the family, had weak but significant associations with lower Blame Externalization and Self-Centered Impulsivity scores and higher Stress Immunity and Fearless Dominance scores. Reflecting these results, research on psychopathic traits and family expressiveness is mixed. In Dembo et al.'s (2007) study of 203 incarcerated youths assessing dimensional psychopathy and family environment, researchers found no

significant relationship between the FES Expressiveness scale and any level of psychopathy. In contrast, Cadoret, Yates, Troughton, Woodworth, and Stewart's (1995) study of adoptive home environments and the development of adoptee Antisocial Personality Disorder found that low FES Expressiveness scale scores were associated with increased aggression, a trait commonly associated with psychopathy.

The relationship between higher family expressiveness and increased Stress Immunity and Fearless Dominance scores are curious findings. On the surface, these correlations suggest that expressiveness within the family may be related to psychopathic functioning; however, this may not be the case. Stress Immunity reflects a person's ability to stay calm in pressure situations (Lillienfeld & Widows, 2005). In a psychopathic individual, high Stress Immunity scores may reflect a lack of anxiety in highly stressful or antisocial situations. Similarly, Fearless Dominance, as a factor scale, measures a person's level of situational anxiety as well as self- confidence. In the current study, the correlations between Expressiveness and Stress Immunity and Fearless Dominance showed modest effect sizes, and may actually reflect positive ego functioning (i.e., healthy self-confidence and assertiveness, low anxiety). It is posited that at low to moderate levels, among non-clinical populations, the Stress Immunity and Fearless Dominance scales may actually assess ego strength, similar to the MMPI-2's Ego Strength scale (Es), which, among other constructs, measures a person's self-confidence and psychological adjustment (Graham, 2006). Consequently, in this study, the relationship between high expressiveness and related Stress Immunity and Fearless Dominance scores are probably reflecting functioning within non-pathological ranges of

these traits. However, as the PPI-R does not directly measure psychological strengths, this notion is only speculative.

Almost universally, a high level of family conflict was associated with higher psychopathy scores. High scores on the FES Conflict scale were significantly related to eight of the 11 PPI-R scale and factor scores. A particularly strong relationship was noted between FES Conflict and PPI-R Blame Externalization and Conflict and Self-Centered Impulsivity. Multiple studies have suggested a link between family conflict and the development of psychopathic traits. For example, Dembo et al.'s (2007) assessed 203 incarcerated youths for psychopathy and family environment. Using the FES measure, only the Conflict scale was positively correlated with psychopathy. Furthermore, youths highest on psychopathic traits also reported the greatest amount of family conflict. In a longitudinal study of psychopathy development, Lynam, Loeber, and Stouthamer-Loeber (2008) found that use of physical punishment, commonly associated with family conflict, was one of the few environmental factors that predicted stable psychopathic traits from age 13 to age 24.

Correlations between the Conflict scale and PPI-R Blame Externalization and Conflict and Self-Centered Impulsivity scores are also noteworthy. Lilienfeld and Widows (2005) describe high scorers on Blame Externalization as individuals who see the world as hostile with a tendency to see fault in others rather than themselves. Similarly, high scorers on Self-Centered Impulsivity tend to blame others for their faults, exhibit a ruthless attitude, and act impulsively. Relationships between these constructs suggest that family relationships, marked by fighting and strife, may encourage externalizing problems from childhood to adulthood. There is substantial research

supporting this notion. In a meta-analysis of 68 studies assessing parental conflict and behavior problems in children, conflict was found to be associated with a variety of externalizing behaviors in children age five to 18, including aggression, delinquency, and substance abuse problems (Buehler et al., 1997).

The final two FES scales, Control and Moral and Religious Emphasis, had several weak but significant relationships with PPI-R scale scores. High levels of control within the family, noted by rigid family rules, were associated with higher levels of Blame Externalization. Similarly, high scores on Moral and Religious Emphasis were related to lower levels of Fearlessness and Coldheartedness. Reflecting previous studies, religiosity has been associated with lower levels of externalizing behaviors, particularly substance abuse (Scott, Munson, McMillen, & Ollie, 2006). Fearlessness, as a closely related element of sensation seeking, may also be influenced by religiosity. Boomsma et al. (1999) assessed religiosity's effect on personality in a large Dutch study of 1974 families with twins. In their study, religiosity had the greatest influence on sensation seeking, particularly disinhibition. They surmised that a strong religious affiliation suppressed the disinhibition aspect of sensation seeking. In regard to the relationship between high levels of control and psychopathy, research has had mixed results. Although a weak relationship was noted here, other studies have suggested that family control may not be associated with typical psychopathic traits, such as anger (Lopez & Thurman, 1993) or antisocial behavior (Rowe, Liddle, & Dakof, 2008).

Although family environment, particularly a poor family environment, appears to have an effect on psychopathy, only a few environmental factors actually predicted psychopathic traits. High FES Conflict scores were the first or second best predictor of

higher PPI-R Total, Machiavellian Egocentricity, Blame Externalization, Carefree Nonplanfullness, Stress Immunity, and Self-Centered Impulsivity scores. To a lesser degree, low Cohesion scores were predictive of Rebellious Nonconformity and Self-Centered Impulsivity scores, whereas low Expressiveness scores predicted Blame Externalization. In contrast, sensation seeking traits were far stronger predictors of psychopathy scales scores as the SSS-V Total score was the best overall predictor of PPI-R Total score. Other sensation seeking elements including Boredom Susceptibility, Experience Seeking, Thrill and Adventure Seeking, and Disinhibition were also predictive of psychopathic traits. Although the data suggests that family environment does have an impact on psychopathic development, sensation seeking levels may have a bigger role. Genetic and biological influences on both these personality constructs may provide clues as to why.

Blonigen et al.'s (2003) twin study of psychopathy and heritability found strong correlations for psychopathic traits among monozygotic twins compared to dizygotic twins. Similarly, using a sample of 422 pairs of adult twins and Zuckerman's Sensation Seeking Scale, Fulker et al. (1980) found that 58% of the variance found in sensation seeking scores was due to hereditary reasons. Since sensation seeking and psychopathic traits appear to be closely related constructs (as suggested by Lilienfeld and Widows, 2005; Blackburn, 1969), it is possible that they may share similar genetic roots. In relation to this study, sensation seeking, in comparison to family environment, may be a better predictor for psychopathic traits due to these shared biological roots.

Hypothesis two was an attempt to determine if positive family environment actually moderated psychopathic traits. The results appeared to support this hypothesis.

Notably, participants who were higher in FES Cohesion scores were significantly lower on PPI-R Total scores, Blame Externalization, and Self-Centered Impulsivity scores as well as seven other PPI-R factor and subscale scores. These relationships held up even after controlling for the effects of gender and history of brain injury. Similarly, low family conflict was associated with lower scores on the PPI-R scale and factor scores. Specifically, low Conflict scores correlated with lower PPI-R Total score, Blame Externalization, Self-Centered Impulsivity and six other PPI-R scale and factor scores. Again, these relationships were present even after controlling for brain injury and gender effects.

Similarly, high Expressiveness scores were associated with lower Blame Externalization and Self-Centered Impulsivity scores. After controlling for brain injury and gender, six other significant relationships between Expressiveness and PPI-R scale and factor scores were found. Moral and Religious Emphasis scores were associated with lower levels of Coldheartedness. After controlling for brain injury and gender, four additional significant relationships between Moral and Religious Emphasis and PPI-R were also identified. In sum, individuals from highly cohesive, low conflict families, where expression of thoughts and emotions were encouraged, were more likely to be low on psychopathic traits.

The findings from hypothesis two suggest that healthy family functioning is associated with lower levels of psychopathy. However, these results are in contrast with some psychopathy and protective factor research. Lynam et al.'s (2008) study, using a longitudinal model assessing psychopathy of 250 males at ages 13 and 24, found that non-psychopathic participants with good support systems tended to stay non-

psychopathic at follow-up. However, family protective factors, theorized to reduce the risk of developing psychopathic traits for participants determined to be at risk for psychopathy, had no significant effect. Similarly, DeMatteo, Heilbrun, and Marczyk (2005), in a study assessing protective effects on psychopathy, specifically strong family relations, religiosity, exposure to healthy role models, and social support, found no significant relationships between protective factors and psychopathy scores. In regard to the present research, it is possible that because of the non-clinical sample used in this study, family environment played a greater role in reducing psychopathic or antisocial traits. A sample of highly psychopathic individuals may produce different family effects.

The finding that families that placed a high regard on morality and religion were lower on the Coldheartedness scale is particularly interesting. Of all the scales used in this study, only high scores on Moral and Religious Emphasis were associated with lower Coldheartedness. It suggests that Coldheartedness, defined by a lack of empathy and guilt (Lilienfeld & Widows, 2005), may be related to individual's lack of early experiences with morality and religion. This notion has been suggested before. In a large school study assessing age and development of empathy in adolescents, Francis (1987) found that child age had no direct relationship with empathy level. In other words, as children aged, their level of empathy did not significantly increase. Only when religiosity was added as an experimental variable did a significant relationship emerge between these constructs. Francis argued that religion was one of the few factors that actually contributed to empathy development.

Hypothesis three expanded on Lillienfeld and Widow's (2005) and Blackburn's (1969) correlation studies, suggesting that low levels of sensation seeking moderate

psychopathy traits. The results appeared to support this hypothesis. In general, those who scored lower on sensation seeking traits were also lower in psychopathy. Specifically, participants who scored low on SSS-V Total score were also significantly lower on PPI-R Total score. Low SSS-V Total score was also significantly associated with lower scores on Rebellious Nonconformity, Fearlessness, Self-Centered Impulsivity, as well as five other PPI-R factor and scale scores. When broken down by SSS-V scale, other significant relationships were noted. For example, for participants who scored lower on the SSS-V Thrill and Adventure Seeking scale, their PPI-R Total, Fearlessness, and Fearless Dominance scores were significantly less elevated. Low Experience Seeking scores were also significantly associated with lower Rebellious Nonconformity and Fearlessness scores. Low Boredom Susceptibility was associated with lower PPI-R Total, Rebellious Nonconformity, and Fearlessness scores. Finally, low Disinhibition was significantly linked to lower PPI-R Total, Rebellious Nonconformity, Machiavellian Egocentricity, Fearlessness, and six other scale and factor scores.

Findings from hypothesis three indicate a linear positive relationship such that higher levels of sensation seeking are associated with higher levels of psychopathy. However, as eluded to by Zuckerman (1994), sensation seeking alone is not equivalent to psychopathy. Rather, high sensation seeking has been found in both prosocial and antisocial groups (Goma-i-Freixanet, 1995). Clues as to why psychopathy is not analogous to sensation seeking may be found in the non-significant relationships between the PPI-R and SSS-V. For example, for high versus low SSS-V Total score groups, PPI-R Blame Externalization and Coldheartedness scales showed no significance even when controlling for the effects of brain injury and gender. Blame Externalization suggest an

inability to see fault in oneself and a tendency to blame others (Lilienfeld and Widows, 2005). Coldheartedness is defined as an inability to feel guilt for one's actions. Cleckley (1941/1982), using slightly different language, suggests that Coldheartedness defined by a complete lack of empathy, is a key feature of psychopathy. It is posited that even if a person presents with some of the behavioral correlates of sensation seeking and psychopathy (i.e., impulsiveness, rebelliousness, etc.), they may still lack the cold, unfeeling elements that are uniquely psychopathic in nature. Regardless, the findings from hypothesis three suggest that not only is sensation seeking and psychopathy related, but that low scores on sensation seeking may have a moderating effect on some psychopathic traits.

Hypothesis four, as the main focus of this study, expands on hypothesis three, suggesting that individuals who are high in sensation seeking but low in psychopathy may have had a positive family environment that moderated the development of psychopathic traits as compared to individuals high in both sensation seeking and psychopathy. The results did not support this hypothesis. Individuals who were high in both sensation seeking and psychopathy were significantly higher on FES Conflict scores compared to those who were low in both sensation seeking and psychopathy. However, no such relationship was noted between the high sensation seeking/low psychopathy group and the high sensation seeking/high psychopathy group, even when controlling for the effects of brain injury, gender, and ethnicity. Similarly, for hypothesis five, ANOVA and ANCOVA analyses assessing family environment differences between the high sensation seeking/low psychopathy group compared to the rest of the sample indicated no significant relationships among FES factors.

Several reasons for the non-significant findings for hypotheses four and five are posited. Contrary to study hypotheses, it is possible that family environment is not a moderating factor for psychopathy among high sensation seeking/low psychopathy and high sensation seeking/high psychopathy groups and that other, unknown factors, influence whether high sensation seekers develop psychopathic traits. In consideration of this notion, it is important to review etiological data for both psychopathy and sensation seeking. Sensation seeking heritability studies have suggested that between 42% (Fulker et al., 1980) and 52% (Koopmans, Boomsma, Heath, & van Doornen, 1995) of sensation seeking development can be attributed to environmental factors. Few studies have analyzed these environmental factors; however, there is some evidence suggesting that family factors can have an influence on sensation seeking development (Feij & Taris, 2010). Feij and Taris reported that parenting style, as an indirect element of family environment, influenced the development of high sensation seeking traits in young adults. Similarly, there is evidence suggesting that psychopathy development is related to genetic (Jang et al., 1996) as well as environmental factors, specifically family environment (Farrington et al., 2001).

These findings suggest that both psychopathy and sensation seeking can be influenced by family environment. In regard to hypotheses three and four, although it is possible that no family environment moderators exist between high sensation seeking/low psychopathy and high sensation seeking/high psychopathy groups, prior research suggests that family can influence both sensation seeking and psychopathy. Thus, there may be other reasons for the lack of significant findings for these hypotheses. In this

regard, it is posited that limitations in study design may have influenced results on hypotheses three and four. Specifically, limitations related to the study sample.

The focus of this investigation was on examining psychopathy and sensation seeking in a non-clinical sample of college students. Although there is value at looking at these traits in this sample, it is also possible that limiting the participants to college students age 30 and below resulted in truncated scores on assessment measures producing more limited relationships. A larger sample of college students may have been required to pick up significant effects in this population. In contrast, a research design that sampled groups hypothesized to be higher in psychopathy, such as a forensic sample of individuals convicted of felony offenses, would likely have had higher levels of psychopathic traits and therefore a wider range of scores on the PPI-R. Similarly, choosing a comparison sample likely to be high in sensation seeking, but lower on psychopathy measures, such as a police officers or other presumably prosocial group may have produced a greater range of significant findings. Although no known study has assessed developmental differences between these groups, prior research (e. g. Goma-i-Freixanet, 1995) has suggested that prosocial and antisocial groups are remarkably similar on sensation seeking measures. If these groups are similar in sensation seeking, the question remains as to why some develop psychopathic traits. It suggests that there must be moderating or mediating factors influencing psychopathy development.

The nature of the study's data collection methodology may have also limited the findings. All data was collected via online survey with the offer of class credit for participation. Survey completion was not a requirement for credit and at nearly 260 items, it is possible that those highest on sensation seeking or psychopathy may have

been the least likely to complete the survey. Additionally, if they did complete the survey, they may have answered items in such a way that rendered the data unusable. In regard to the latter, almost 11% of the sample, or 34 participants, produced inconsistent response patterns (i.e., random or extremely biased responding) invalidating their overall surveys. Similarly, almost 9%, or 27 participants, of the total sample could not be used due to large amounts of missing data. Because 27 of these participants had large portions of omitted items, both descriptive and test data, it is not possible to identify ways in which these participants may have differed from participants who successfully completed all items. In statistical terms, having accurate data from an additional 20% of the sample could have increased statistical sensitivity in detecting potentially significant effects.

Follow up analyses comparing participants who provided a valid PPI-R protocol to those who did not provides additional information. On the Background and Demographics Questionnaire (BDQ), participants who provided an invalid PPI-R protocol had significantly higher endorsement rates of: unlawful behavior [$F(1, 279) = 4.47$, $\eta^2 = .02$, $p \leq .05$], experience of child abuse [$F(1, 275) = 8.79$, $\eta^2 = .03$, $p \leq .01$], lack of parental involvement [$F(1, 277) = 4.78$, $\eta^2 = .02$, $p \leq .05$], family member(s) who got in trouble with the law [$F(1, 277) = 4.86$, $\eta^2 = .02$, $p \leq .05$], financial difficulties growing up [$F(1, 278) = 4.41$, $\eta^2 = .02$, $p \leq .05$], and growing up in a neighborhood with higher crime [$F(1, 279) = 4.47$, $\eta^2 = .00$, $p \leq .05$]. It is impossible to identify if these participants responded truthfully on the BDQ; however, the BDQ was the first measure completed on the survey while the PPI-R was the last, therefore, participants in the invalid group may have produced more truthful responses before testing fatigue could become a factor. Regardless, the results between the two groups suggest that those who

invalidated the PPI-R may have had a more dysfunctional background compared to those who produced a valid survey. If there is a correlation between psychopathy and a negative background environment, it lends credence to the notion that those who provided an invalid PPI-R may have actually been higher on psychopathy.

Finally, the cross-sectional study design employed in the current study is limited in its usefulness. The current study provides information on relationships between sensation seeking, psychopathy, and family environment, at a single moment in time, and therefore, causation cannot be determined. A design that assessed psychopathy, sensation seeking, and family environment longitudinally, from childhood to adulthood, may have revealed changes in relationships across time that was impossible to detect in the current research design. For example, the critical period for divergence of sensation seeking and psychopathic characteristics may occur during childhood, adolescents, or even adulthood. Only a longitudinal design would be able to detect important issues related to temporal factors. Additionally, longitudinal data collected from multiple sources, such as from teachers and parents, may have also elaborated on study findings.

# CONCLUSIONS

The results of this analysis provide a glimpse at relationships between sensation seeking, psychopathy, and family environment. They suggest that sensation seeking and psychopathy are closely related and that family environment can play a role in the development of psychopathic traits. Additionally, there is evidence to suggest that brain injury may be positively related to both sensation seeking and psychopathic traits.

Although intriguing, the findings in this study should be interpreted with caution. Henrich, Heine, and Norenzayan (2010) recently noted that of American psychology studies, 67 percent were based on psychology undergraduate samples. The current investigation is subject to this potential sample bias, sampling entirely from low-level psychology courses. Although findings may be relevant to the larger population, they could also differ from results obtained in clinical populations.

To date, the question of why some sensation seekers develop psychopathic traits whereas others are merely "thrill seekers" remains unanswered. Although sensation seeking appears to be fairly common, psychopaths are rare, with recent studies suggesting that they compose less than two percent of the total population (Neumann & Hare, 2008). Yet, as this study suggests, psychopathy and sensation seeking traits overlap substantially as personality constructs. It will be up to future researchers to tease apart what uniquely separates the constructs of sensation seeking from psychopathy, as well as replicate the current findings regarding the relationship between family environment factors, sensation seeking, and psychopathy constructs.

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# APPENDIX

## BACKGROUND AND DEMOGRAPHICS QUESTIONNAIRE

DIRECTIONS: Below are a number of statements used to describe people's beliefs and life experiences. Read each statement and then circle the response option that is the best fit for you. There are no right or wrong answers. Do not spend too much time on any one statement, but give the answer which seems to best describe your beliefs or experiences.

1. What is your age in years? [18-24] or [25-30]

2. What is your gender? _____

3. What ethnic background do you identify with?

    A. Asian

    B. African American

    C. Caucasian

    D. Hispanic or Latino

    E. Multi-ethnic

    F. Other

4. Have you ever suffered a traumatic brain injury, such as from a concussion, stroke, or tumor?

    A. Yes

    B. No

5. I am a religious or spiritual person.

    A. Very much so

    B. Moderately so

C. Somewhat

D. Not at all

6. I have had problems with Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD).

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

7. I have gotten into trouble with the law.

A. Very much so

B. Moderately so

C. Somewhat

D. Not at all

Please answer the following questions based on your experiences as a childhood or adolescent.

8. One of my parents was absent during most of my childhood.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

9. When I was growing up, I was subjected to child abuse.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

10. My parents were involved and supportive in my childhood.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

11. I had a close family member who would often get in trouble with the law.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

12. My family had enough money to buy luxuries as well as the essentials.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

13. I received a lot of attention and care in my family.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

14. I lived in a neighborhood with a lot of crime.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

15. I got into a lot of trouble.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

16. I received a lot of detentions and/or suspensions in school.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

17. I hung out with friends who got in a lot of trouble.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

18. I often skipped school.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

19. I would sometimes have to bully or manipulate others to get what I wanted.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

20. I often ran away from home.

A. Very much so

B. Moderately so

C. Somewhat

D. Rarely or Not at all

# VITA

**CASEY S. IWAI**

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Psychology Department

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## EDUCATION

| | |
|---|---|
| Aug. 2009 – Aug. 2014 | Virginia Consortium Program in Clinical Psychology |
| | Psy.D., Clinical Psychology (APA Accredited) |
| May 2011 | Norfolk State University |
| | M.A., Clinical and Community Psychology |
| May 2009 | Arizona State University |
| | B.A., Communication |

## CLINICAL TRAINING

| | |
|---|---|
| Sept. 2014 – Sept. 2014 | Baylor Scott and White Healthcare System |
| | Postdoctoral Fellow, College Station, TX |
| Aug. 2012 – Aug. 2013 | VA Gulf Coast Veterans Health Care System |
| | Psychology Intern, Biloxi, MS (APA Accredited) |

## PSYCHOLOGY HONORS AND AWARDS

| | |
|---|---|
| Aug. 2013 | Erwin L. Shatus Outstanding Psychology Intern Award |
| Oct. 2010 – 2011 | Fellow at the Washington Center for Psychoanalysis |
| Aug. 2009 – 2011 | Virginia Consortium Graduate Assistantship and Stipend |