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The Psychophysiological Correlates of Personality, Trauma, Posttraumatic Stress Disorder and Social Support

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THE PSYCHOPHYSIOLOGICAL CORRELATES OF PERSONALITY, TRAUMA, POSTTRAUMATIC STRESS DISORDER, AND SOCIAL SUPPORT

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Abstract

Theories considering the etiology of psychopathy suggest that trauma exposure, specifically childhood maltreatment and sexual abuse, is related to the development of callous-unemotional traits in children and adolescents, which are precursors to psychopathic traits in adulthood. Furthermore, posttraumatic stress disorder has an opposite relationship with many of the emotional and behavioral components of the two-factor model of psychopathy. Specifically, PTSD is positively associated to IA and traits associated with it and negatively associated with FD. Thus, this study sought to expand upon the current theories of a trauma-based etiology of psychopathy by investigating the relationship between trauma, PTSD, and psychopathic traits in an adult population.

We investigate several emotional and behavioral factors associated with trauma and resilience and how physical and perceived social support moderated both in the physiological and psychological relationship between trauma and PTSD in individuals high in psychopathic traits. We examined stress reactive cortisol, fear potentiated startle, and P3 event related potential in 186 undergraduate students. We found that individuals with IA had a high incidence of trauma exposure and was associated with more severe PTSD symptoms, whereas FD was associated with high levels of trauma exposure but was negatively associated with PTSD symptoms. Next, individuals higher in both IA and FD benefited physiologically from social support. Thus, this study provides the first evidence that social-based interventions may be beneficial for individuals higher in psychopathic traits. Furthermore, lower levels of social support were associated with the development of IA after being exposed to trauma. Thus, future studies should examine how socially based interventions can be used to prevent the development of maladaptive traits.

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Chapter 1: Introduction

Approximately 50% of United States (U.S.) citizens will experience a traumatic event before the age of 50 (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Out of these exposed individuals, around 10% go on to develop posttraumatic stress disorder (PTSD). Exposure to traumatic events also leads to the development of externalizing disorders and subsequent dysregulations of biological systems (Agorastos et al., 2014; Bae et al., 2015; Keilp et al., 2016; Shirtcliff, Granger, Booth, & Johnson, 2005). For example, one theory of schizophrenia includes exposure to acute stress or trauma in utero and then again later in life, which precipitates full expression of the disorder (Jones & Fernyhough, 2007; Walker & Diforio, 1997). Further, PTSD is associated with comorbid pathologies like depression, substance abuse, psychopathy, and panic disorder (Ginzburg, Ein-Dor, & Solomon, 2010; Kaufman & Charney, 2000; Sellbom, 2015) that span internalizing and externalizing factors of psychopathology (Krueger, 1999).

Trauma has also been implicated in the development of personality disorders (Grover et al., 2007). Personality disorders are pervasive patterns of behavior, cognition, and affect that differ from societal and cultural norms and cause significant distress in an individual's life (American Psychiatric Association; APA, 2013). These disorders differ from other psychopathologies in that they are inflexible and personality traits typically emerge early in adolescence. In contrast, other psychopathology symptoms like anxiety disorders and PTSD emerge in adulthood, are flexible, and have better treatment outcomes (Feske et al., 2004). Both genetic (Checknita et al., 2015; Distel et al., 2008) and environmental factors (Belsky & Pluess, 2009; Sharp & Fonagy, 2015) influence personality disorder symptomatology. For example, a longitudinal study investigating the etiology of schizotypal, depressive, obsessive-compulsive,

and borderline personality disorder found that childhood abuse is associated with an increased incidence of all of these disorders (Yen et al., 2002).

Thus, seemingly unrelated disorders may have a common predictor: trauma. Psychopathy and PTSD are both associated with exposure to trauma early in life, and this exposure increases the likelihood of developing the disorders in adulthood (Agorastos et al., 2014; N. Graham, Kimonis, Wasserman, & Kline, 2012; Klengel et al., 2013). The likelihood of developing PTSD increases after exposure to multiple traumatic events (Cloitre et al., 2009). When investigating differences in resilience following a traumatic event, studies have found that individuals are more likely to develop PTSD if they were exposed to abuse or trauma during childhood (Vranceanu, Hobfoll, & Johnson, 2007). Similarly, exposure to traumatic events during childhood increases callous-unemotional traits in youth, which then increases the likelihood of psychopathy later in life (Kimonis, Ray, Branch, & Cauffman, 2011; Sharf, Kimonis, & Howard, 2014).

Furthermore, Psychopathy and PTSD are associated with differences in prevalence between sexes. Women are three times as likely than men to be diagnosed with PTSD (Carmassi et al., 2014; Kessler, Chiu, Demler, & Walters, 2005). Similarly, psychopathy is more common in men compared to women (Grann, 2000; Hare, 2006). Sex differences are implicated in differential symptom expression (Norris, Perilla, Ibañez, & Murphy, 2001; Pratchett, Pelcovitz, & Yehuda, 2010; Verona, Bresin, & Patrick, 2013; Weizmann-Henelius et al., 2010) and changes in biological systems that are associated with both disorders (Freidenberg et al., 2010; O'Leary, Loney, & Eckel, 2007). Thus, examining how sex is involved in both disorders is important to understanding symptomatology and developing effective treatments.

In the following review of the literature, I will examine the similarities between PTSD and psychopathy. I will first discuss the etiology and symptomatology of both disorders separately and then focus on the similarities between the disorders. Because the incidence of PTSD and psychopathy differs between the sexes, I will include a discussion on sex differences associated with behavioral correlates of PTSD and psychopathy. Lastly, I will conclude with a discussion of the role of social support in resilience to and recovery from PTSD and the gap in the literature that exists for that same role in psychopathy.

Chapter 2: Literature Review

Psychopathy and Posttraumatic Stress Disorder

PTSD. The most recent revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines PTSD as a stress and trauma related disorder that occurs when an individual is exposed to the real or threatened death of himself or herself or another person (American Psychiatric Association; APA, 2013). It is important to note that this definition has recently changed. Much of the research discussed throughout this chapter uses PTSD as defined by the fourth edition of the DSM (APA, 2013), which defined PTSD as exposure to a traumatic event that causes the individual to feel helpless and horrified. It further specified that these events typically involved real or threatened death. DSM-5 specifies that the qualifying traumatic event must be violent (e.g., combat trauma, violent assault, sexual assault); however, repeated first hand exposure to the details of a traumatic event also qualifies.

The symptoms associated with PTSD are broken down into four distinct clusters: intrusive symptoms, avoidance, negative mood and cognitions, and hyperarousal (APA, 2013). Two of these are similar between DSM-IV and DSM-5. Intrusive symptoms consist of unwanted intrusive memories and flashbacks. Hyperarousal includes explosive emotional outbursts, hypervigilance, increased startle response, and trouble concentrating and sleeping. Previous formulations of PTSD combined avoidance and emotional numbing into a single symptom cluster. In DSM-5, avoidance symptoms broke into a separate cluster entailing avoiding stimuli reminiscent or symbolic of the trauma. The numbing symptoms were transmuted into the negative mood and cognition symptoms, which are expressed as persistent negative mood states and beliefs, trouble remembering details associated with the traumatic event, and the dampening of positive emotional responses. Nevertheless, the revision of the definition and symptom

clusters has not significantly reduced the prevalence and incidence of PTSD in the U.S. population (Kilpatrick et al., 2013).

Posttraumatic stress disorder has a moderate prevalence within the U.S. population, but the prevalence and symptom expression differ between sexes. Current epidemiological studies indicate that, within the U.S., the incidence of PTSD is 3.6% for men and 9.7% for women (Carmassi et al., 2014; Kessler, Chiu, Demler, & Walters, 2005). This prevalence imbalance occurs because women endorse a greater number of symptoms related to PTSD (Hourani, Williams, Bray, & Kandel, 2015), particularly in the hyperarousal cluster than do men (Norris et al., 2001). The reasons underlying the sex differences in the prevalence and symptomatology of PTSD are still unclear. Women are more likely to seek assistance for mental health issues than are men; thus, a treatment seeking bias cannot be ruled out as a possible cause for the higher incidence among women (Kessler, Brown, & Broman, 1981). Additionally, the following factors also contribute to the differences in the incidence of PTSD between men and women. First, exposure to specific trauma types differs between the sexes. Men are more likely to encounter physical assault and combat trauma (Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999). Women are more likely than men to experience a traumatic event where they have a close association with the perpetrator, such as sexual assault (Schauer & Elbert, 2010). However, when controlling for trauma type, women still have a higher incidence of PTSD overall (Breslau et al., 1999). Lastly, behavioral and psychological reactions to the traumatic event play a role in the development of PTSD (Karstoft, Armour, Elklit, & Solomon, 2015; Spinhoven, Penninx, Krempeniou, van Hemert, & Elzinga, 2015). For example, peritraumatic dissociation, which is more common in women, is predictive of developing PTSD and is associated with greater PTSD symptom severity (Pratchett et al., 2010).

Psychopathy. Psychopathy is a personality disorder that is associated with distinct emotional, behavioral, and interpersonal features (Cleckley, 1976; Hare, 2006). The emotional features consist of dampened emotional reactivity, inflated ego, and lack of guilt and empathy. The behavioral features consist of impulsivity, disregard for social norms and rules, and, in some cases, violent behavior. These features are associated with criminal recidivism. Interpersonal features consist of expressions of dominant behaviors and personality characteristics like narcissism and manipulation.

DSM-5 (APA, 2013) includes psychopathy as another term for the pattern of symptoms expressed by those diagnosed with antisocial personality disorder. However, the DSM-5 symptoms do not fully encompass psychopathy. Rather, the DSM-5 focuses on the antisocial and behavioral characteristics of the disorder but does not address many of the emotional and interpersonal symptoms. Thus, clinicians have developed measures to capture all aspects of psychopathy: emotional, behavioral, and interpersonal (Hare, 1991, 2003). One prominent measure, the Psychopathy Checklist-Revised (PCL-R; Hare, 2006) is used to measure psychopathy in clinical and forensic populations. This measure models psychopathy with four distinct facets that are associated with two factors. Factor 1 consists of facet 1: interpersonal aspects of psychopathy (e.g., charming and manipulative tendencies) and facet 2: affective aspects (e.g., limited prosocial emotions). Factor 2 consists of facet 3: lifestyle influences (e.g., impulsive and irresponsible actions) and facet 4: antisocial tendencies (e.g., criminal recidivism).

Nevertheless, the PCL-R still captures the externalizing aspects of psychopathy more than its interpersonal aspects (Patrick, Hicks, Nichol, & Krueger, 2007). The features of psychopathy can be parsed into two distinct factors that capture the interpersonal and externalizing aspects of the disorder. One such model defines psychopathy as a construct

composed of two orthogonal factors: fearless dominance (FD) and impulsive antisociality (IA; (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005). In this approach, FD and IA are defined not by symptom clusters but by confluences of extremes in personality traits. FD is measured by traits associated with social dominance, a lack of reactivity to stress, and a preference for thrilling or dangerous activities (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003; Lilienfeld & Widows, 2005; Ross, Benning, Patrick, Thompson, & Thurston, 2009). In contrast, IA combines suspicion and mistrust of others, an aggressive and hostile temperament, nonconformity to social constructs, low levels of interpersonal closeness, and poor planning (Benning et al., 2003; Lilienfeld & Widows, 2005; Ross et al., 2009).

Factors related to psychopathy are differentially associated with broad factors of psychopathology, namely internalizing and externalizing disorders. These divergent associations illustrate differences in how the adaptive nature of the traits in terms of daily functioning. For example, IA is associated with externalizing disorders like substance abuse (Blonigen, Hicks, Krueger, Patrick, & Iacono, 2005) and symptoms related to antisocial personality disorder (Edens & McDermott, 2010). Further, IA is positively correlated with internalizing psychopathology (Patrick, Edens, Poythress, Lilienfeld, & Benning, 2006). Thus, individuals higher in IA may have a greater risk for developing both externalizing and internalizing psychopathologies. Conversely, FD is negatively associated with internalizing disorders like depression and anxiety. Therefore, personality factors associated with FD may provide a protective buffer against developing internalizing disorders.

FD and IA correspond with differences in cognitive and emotional processing and physiological responses to a variety of stimuli. For instance, both factors are linked to deficits in emotional processing and a failure to process peripheral cues. The magnitude and type of

physiological reaction to stimuli are differentially affected by the factor in which an individual is higher. For example, high FD is correlated with reduced fear potentiation as demonstrated by attenuated startle-blink to demanding cognitive tasks (Anderson, Stanford, Wan, & Young, 2011; Benning, Patrick, & Iacono, 2005). IA, on the other hand, is correlated with blunted central and peripheral response to cues and an impulsive response style that is associated with reduced neural reactivity to committing errors (Heritage & Benning, 2013).

Psychopathy has a low prevalence of around 1% in the general United States Population (Hare, 2006); however, the prevalence is higher within the criminal population. The prevalence of psychopathy in the criminal population differs between sexes, where men have a prevalence around 25% and women have a prevalence around 11% (Grann, 2000). These percentages vary even more when examining violent offenders. In prison populations, the prevalence of psychopathy in male violent offenders is 31% versus 16% in women (Salekin, Rogers, & Sewell, 1997). Further, Ross and colleagues (2009) found that men score higher in both FD and IA factors than do women. Thus, unlike PTSD, psychopathy is more common in men than in women. These sex differences may be a result of reporting error. Most of the measures used to quantify psychopathy in prison populations were developed for male offenders.

Recent research has examined sex differences in symptomatology as measured by the PCL-R (Verona, Sprague, & Javdani, 2012; Weizmann-Henelius et al., 2010). These studies have found that men score higher on items that cover the interpersonal aspects of the disorder, like narcissism, glibness, and resistance to fear and anxiety than do women. Some studies have also found a difference in behavioral and affective trait expression between men and women. Men high in psychopathic traits typically engage in aggressive and violent behaviors and express a more dominant personality; conversely, in women, psychopathy is associated with theft and

fraud (Harris, Rice, Hilton, Lalumiére, & Quinsey, 2007). Further, women display manipulative personality traits through flirtation and socially isolating peers. However, some studies have found differences in the severity and frequency of psychopathy between men and women but not differences in the expression of psychopathic traits (Gray & Snowden, 2016; Ross et al., 2009). Thus, the general construct of psychopathy is preserved between genders.

Trauma as a Common Risk Factor for PTSD and Psychopathy

Trauma exposure in youth is associated with the development of psychopathologies like PTSD, depression, and anxiety (Agorastos et al., 2014; Comijs et al., 2013; Klengel et al., 2013). Around 60% of youth are exposed to a traumatic event before the age of 16 (*Children's Exposure to Violence*, 2009). While most individuals do not immediately go on to develop psychopathology, the mere exposure to trauma sensitizes the stress-reactive centers of the brain (e.g., HPA-axis) to respond more forcefully to future environmental cues (Thompson et al., 2014). This sensitization is thought to lead to dysregulated hormonal responses to subsequent traumas, which are associated with the development of PTSD. Further, trauma exposure early in life is associated with developing callous-unemotional traits and hormonal dysregulations similar to those seen in individuals with PTSD.

Psychopathologies like PTSD are more likely to develop when an individual is exposed to a trauma that involves violence (Inslicht et al., 2006; Kimonis et al., 2011). Exposure to violence also leads individuals to develop problems with controlling anger and aggressive behaviors. Both witnessing and being a victim of violence during youth is associated with increased aggressive behavior that often leads to the perpetration of violence along with the development of PTSD and callous-unemotional traits (Kimonis et al., 2011). Callous-unemotional traits consist of behavioral and affective symptoms similar to those seen in adult

psychopathy. Namely, youth with these symptoms lack normal empathic responses to others' distress or sadness, are resistant to stress, and engage in reward-dominant behaviors (Frick, Cornell, Barry, Bodin, & Dane, 2003). Kimonis and colleagues (2011) investigated if PTSD symptoms and anger mediate the relationship between violence exposure and subsequent violent behaviors in boys in juvenile detention. In addition, they investigated if callous-unemotional traits contributed to violent behaviors separately from anger and PTSD. They found that anger and callous-unemotional traits but not PTSD partially contributed to violent behaviors. Although PTSD was not associated with violent and aggressive behavior, it was associated with exposure to violent traumas in this sample.

Much of the literature examining the developmental trajectory of psychopathy in adults focuses on personality and biological differences. Several studies have linked the development of callous-unemotional traits to trauma exposure early in life (Bennett & Kerig, 2014; N. Graham et al., 2012; Sharf et al., 2014). Similarly, exposure to trauma like childhood sexual abuse is associated with the development of PTSD upon subsequent trauma (Ullman, 2016). Thus, these findings suggest an important role of trauma exposure in childhood in the etiology of both PTSD and psychopathy.

Psychopathy and PTSD have some similar behavioral and emotional symptomatology. However, PTSD is associated with increased startle and threat sensitivity, whereas the opposite is true of psychopathy (Palermo, 2012; Willemsen, De Ganck, & Verhaeghe, 2012). Thus, while it may seem counterintuitive that both disorders occur together, there is evidence to suggest that they can. For example, Sharf and colleagues, (2014) found that exposure to negative life events was associated with significant increases in callous-unemotional traits and PTSD symptoms.

Given the similarities between psychopathy and PTSD, it is surprising that this relationship remains so understudied. The few studies that have been conducted suggest an association between the experience of traumatic events early in live with the development of psychopathy in adulthood. For instance, male sex offenders who experienced childhood sexual abuse had higher scores on the PCL-R than offenders that experienced other forms of childhood abuse (Graham et al., 2012). Furthermore, in this study, having experienced physical abuse and neglect was positively associated with antisocial behavior. Blonigen, Sullivan, Hicks, and Patrick (2012) investigated the relationship between trauma exposure, PTSD, and psychopathy in female prisoners using the PCL-R. They found that only Factor 2 (impulsive antisocial facets) was associated with trauma exposure and PTSD symptoms. In this sample, Factor 1 (interpersonal and affective facets) was unrelated to both trauma exposure and PTSD.

When the relationship between PTSD and psychopathy is broken down by IA and FD factors, IA is positively associated with PTSD symptoms and FD is negatively associated with PTSD symptoms in undergraduates (Sellbom, 2015). Furthermore, in this study, negative trait affectivity explained 80% of the variance in the relationship between IA and PTSD. Thus, traits more commonly attributed to IA may underlie the propensity to develop comorbid PTSD, particularly given the associations between experiencing trauma and IA (Hicks et al., 2012). While PTSD is unlikely to co-occur in individuals with FD dominated psychopathy, trauma exposure may inhibit the psychobiological expression of FD. Alternatively, traits like fearlessness, blunted affective response, and narcissism may be protective against the development of PTSD after experiencing a traumatic event. Thus, this study will investigate the role adaptive factors of psychopathy, like FD, play in resilience to PTSD. Further, because PTSD and psychopathy share similar patterns of hormonal response to stress (Feilhauer, Cima,

Korebrits, & Nicolson, 2013; MacMillan et al., 2009) but opposing sex differences in prevalence (Carmassi et al., 2014; Grann, 2000), we will investigate the biological underpinnings and sex differences associated with both disorders.

Biological Underpinnings of PTSD and Psychopathy

Psychopathy and PTSD share similar hormonal profiles in response to stress (Feilhauer et al., 2013; MacMillan et al., 2009). This section begins with a discussion about normal hypothalamic-pituitary-adrenal axis (HPA-axis) functioning and then discusses both disorders separately. We also include a discussion on the synergistic relationship between cortisol and testosterone because both play a role in regulating the stress response.

HPA-axis. The HPA-axis is a major component in regulating the physical response to stress (Lightman, 2008). When individuals experience stress, the sympathetic nervous system first activates the fight or flight response. Shortly thereafter, the HPA-axis responds by releasing corticotrophin-releasing hormone (CRH) from the hypothalamus. CRH then stimulates receptors in the anterior pituitary prompting the release adrenocorticotrophin (ACTH) into the blood stream, resulting in the binding of ACTH to receptors in the adrenal cortex. Cortisol is then released from the adrenal cortex and binds to glucocorticoid receptors in the hypothalamus and pituitary stopping the secretion of CRH and ACTH, thus completing a negative feedback loop. Cortisol release is also associated with the circadian rhythm, specifically, the awakening arousal system (Kudielka, Schommer, Hellhammer, & Kirschbaum, 2004). Cortisol concentrations are highest within thirty minutes of waking and steadily decrease throughout the day (Kudielka & Kirschbaum, 2003).

The HPA-axis maintains homeostasis during stressful events (Johnson, Kamilaris, Chrousos, & Gold, 1992). Cortisol release causes an increase in alertness, a decrease in the

sensory threshold and suppresses hunger, digestion, reproduction and immune function. Though these physiological alterations are adaptive in the context of short-term stress, prolonged exposure to stress can lead to detrimental effects in physical and psychological health. Further, constant exposure to a stressor may lead to a dysregulated HPA-axis, leading to physical ailments like hypertension, diabetes, and immune suppression.

Previous research indicates distinct gender differences in endocrine stress reactivity (For a review see Kudielka & Kirschbaum, 2005). Studies that measure salivary cortisol release in response to laboratory stressors found that men have greater stress-reactive cortisol concentrations when compared to women in the follicular phase of the menstrual cycle, but not with women in the luteal phase (Childs, Dlugos, & De Wit, 2010; Zimmer, Basler, Vedder, & Lautenbacher, 2003). The follicular phase of the menstrual cycle is marked by increased concentrations of estrogen and ends with ovulation and the luteal phase is marked by increased concentrations of progesterone and ends with menses. These studies also found that cortisol concentrations decrease more quickly in men than women in either phase of the menstrual cycle, indicating a faster recovery from stress. Gender differences in stress recovery are linked to specific stress-related diseases. For example, men are more prone to heart disease, which may be associated with larger cortisol concentrations released during stress and fast fluctuations in recovery. Conversely, women are more prone to autoimmune and inflammatory diseases, which may be related to sustained cortisol concentrations during the recovery phase (Kudielka & Kirschbaum, 2005).

Cortisol and PTSD. Distinct neuroendocrine changes have been found in individuals with PTSD compared to healthy populations (Baker et al., 2005; Lauc, Zvonar, Vuksić-Mihaljević, & Flögel, 2004). It is not known whether the changes occur as a result of trauma or are present

prior to trauma exposure and predispose the individual for developing PTSD. Previous research has represented conflicting results in cortisol concentrations related to posttraumatic stress disorder. Some studies have found evidence of higher than normal cortisol in individuals with PTSD (Baker et al., 2005; Björntorp, 1996; Lindley, Carlson, & Benoit, 2004), and some studies found evidence of lower than normal cortisol (Mason et al., 2002).

Many of the studies that have found higher than normal cortisol concentrations are not representative of changes typically associated with the disorder and may be a result of comorbid major depression disorder (Baker et al., 2005; Björntorp, 1996; Lindley et al., 2004)) or measuring total rather than free cortisol (Mason, Giller, Kosten, Ostroff, & Podd, 1986). Cortisol measured in saliva and urine gives measurements of bioactive cortisol that is not bound to proteins. Measurements of cortisol taken from plasma or CSF may produce higher cortisol concentrations but do not accurately reflect biologically active cortisol due to protein binding. Thus, is unclear whether the increased cortisol concentrations found in these studies indicate functional hypercortisolism (i.e., increased free cortisol) or successful compensation via increased production of binding globulins (i.e., increased bound cortisol).

Lower than normal cortisol concentrations (hypocortisolism), a sign of HPA-axis negative-feedback hypersensitivity, is currently the leading theory regarding dysregulation associated with PTSD (Boscarino, 1996). Several studies support this theory, most using measures of free cortisol which a better example of biologically active cortisol concentrations (Lauc et al., 2004; MacMillan et al., 2009; Simeon et al., 2007). Simeon and colleagues (2007) examined urinary free cortisol and plasma cortisol in individuals with dissociative disorders, individuals with PTSD and healthy controls. Urinary samples were collected over a 24-hour period, and blood samples were collected once per hour. Individuals with PTSD and dissociative

symptoms had blunted basal plasma cortisol concentrations compared to healthy controls. Boscarino (1996) investigated morning serum cortisol in Vietnam era veterans not diagnosed with PTSD and Vietnam theater veterans diagnosed with PTSD. Cortisol concentrations were lower in Vietnam theater veterans diagnosed with PTSD than Vietnam era veterans who were not. Further, Lauc and colleagues (2004) collected salivary cortisol from veterans with PTSD with history of hospitalization, veterans with PTSD and no history of hospitalization, and veterans without a history of PTSD. They found blunted cortisol concentrations in veterans with current PTSD, regardless of hospitalization, compared to veterans without PTSD. Kanter and colleagues (2001) found lower basal plasma cortisol concentrations and higher corticosteroid binding globulin in male Vietnam veterans with PTSD when compared to healthy controls.

Few studies have examined HPA-axis function with regard to PTSD in women. Some studies that have investigated this population found that women with PTSD have blunted cortisol concentrations compared to controls. Most of the studies conducted focus on intimate partner violence and childhood abuse. For example, Young, Tolman, Witkowski, and Kaplan, (2004), examined salivary cortisol in low-income women with recent PTSD, past PTSD and healthy controls. This study collected cortisol at awakening and bedtime as well as during participants' visit to the research site. The researchers found that individuals with recent trauma had higher awakening cortisol concentrations, however, they did not find a significant difference between individuals with a lifetime diagnosis of PTSD and controls. Inslicht et al. (2006) examined salivary cortisol in women with intimate partner violence related PTSD and abused women with no history of PTSD. They found that women with PTSD had higher concentrations of basal cortisol than women without. Lemieux and Coe (1995) examined samples of urinary cortisol collected over a 24-hour time period in women diagnosed with PTSD from childhood sexual

abuse, those who experienced sexual abuse but did not develop PTSD, and healthy controls. Women with PTSD exhibited higher cortisol concentrations compared to women without PTSD and healthy controls. MacMillan and colleagues (2009) examined resting and reactive concentrations of salivary cortisol of girls ages 12-16 with a history of maltreatment and controls. Saliva was collected as part of the Trier Social Stress Test (TSST). Girls diagnosed with PTSD had blunted cortisol concentrations following the TSST.

Even fewer studies examine gender differences in cortisol's relationship to PTSD directly. Many studies that have examined both men and women do not compare HPA-axis function in terms of gender. One study investigated basal salivary cortisol in both men and women (Freidenberg et al., 2010). Salivary cortisol was collected at three time points from women and men with PTSD resulting from a motor vehicle accident. Women's cortisol concentrations were lower than men's after awakening and decreased more slowly. However, given that this study did not compare individuals with PTSD to healthy controls, it is not clear if the gender differences found are specific to PTSD.

Cortisol and Psychopathy. Much like PTSD, research that focuses on HPA-axis function in psychopathy is discrepant. Studies have found low (Cima, Smeets, & Jelicic, 2008; Loney, Butler, Lima, Counts, & Eckel, 2006; Platje et al., 2013) or no (Feilhauer et al., 2013; Glenn, Raine, Schug, Gao, & Granger, 2011) differences in basal cortisol concentrations. Several of these studies investigate cortisol at one time point, which makes it difficult to tease apart differences in HPA-axis functioning relative to stress or diurnal release (Loney et al., 2006; Welker, Lozoya, Campbell, Neumann, & Carré, 2014). Overall, very few studies have investigated the role of hormones in psychopathy in adults. Further, because changes in both testosterone and cortisol are implicated with antisocial and instrumental aggression, many studies

include an investigation of both cortisol and testosterone (Denson, Mehta, & Ho Tan, 2013; Glenn et al., 2011; Mehta, Welker, Zilioli, & Carré, 2015; Popma et al., 2007).

Briefly, the HPA- and the hypothalamic-pituitary-gonadal axis (HPG-axis) work synergistically to drive human behavior (Mehta & Josephs, 2010; Windle, 1994). The activation of the HPA-axis during a stressful situation is associated with withdrawing from the situation, whereas HPG-axis activity is associated with engaging in aggressive behavior during a stressful situation. Thus, in times of stress where an individual would be better served by fleeing a situation, the HPA-axis attenuates HPG-axis activity, resulting in an attenuation of testosterone synthesis (Johnson et al., 1992). Conversely, when an individual needs to fight, the HPG-axis then blocks HPA-axis activity, leading to the synthesis and release of testosterone. The relationship between these systems leads to individual differences in behavior to stressful situations. These differences are often examined by investigating the cortisol-testosterone ratio. Higher concentrations of testosterone are associated with antisocial and aggressive behavior (Denson et al., 2013; Popma et al., 2007) and low cortisol concentrations are associated with decreased stress and higher risk taking propensity (Mehta et al., 2015). The symbiotic relationship of these systems most likely underlies the differences in cortisol observed in psychopathy. Thus, we include research that measured both cortisol and testosterone in this discussion.

Several studies have found lower cortisol concentrations in individuals with psychopathy (Johnson et al., 2014; Loney et al., 2006; Platje et al., 2013). However, these changes are often differentially associated with psychopathic traits (Johnson et al., 2014; Stoppelbein, Greening, Luebbe, Fite, & Becker, 2014). Most studies do not include women and those that do, have not found a relationship between cortisol and psychopathy (Loney et al., 2006; Welker et al., 2014).

For example, Loney and colleagues (2006) investigated the relationship between cortisol, testosterone, and CU traits in male and female adolescents. They found that only boys higher in callous unemotional traits had lower cortisol concentrations when compared to male controls. No relationship was found between testosterone and callous unemotional traits in either sex. However, they did find that boys had higher testosterone concentrations when compared to girls.

Further, very few studies have examined stress-reactive cortisol in psychopathic individuals. This gap in the literature exists because much of the literature focuses on prison populations or adolescents. Conducting stress protocols with special populations is logistically difficult and can be ethically questionable. Only one study, to our knowledge, used the TSST to investigate differences in the stress response in male prisoners (Johnson, Mikolajewski, Shirtcliff, Eckel, & Taylor, 2015). This study found that stress-reactive cortisol concentrations were blunted in individuals higher in psychopathic traits but only if they were non-responders. Non-responders were individuals who did not show an increase in cortisol during the session and instead showed a diurnal decline. Although this study filled a gap in the literature, there was one methodological issue that should be addressed in future studies. This study only collected two saliva samples to measure stress reactivity. Typically, three or more samples are necessary to best analyze the rise and fall of cortisol throughout the TSST (Kirschbaum, Pirke, & Hellhammer, 1993). This allows researchers to collect information about how cortisol fluctuates through baseline, stress reaction and recovery.

It should be noted that some studies have found no relationship between cortisol concentrations and psychopathic traits. One such study conducted by Feilhauer and colleagues (2013) examined callous unemotional traits, impulsivity, and narcissism and the relationship

with basal cortisol concentrations in male juvenile delinquents and community volunteers. This group found no relationship between callous unemotional traits or narcissism and basal cortisol levels between juvenile delinquents and community participants. However, impulsivity was associated with lower basal cortisol concentrations in community participants but not delinquents. This study illustrates the need for additional research investigating possible gender and age effects.

Many of the studies outlined in this section investigated the relationship between hormonal concentrations and psychopathy in youth and prison populations. HPA-axis function changes throughout the lifespan (for a review, see Gupta & Morley, 2014), thus caution should be taken when evaluating the relationship between psychopathy and HPA-axis function. Further, there is a higher prevalence of psychopathy in prison populations (Grann, 2000; Hare, 2006; Salekin et al., 1997). Therefore, the differences observed in studies conducted with prisoners may over represent more severe forms of the disorder. Our study will investigate these factors in a sample of university and normal-range adult sample, thus filling a large gap in the literature. This will allow us to better illustrate dysregulations in HPA-axis functioning related to psychopathy and trauma exposure**.**

Electrophysiology of PTSD and Psychopathy

PTSD. Research suggests that PTSD symptom expression is affected by a wide variety of variables and result in differential biological responses (Klimova, Bryant, Williams, & Louise Felmingham, 2013; MacMillan et al., 2009). As previously discussed, symptoms associated with PTSD are influenced by a variety of factors, including gender (Carmassi et al., 2014; Kessler et al., 2005) and trauma type (Graham et al., 2016; Pratchett et al., 2010; Wolff, Loos, Tutus, & Goldbeck, 2015). Differences in symptom expression and symptom severity lead to changes in

biological response to stimuli, especially in those that contain an emotional component (Kimura, Ueda, Takeda, Sugimoto, & Katayama, 2013; Klimova et al., 2013). In addition to hormonal dysregulation, PTSD is largely associated with deficits in information processing and coding, particularly when the information has a negative emotional component (Kertzman, Avital, Weizman, & Segal, 2014; Levy-Gigi, Szabo, Richter-Levin, & Kéri, 2015; Pineles et al., 2016). Furthermore, PTSD is associated with changes in heart rate (HR; Shah et al., 2013), fear-potentiated startle (FPS; Grillon & Morgan, 1999) and skin conductance (Liberzon, 1999) when exposed to emotional stimuli. This section will outline psychophysiological correlates of PTSD, focusing on the P3, and FPS. We will discuss the same components as they relate to psychopathy in the section that follows.

When examining information processing in individuals with PTSD, much of the literature focuses on the P300 or P3 event related potential (ERP; Araki et al., 2005; Felmingham, Bryant, Kendall, & Gordon, 2002; Klimova et al., 2013). The P3 is an early potential that occurs around 300-600 ms after a stimulus that requires probability assessment, use of working memory, and attentional resources (Luck, 2014). It is often used for tasks that contain an emotional or evaluative component. Symptoms associated with PTSD are differentially associated with the P3 response. Dissociative symptoms like avoidance are associated with attenuated P3 amplitude to emotionally salient stimuli compared to healthy controls (Araki et al., 2005; Felmingham et al., 2002; Klimova et al., 2013). The dissociative subtype of PTSD marked by symptoms of depersonalization and derealization. Dissociation following a traumatic event may serve a regulatory function, allowing an individual to consciously control arousal to threat. In the case of PTSD, this dampening of arousal may generalize across stimuli domains and emotional saliency. Conversely, symptoms associated with hyperarousal are associated with a potentiated P3

amplitude to emotionally salient stimuli when compared to healthy controls (Lobo et al., 2014). P3 amplitude's relationship to PTSD also differs according to the type of stimuli presented. In a meta-analysis of 36 studies, Johnson, Allana, Medlin, Harris, and Karl (2013) found that the P3 did not differ in individuals with PTSD compared to healthy controls when exposed to neutral stimuli but was larger in individuals with PTSD when stimuli contained a trauma-related distractor.

As previously discussed, one hallmark symptom of PTSD is exaggerated startle (APA, 2013; Morgan, Grillon, Southwick, Davis, & Charney, 1995). This reflex can be measured through electromyography with sensors placed on the orbicularis oculi (Grillon, Ameli, Woods, Merikangas, & Davis, 1991). However, it is more typical to use fear potentiation of the startle reflex (FPS) than raw startle magnitude to study fear in the laboratory. FPS is typically elicited through the use of white noise bursts or electrical during conditioning paradigms and is a measure of fear when exposed to threatening or aversive stimuli (Costanzo et al., 2016; Grillon & Morgan, 1999; Morgan et al., 1995). FPS has been used to investigate differences in fear learning (Costanzo et al., 2016; Fani et al., 2012; Grillon & Morgan, 1999) and treatment response (Robison-Andrew et al., 2014), as well as a tool to predict the development and persistence of PTSD symptoms after trauma exposure (Sijbrandij, Engelhard, Lommen, Leer, & Baas, 2013). PTSD is associated with greater FPS to fear-conditioned stimuli, as well as deficits in extinguishing this response over time (Costanzo et al., 2016; Fani et al., 2012). Differences in FPS have also been observed between individuals who respond to treatment and those who do not (Robison-Andrew et al., 2014). Individuals with PTSD who respond to treatment have been found to have an increase in FPS mid-way through treatment when exposed to trauma-related imagery paired with intermittent white noise bursts. This response decreases throughout the

course of treatment. No response to treatment was associated with no significant changes in FPS over the course of treatment. Furthermore, FPS has been linked to persistence of PTSD symptoms after prolonged trauma exposure (i.e. military deployment). Specifically, those who went on to develop PTSD symptoms after deployment had reduced inhibition to startle as evidenced by a larger FPS compared to trauma-exposed controls (Sijbrandij et al., 2013).

Psychopathy. Psychopathy is also associated with changes in P3 and FPS. The associations between the P3 response and psychopathy are inconsistent, with some studies finding potentiated (Alius, Pané-Farré, Löw, & Hamm, 2015; Raine & Venables, 1988), attenuated (Kiehl, Hare, Liddle, & McDonald, 1999; Kiehl, Bates, Laurens, Hare, & Liddle, 2006), or no difference in P3 amplitude (Brazil et al., 2012). Many studies find a reduction in P3 amplitude in psychopathic populations, indicating deficits in attentional allocation. However, changes in P3 amplitude differ when psychopathy is broken down by factor or facet (Carlson & Iacono, 2008; Carlson & Thái, 2010; Venables & Patrick, 2014). Studies that break psychopathy into two psychopathic traits have found that Self-Centered Impulsivity/IA or PCL-R Factor 2 (impulsive and antisocial behaviors) were associated with reduced P3 amplitude, but no relationship was found in P3 amplitude and FD (Carlson, Thái, & McLarnon, 2009; Venables & Patrick, 2014). Thus, it appears that deficits in the allocation of attentional resources is associated with the maladaptive antisocial and externalizing psychopathic traits. Few studies that have investigated ERPs in psychopathic populations include women, and no research to date has examined the role of trauma in moderating differences in P3 amplitude between psychopathic traits. Future research is needed to elucidate the effects of gender and trauma on psychopathy and the P3 response.

FPS has also been investigated in individuals of psychopathy. One hallmark feature of psychopathy is fearlessness. Much like the research that investigates the P3 ERP, FPS is differentially associated with psychopathic traits. Deficits in arousal measured by FPS may indicate deficits in allocating attention to or processing emotionally complex or salient stimuli (Sadeh & Verona, 2012). Unlike PTSD, most studies have found that psychopathy is associated with deficits in FPS; however, when psychopathy is broken down into factors, many studies find that only FD and/or the affective-interpersonal facet of the PCL-R are associated with deficits in FPS (Anderson et al., 2011; Benning, Patrick, & Iacono, 2005; Dvorak-Bertsch, Curtin, Rubinstein, & Newman, 2009; Newman, Curtin, Bertsch, & Baskin-Sommers, 2010; Patrick, Bradley, & Lang, 1993; Vaidyanathan, Hall, Patrick, & Bernat, 2011). Taken together, this research suggests that FPS is associated with the affective and interpersonal components of psychopathy, which is similar but opposite to PTSD. Women seem to have the same selective association of FPS with FD as men (Anderson et al., 2011), but it remains unclear whether they have similar FPS deficits linked to IA.

Social Support in PTSD and Psychopathy

Social support is associated with positive physical and psychological health outcomes and is an important factor in the resilience against stress and trauma related disorders (Dumont & Provost, 1999; Woodward et al., 2015). Several studies have found that physical touch administered by a close friend or family member reduces stress-reactive cortisol concentrations during laboratory stressors (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003; Smith, Loving, Crockett, & Campbell, 2009). Furthermore, studies have found that individuals who report stronger relationships have lower levels of basal cortisol (Grewen, Girdler, Amico, & Light, 2005; Saxbe, Repetti, & Nishina, 2008). Conversely, low levels of perceived social

support are associated with negative health outcomes and stress-related diseases like depression and heart disease (Uchino, 2009). Social support is associated with resilience to and recovery from PTSD in both men and women (Feder et al., 2013; King, King, Fairbank, Keane, & Adams, 1998; Schumm, Briggs-Phillips, & Hobfoll, 2006). However, some studies indicate that social support may play a more prominent role in the recovery from PTSD in women compared to men (Ahern et al., 2004; Andrews, Brewin, & Rose, 2003). One such study conducted by Andrews, Brewin, and Rose, (2003) For instance, women who reported negative experiences with support versus positive support were more likely to develop PTSD symptoms after experiencing a traumatic event.

Psychopathic traits are associated with behaviors that lead to high levels of interpersonal stress for the individual and with those he or she is closest. FD and IA result in differential disruptions in social networks. FD is associated with personality traits like narcissism and dominance (Benning, Patrick, Blonigen, et al., 2005), which make the individual more likely to engage in socially disruptive behaviors like using others for personal gain. Conversely, IA is associated with high levels of alienation and low levels of social closeness (Edens & McDermott, 2010). As a result, individuals higher in IA are likely to have fewer friends and other close relationships. However, no study, to our knowledge, has directly assessed how individuals with psychopathic traits benefit from social support provided through close relationships or through physical support during times of stress. Research has demonstrated the importance of maintaining relationships for physical and psychological health (Hartup & Stevens, 1999). Thus, future studies should examine the role of social support in psychopathy.

Chapter 3: Methods

Participants

Participants were recruited from the Department of Psychology subject pool and were enrolled in undergraduate classes at the University of Nevada, Las Vegas. Participants were responsible for recruiting and bringing an individual whom they considered a close friend. At the time of data analysis, 96 participants and 96 friends had participated in the study. Out of these individuals, 116 were women and 79 were men. We excluded data from 1 participant and friend pair due to incomplete data resulting from a campus-wide power outage. Furthermore, the MPQ-BF includes validity-testing scale that allows the researchers to exclude responses that are invalid due to response bias or missing data. As a result, we excluded data from 8 participants, leaving a total of 186 participants and friends for data analysis. Discrepancy in participation numbers on three of our questionnaires occurred due to a technical issue with the Qualtrics survey. As a result, data from 52 participants and 25 friends had to be recollected. Of the 77 participants that were recontacted, 38 responded.

Our participants' ages ranged from 18 - 52 (M = 20.81, SD = 5.66). To examine if mean ages differ between men and women, we conducted an independent t-test where no statistically significant differences emerged $t(167) = -.260$, $p = .795$. Table 1 provides participants' age and race/ethnicity by sex.

Table 1

Demographics

	Men		Women	
Age	*Mean*	*St. Dev*	*Mean*	*St.Dev*
	20.66	4.35	20.89	6.32
Race/Ethnicity	*n*	*%*	*n*	*%*
Asian Indian	0	0.00	3	2.70
Black/African American	13	17.33	15	13.51
Caucasian	21	27.27	37	33.33
Chinese	3	3.90	8	7.21
Filipino	13	17.33	20	18.02
Japanese	2	2.66	1	0.90
Mexican American/Mexican/Chicano	5	6.66	5	4.50
Puerto Rican	1	1.33	0	0
Other Hispanic/Latino	3	3.90	2	1.80
Multiple Race/Ethnicity	7	9.33	0	
None of these Choices	7	9.33	20	18.02

Note. Male (n = 75) and Female (n = 111).

Measures

Demographics. Our demographics questionnaire was made up of 61 items (Appendix A) that included questions about age, gender, race/ethnicity, marital status, and education. We also include questions about substance use, medical history, and criminal activity.

Multidimensional Personality Questionnaire - Brief Form (MPQ-BF; Patrick, Curtin, & Tellegen, 2002). The MPQ-BF is a 155-item questionnaire that is made up of 11 primary trait scales that capture different aspects of emotionality and behavioral constraint. Coefficient alphas for the primary trait scales MPQ-BF range from .54 to .86 in our sample. Patrick and colleagues (2002) found similar reliability with alphas that ranged from .74 to .84. This questionnaire's primary trait scales can be aggregated through regression equations to

assess FD and IA in psychopathy (Benning et al., 2003). FD is associated with traits such as charisma, manipulation, and thrill seeking; whereas IA is associated with externalizing factors such as aggression, impulsive behavior, and criminality (Edens & McDermott, 2010).

Life Events Checklist for DSM-5 (LEC-5; Weathers, Litz, & Keane, 2013). The LEC-5 is a 17-item questionnaire used to assess exposure to traumatic events throughout participants' life spans (e.g., Natural Disaster: it happened to me, I witnessed it, learned about it). Higher scores on the LEC-5 indicate higher levels of traumatic experiences. In our sample, the LEC-5 had questionable reliability with a Cronbach's alpha of .53. Gray (2004) demonstrated similar relaibility with a Cronbach alpha of .67.

PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, & Keane, 2013-b). The PCL-C is a 17-item measure that consists of descriptions of symptoms that are associated with PTSD (e.g. repeated, disturbing memories, thoughts or images of a stressful situation from the past). Participants are asked to rate how much they have been bothered by a listed problem over the past month on a scale from 1 "Not at all" to 5 "Extremely." The PCL-C had excellent internal consistency in our sample with a Cronbach's alpha of .91 .Ruggiero, Ben, Scotti, and Rabalais, (2003) demonstrated similar reliability with a coefficient alpha of .94.

Inventory of Depressive Symptomatology-Self Report (IDS-SR; Rush, Carmody, & Reimitz, 2000). Exposure to traumatic events can result in PTSD or depression. Depression results in different patterns of cortisol dysregulation opposite to that seen with PTSD (Björntorp, 1996). Thus, in order to control for the effect of depression on cortisol concentrations we will include the IDS-SR. This measure consists of 30-items that evaluate the severity of depressive symptoms. Participants are asked to rate each question from 0 indicating no symptoms to 3 being the most severe form of the symptom. The IDS-SR had good internal consistency in our sample

with a Cronbach's alpha of .81. Rush and colleagues (2000) found excellent internal consistency with a Cronbach's alpha of .94.

Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983). The ISEL is a 40-item questionnaire that investigates four aspects of social support: tangible support, belonging support, self-esteem support, and appraisal support. The ISEL also provides an overall measure of social support when items are summed. Higher scores are associated with higher levels of social support. Participants are asked to rate each with how true or false that item is for them from "Definitely True" to "Definitely False." In our sample, the Cronbach's alpha for its subscales ranged from good .73 to excellent .94. Delistamati and collegues (2006) found lower internal consistency in their sample, with Cronbach's alphas ranging from .45 to .75.

Visual Analogue Scale (VAS). The VAS (Appendix B) consists of one question: "How stressed out do you feel right now." Participants will be asked to make a tick mark along a 10 cm line that ranges between "Not Stressed" to "Very Stressed" during each saliva sample collection.

Life Orientation Test-Revised (LOT-R; Scheier, Carver, & Bridges, 1994). The LOT-R is a brief measure used to evaluate differences in general levels optimism and pessimism. The measure consists of 10 items that are rated on a scale from "A= I agree a lot" to "E= I Disagree a lot." The LOT-R had poor internal consistency in our sample, as evidenced by a Cronbach's alpha of .55. The LOT-R had better internal consistency in previous studies, as evidenced by a Cronbach's alpha of .82 (Scheier, Carver, & Bridges, 1994). Optimism in the face of stress and trauma is associated with better health outcomes (Jobin, Wrosch, & Scheier, 2014; Stellar et al., 2015).

Brief COPE (Carver, 1997). The Brief COPE is a 28-item measure that measures how individuals cope with stress in their lives. Participants are asked to rate each situation with how

often they engage in the stated behaviors ranging from 1 "I haven't been doing this at all" to 4 "I've been doing this a lot." The measure consists of 14 subscales consisting of two questions each. The subscales are: Self-Distraction, Active Coping, Denial, Substance Use, Use of Emotional Support, Use of Instrumental Support, Behavioral Disengagement, Venting, Positive Reframing, Planning, Humor, Acceptance, Religion, and Self-Blame. However Carver (1997) suggests that researchers conduct a factor analysis to determine the factor structure in their own samples. Thus, a factor analysis was conducted on the 28-question measure with the data we collected. Two factors emerged from our data when principal axis factoring followed by promax rotation were employed ($\kappa = 4$, inter-factor $r = .33$). Factor 1 consisted of items 2, 5, 7, 10, 12, 14, 15, 17, 18, 20, 23, and 25. This factor consisted of items that appear to measure solution-focused coping and had a Cronbach's alpha of .86. Factor 2 consisted of items 3, 6, 8, 13, 16, and 26. Factor 2 appeared to measure negative coping mechanisms and had a Cronbach's alpha of .72. Items that were retained for both factors had loadings of at least .4 on one factor and loaded less than .25 on the other. Because the factor structure suggests two factors and subsequent reliability testing evidenced good internal consistency, we retained the two-factor solution for analysis. In our sample, the internal consistency ranged from good to excellent with Cronbach's alphas ranging from .71 to .86.

Resilience. To investigate resilience to PTSD, we computed a "Resilience" score by subtracting the z-scored LEC-5 total scores from the z-scored PCL total scores. Z-scores were used to ensure that both scales were transformed to the same metric, allowing both scales to contribute equally to our measure of resilience to PTSD. Higher resilience scores indicate more traumatic experiences and lower rates of PTSD and lower scores indicate fewer traumatic experiences and higher PTSD scores.

Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS consists of 20 words that describe positive and negative emotions. Participants are asked to rate how often they have felt the emotion during the past week on a scale from 1 "Slightly or not at all" to 5 "Extremely." The internal consistency of the PANAS was good in our sample with Cronbach's alphas ranging from .87 for the positive affect scale and .83 for the negative affect scale. Watson, Clark, & Tellegen (1988) found similar internal consistency with Cronbach alphas ranging from .86 for the positive affect scale and .84 for the negative affect scale.

Locus of Control (LOC; Pettijohn, Pettijohn, & Sacco, 2005). The LOC consists of 20 statements that measure the extent to which an individual assigns internal or external reinforcement beliefs in daily life. Participants are asked to answer each statement with True or False based on their belief system. Higher scores indicate a higher external locus of control and lower scores indicate an internal locus of control. In our sample, the internal consistency was poor, albeit higher than was previously found (α=.43; Pettijohn, Pettijohn, & Sacco, 2005), as evidenced by a Cronbach's alpha of .51.

Life Events Checklist (LEL; Cohen, Tyrrell, & Smith, 1991). The LEL is a 24-item measure that assesses events that occur in daily life and if those events cause a negative or positive reaction. Participants are asked to indicate whether an event has happened to themselves or a close other. They are then asked to indicate if the even has made their life better, worse, or if it has stayed the same. Participants are also asked to rate their experiences from "Very good" to "Very bad." The final score is a cumulative events score with higher scores indicating that the participant experienced more negative life events.

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS is a 10-item measure that investigates daily life stress is perceived. Participants are asked to answer

each question with how often they felt a specific way ranging from 0 "Never" to 4 "Very often." Higher scores indicate that the individual endorsed the items as being stressful. This measure had excellent internal consistency in our sample, with a Cronbach's alpha of .84. Cohen and Janicki-Deverts (2012) found similar internal consistency with a Cronbach's alpha of .91.

Leibowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS is a measure used to investigate performance and social anxiety. The LSAS contains 13 questions that measure performance anxiety and 11 questions that measure social anxiety. Participants are asked to rate 24 situations with how with how anxious the situation makes them feel on a scale from 0 "None" to 3 "severe". Then, participants are asked to rate how often they avoid the same situations on a scale from 0 "Never" to 3 "Usually" The LSAS is an excellent measure of social and performance anxiety. The Cronbach's alphas in our population were .90 for the anxiety scale and .91 for the LSAS avoidance scale. Heimberg and Holaway (2007) found an average Cronbach's alpha of .96 for the complete measure.

Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The PTGI is a 21-item scale that measures factors related to positive changes after experiencing a traumatic event. These factors include, spiritual change, relating with others, and personal strength. Participants are asked to rate each item on how much change resulted from 0 "I did not experience this change as a result of my crisis" to 5 "I experienced this change to a very great degree as a result of my crisis. The PTGI total scale has an excellent internal consistency in our sample, with a Cronbach's alpha of .95. Similarly, Tedeschi and Calhoun (1996) demonstrated excellent internal consistency with a Cronbach's alpha of .94.

Short Form Health Survey (SF-36; Ware, Snow, Kosinski, & Gandek, 1993). The SF-36 is a 36-item scale that measures participants' physical and psychological health. The

measure contains 8 subscales: Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health. Score ranges on each scale vary; however, lower scores indicate low levels of functioning and higher scores indicate high levels of functioning. The SF-36 has moderate to excellent internal consistency with Cronbach's alphas ranging from .73 to .96. Similarly, a previous study found the SF-36 to have moderate to good internal consistency with coefficient alphas ranging from .70 to .80 (Gandek, Sinclair, Kosinski, & Ware, 2004).

Letter-Shock Task

Each participant participated in a version of a task previously used to study reaction to threat in psychopathy (Dvorak-Bertsch et al., 2009). The task consisted of letter cues that were presented in yellow and red. These cues were grouped into four task blocks of 50 trials. The participant was instructed that he or she would be shocked during one of the two color presentations, which was counterbalanced across participants. During each block, 25 red letters and 25 yellow letters were presented. During each block, the letters were further separated into 25 uppercase and 25 lowercase letters. Each letter was presented for 500 ms, with a 3-4 s randomly jittered inter-letter interval. The participant received shocks 1750 ms after the onset of 20% of the letters whose color was paired with shock and during 0% of the other color. These shocks were delivered to their fingertips on the participant's non-dominant hand by an aversive finger stimulator (Coulbourn; Allentown, PA). Each participant was shocked at an individually determined level one step down from the maximum level that was tolerable. The aversive stimulator has an absolute maximum shock level of 4.0 mA, which is well below a threshold that can cause injury to participants. In addition, during each block, 10 red and 10 yellow letters (5 uppercase and 5 lowercase in each condition) had startle probes delivered 500 ms after the

letter's offset to assess defensive startle blink reactivity (Figure 1). The startle probe consisted of 50 ms of 105 dB white noise.

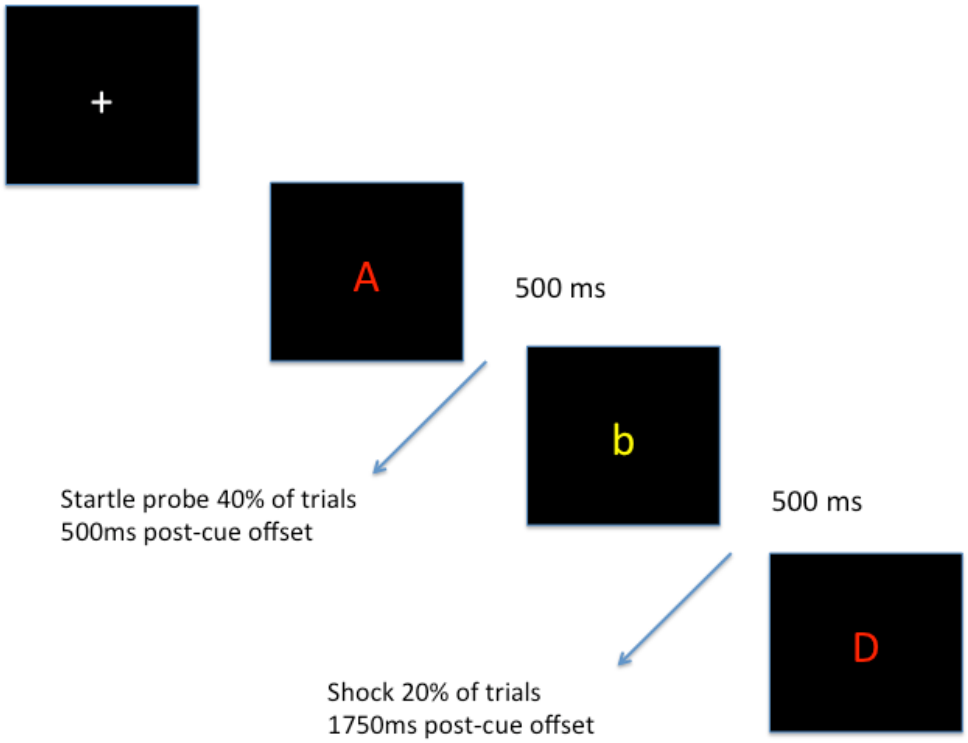

Figure 1. Sample trial in the instructed fear-conditioning paradigm involving shock.

Task instructions for the blocks of trials varied across two conditions: threat focus (TF) and alternative focus (AF). In TF blocks, the participant was instructed to attend to the color (red or yellow) of the letter cue and to press one of two buttons using his or her right hand to indicate letter color. He or she was instructed that a specific color and case of letter would be associated

with a higher probability of shock. In AF blocks, the participant was instructed to attend to the case of the letter cue and press one of the two buttons to indicate if the letter cue was in upper or lowercase. During one contiguous set of TF and AF blocks, the participant was in the room only with the experimenters, who were situated out of sight of the participant. In the other set of TF and AF blocks, the participant had his or her friend's hand placed on a shoulder for social support. The order of these sets (TF and AF blocks) was counterbalanced across participants.

Psychophysiological Measures

Psychophysiological recordings. We collected FPS, SCR, HR, and P3 data from the participant as physiological measures of stress within each block. All physiological data was recorded using a Neuroscan Synamps^2 system. The sampling rate was 2000 Hz and then online bandpass filtered at 0.05-500 Hz. FPS was measured using startle blink reflexes from the orbicularis oculi (beneath the eye) and the corrugator (above the brow) on the right eye. The P3 was measured from FZ, CZ and PZ sites using a 64-channel Neuroscan Quick-Cap with Ag/AgCl sintered electrodes. The P3 epochs were sampled at 2000 Hz with the Neuroscan SynAmps^2 bioamplifier at DC with a 500 Hz low-pass filter.

Saliva collection. We collected five passive drool salivary cortisol samples from each participant to investigate differences in stress reactive HPA axis functioning. Before each saliva sample was collected, a research assistant had the participant complete a visual analogue scale (VAS) to assess subjective stress levels. The first saliva sample was collected 30 minutes after the participant arrived to the laboratory. During the 30-minute habituation phase, the participant was seated in the testing room and had the sensors and EEG cap applied. Previous studies have shown that this time period is sufficient for participants to habituate to the testing location (Kirschbaum et al., 1993; Kudielka et al., 2004). We collected the second saliva sample after the

first block of the fear-conditioning procedure (see Figure 2). Between social support and alone blocks, the participant rested for 20 minutes while completing questionnaires to allow cortisol levels to return to baseline. Upon completion of the 20-minute resting period, the participant provided a third saliva sample and began the second fear-conditioning block. After completing the second block, we collected the fourth saliva sample. Participants then rested for 30 minutes before providing the fifth and final saliva sample. Salivary cortisol was chosen because it is a minimally invasive method that allowed us to assess hormonal responses to stress within each condition. To minimize the effects of diurnal variation in cortisol levels, experimental runs took place at between 10:00am and 5:00pm every testing day (Kudielka et al., 2004).

Saliva samples were stored in cryogenic vials at -20°C until the samples were assayed. Before assays were conducted, samples were spun down in an Allegra centrifuge (X-15R, Beckman Coulter Inc.). We performed cortisol assays using the Salimetrics Expanded Range High Sensitivity Salivary Cortisol Enzyme Immunoassay kit (Salimetrics, State College, PA) according to the manufacturer's instructions. A multi-mode microplate reader provided readings of the cortisol assays (ELx800, Bio-Tek Instruments). Each sample was assayed in duplicate, and cortisol concentrations were interpolated from a standard curve of serial cortisol dilutions provided with the kit. The intra-assay variability coefficients ranged from low, 3%, to high, 7% and the inter-assay variability coefficients ranged from low, 3%, to high, 11%.

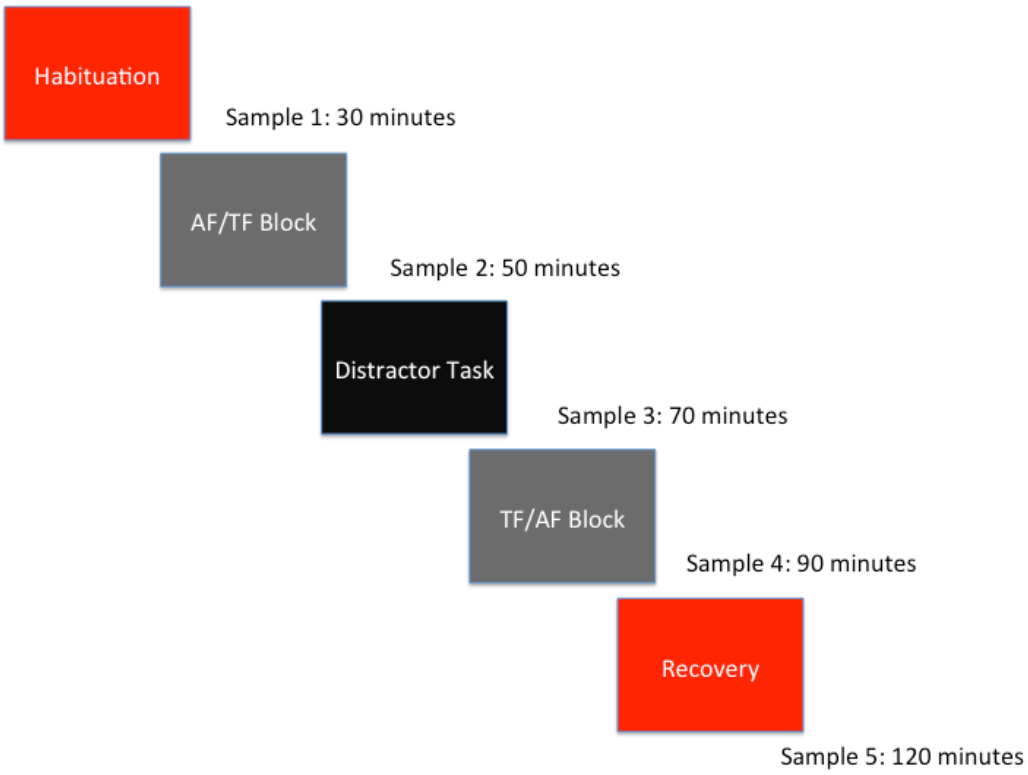

Figure 2. Timeline of cortisol collection during instructed fear-conditioning experiment.

Procedure

During the spring, summer, and fall 2016 semesters semester, 86 psychology students from the University of Nevada, Las Vegas subject pool were recruited to complete this study. Each participant was instructed to bring one friend with whom he or she is closest, to complete questionnaires and provide social support during the study. Upon arriving to the lab, research assistants escorted the participant and friend into separate rooms to be consented. After providing informed consent, a research assistant provided the participant with instructions and access to a Qualtrics survey. The Qualtrics survey contained questionnaires to better understand the relationship between trauma and psychopathy and how this relationship is mediated by social support. Each participant and friend was asked to complete a demographics questionnaire

(Appendix B), the MPQ-BF and the LEC-5. The participant and friend was also asked to complete questionnaires to assess trauma exposure, symptoms of PTSD, depression, and perceived social support. Research assistants placed sensors and the EEG cap on the participant while he or she is finished the questionnaires. The friend was instructed to complete the same questionnaires on a computer in separate room.

After research assistants completed sensor placement and the participant finished the questionnaires, the participant began the first block of the letter-shock task. During this time, depending on the condition, the friend was prepared to enter the testing room or was asked to hold questions until the block had ended. Once this block was completed, the participants rested for 20 minutes while completing several additional paper and pencil questionnaires. These questionnaires were issued in an order that began with the least stressful measure and ended with the most stressful measure to control for stress related cortisol fluctuations during the brief recovery phase. The order of the questionnaires was: LOT-R, PANAS, LoC, Brief COPE, LSAS, PSS, LEL, PTGI, and the SF-36. Participants were given the option of finishing the surveys during the 30-minute recovery phase at the end of the session. After the 20-minute recovery period, the second block started and the friend was either prepared to enter the testing room or be debriefed and dismissed. After the second block ended, participants were debriefed and instructed to relax for 30 minutes, during which the sensors and cap were removed.

Chapter 4: Current Study

This study will expand upon the current theories of a trauma-based etiology of psychopathy by investigating the relationship between trauma and psychopathic traits in adult populations. Furthermore, we will investigate the role of social support in moderating the relationship between trauma and PTSD in individuals high in psychopathic traits. Specifically, we will examine how physical touch may buffer the physiological response to stress. Moreover, we will investigate the relationships among gender, PTSD, psychopathic traits and the physical response to stress. We will also investigate how personality factors associated with FD are related to resilience from developing PTSD.

Furthermore, we will examine the biological underpinnings of PTSD and psychopathy by investigating salivary cortisol in conjunction with FPS and P3 amplitude to examine the central and peripheral response to stressful stimuli. We are particularly interested in the biological factors underlying the differences between IA and FD and how these factors may lead to resilience to PTSD in individuals higher in FD. Combining methods to investigate the stress response provides an innovation seldom seen in this literature. Measuring FPS will provides information about physiological arousal throughout the task. Collecting salivary cortisol provides a non-invasive method to measure HPA axis activity. Investigating ERPs will provide a cleaner temporal resolution with regards to how stress cues are processed. Thus, combining these methodologies will expand our understanding of how the stress response is disturbed in PTSD and psychopathy. Currently, no interventions focus on the psychosocial dimensions of the psychopathy, specifically how social support impacts the ability of these individuals to respond to stress. Thus, this research could lay a foundation to develop socially based prevention and intervention programs.

Hypotheses

Stress, trauma, and resilience. We hypothesize that trauma exposure will be positively correlated with IA and negatively correlated with FD. Furthermore, we expect PTSD to be associated with higher levels of depression, percieved stress, trauma exposure, and negative affect. Generally, we also expect trauma and IA to be negatively associated with factors that contribute to resilience from PTSD (e.g., positive coping methods, perceived social support, perceived stress, and locus of control). Lastly, we expect that social support will moderate the relationship between trauma and psychopathic traits. Specifically, we expect that individuals who report traumatic experiences and report lower levels of social support, as measured by the ISEL, will be higher in psychopathic traits.

Endocrinology and psychophysiology. We hypothesize that women will benefit more from social support than men. This will be evidenced by lower cortisol concentrations during the support condition compared to the alone condition. We hypothesize that FD should be negatively related to stress response (i.e., the difference between responses to shock and non-shock cues in these physiological measures) in AF but not TF blocks, whereas IA will be unrelated to stress response in AF and TF blocks. We further hypothesize that FD should be negatively correlated with differences between support and alone conditions in FPS. These correlations should be mediated by the reduced baseline reactivity during the AF alone condition. IA should show the same negative correlations with differences in physiological measures between support and alone condition. When investigating sex differences, we expect women to be more sensitive to the stress response to threat overall, as evidenced by larger FPS during the TF condition. When examining the P3 response, we hypothesize that women will have larger P3 amplitudes to threat

cues when compared to men. We further hypothesize that individuals higher in FD will have smaller P3 amplitudes to threat cues versus non-threat cues, regardless of sex.

Chapter 5: Data Analysis

Factor Analysis

The Brief COPE consists of 28 questions that make up 14 subscales; however, Carver (1997) advises that exploratory factor analyses should be conducted to determine the factor structure in the current sample. Thus, an exploratory factor analysis was conducted to determine the underlying factors of the Brief COPE. Based on previous research (Benning, unpublished), it was predicted that two factors would emerge. We conducted parallel analyses, examined the scree plot, and used oblique promax rotation ($\kappa = 4$) to rotate the factors.

Correlations and T-Tests

Correlational analyses were conducted between factors associated with social support, stress, and resilience and their relationship with FD, IA, the interaction between the two factors (FDxIA; psychopathy) and PTSD (PCL-C symptom severity). First, correlations were conducted to investigate the relationship between psychopathy, PTSD and trauma exposure. Next, we examined the relationship between factors related to health using the SF-36 subscales. Furthermore, we conducted correlational analyses to investigate the relationship between psychopathy, PTSD, posttraumatic and growth coping, using the PTGI subscales and the two-factor solution of the Brief COPE. We also examined the relationship between PTSD, psychopathy, affect and life orientation. Lastly, we conducted correlations to investigate PTSD, psychopathy, depression, stress and anxiety.

We conducted three t-tests to examine whether the sexes differed in PTSD (PCL total scores), FD, IA and psychopathy (MPQ-BF), *p*-values were corrected for multiple comparisons. Welch's t-test was used to follow up on MANOVA and ANOVA results that indicated unequal

error variance. Lastly, correlations were conducted to examine significant interactions in psychophysiological data with our psychopathy and PTSD covariates.

Mediation Analyses

To further examine the relationship between trauma and psychopathy, we conducted mediation analyses to determine effects of social support on the relationship between trauma and psychopathy. To this end, mediation analyses were conducted to determine whether trauma exposure measured by the LEC-5 mediated the relationships between psychopathy factors and PTSD. We examined if social support mediated the relationships between trauma exposure and psychopathy factors. Lastly, we investigated if sex mediated the relationships between psychopathy factors and PTSD.

Meditational analyses were conducted using the INDIRECT macro in SPSS. We used 1000 bootstrapped samples to generate 95% confidence intervals around the parameter estimates for the meditational effects (Preacher & Hayes, 2008). Significant mediation of the relationship between psychopathy and PTSD variables were indicated by confidence intervals that did not include 0.

Mulitivariate and Univariate Analyses of Covariance

Then, to determine if social support, as measured by the ISEL, differed as a function of sex when controlling for psychopathy and PTSD, we conducted two ANCOVAs where the ISEL total score was the dependent variable, sex (man or woman) was the independent variable, and PCL total scores, IA, FD and the interaction, FDxIA were the covariates. Two ANCOVAs were conducted to preserve power when analyzing psychopathy factors because the PCL had fewer respondents than the MPQ-BF.

Next, to determine if physical support buffered stress-reactive cortisol concentrations and if this effect differed as a function of sex, we conducted two ANCOVAs. First, a repeated-measures ANCOVA was conducted to examine the effect of physical support on the cortisol response to stress using psychopathy factors as the covariates. The dependent variables were cortisol concentrations collected after participants received support and cortisol concentrations when the participants completed the task alone, sex (man or woman) was the independent variable and IA, FD and psychopathy were the covariates.

To investigate differences between conditions while controlling for our covariates, we conduced conducting two mixed-model ANCOVAs. The first ANCOVA was a 2 (Support Friend/Alone) x 2 (AF/TF) x 2 (presence of shock: CS+/CS-) factorial ANCOVA was conducted with sex as the between subjects factor and the psychopathy factors (FD, IA, FDxIA) as covariates. The second ANCOVA was conducted similarly; however, only PTSD (PCL-C scores) was examined as a covariate. Lastly, to examine differences in the P3 between groups, we conducted two 2 (Support Friend/Alone) x 2 (AF/TF) x 2 (presence of shock: CS+/CS-) factorial ANCOVAs with sex as the between subjects factor and the psychopathy factors (FD, IA, FDxIA) as covariates. The second ANCOVA was conducted similarly; however, only PTSD (PCL-C scores) was examined as a covariate.

Chapter 6: Results

Stress, Trauma, and Resilience Self-Report Measures

Participant and friend data were taken together to examine the relationships between personality, resilience, stress, and trauma factors. These relationships are displayed in Tables 2-7, descriptive statistics for all measures can be found in Appendix B. First, correlations were conducted to investigate the relationship between PTSD and psychopathy factors. FD was positively associated with trauma exposure (LEC-5 total score), $r(184) = .219$, $p = .003$ and negatively to both PTSD symptomatology, $r(112) = -.186$, $p = .048$. Thus, higher levels of FD are associated with higher levels of trauma exposure but lower levels of PTSD symptomatology. IA, on the other hand, was positively associated with both trauma exposure, $r(184) = .194$, $p = .008$ and PTSD, $r(112) = .488$, $p < .001$, such that higher levels of IA are associated with higher levels of trauma exposure and more severe PTSD symptomatology.

Several significant relationships between perceived support, as measured by the ISEL, and FD emerged. FD was positively related to total perceived support, $r(112) = .247$, $p = .008$. Further, when broken down by type of support, FD was positively related to self-esteem support, $r(112) = .477$, $p < .001$, and belonging support, $r(112) = .197$, $p = .036$, but not tangible ($p = .186$) and appraisal support ($p = .227$). Conversely, IA was negatively associated with total perceived support, $r(112) = -.361$, $p < .001$, appraisal support, $r(112) = -.353$, $p < .001$, tangible support, $r(112) = -.263$, $p = .005$, self-esteem support, $r(112) = -.235$, $p = .012$, and belonging support, $r(112) = -.392$, $p < .001$. Psychopathy was not significantly related to perceived support (ps range from .178 to .454).

Similar to IA, higher PCL-C scores were associated with lower total perceived support, $r(112) = -.441$, $p < .001$, appraisal support, $r(112) = -.394$, $p < .001$, tangible support, $r(112) = -$

.345, $p < .001$, self-esteem support, $r(112) = -.408$, $p < .001$, and belonging support, $r(112) = -.393$, $p < .001$. Thus, more severe PTSD symptomatology is related to lower levels of perceived social support.

Table 2

Correlations between Social Support, PTSD, and Psychopathy

	PTSD	FD	IA	FDxIA
Appraisal	**-.394*** **	.114	**-.353*** **	.126
Tangible	**-.345*** **	.125	**-.263** **	.127
Self-esteem	**-.408*** **	**.477*** **	**-.235***	.116
Belonging	**-.393*** **	**.197***	**-.392*** **	.071
Total	**-.441*** **	**.247** **	**-.361*** **	.126

Note. * = $p < .05$ and ** = $p < .01$, and *** = $p < .001$. $n = 114$ for all scales, PTSD refers to PCL-C symptom severity. Social Support refers to ISEL scales, and FD, IA, and FDxIA were computed using MPQ-BF subscales.

When investigating the role of physical and emotional health, as measured by the SF-36, we found that FD was associated with higher levels of energy and less fatigue, $r(180) = .290$, $p < .001$, higher levels of emotional wellbeing, $r(180) = .391$, $p < .001$, higher levels of social functioning, $r(180) = .180$, $p = .016$, and better general health, $r(180) = .291$, $p < .001$. IA, on the other hand, was associated with a greater role of limitations due to physical health, $r(180) = -.203$, $p = .006$, and emotional problems, $r(180) = -.272$, $p < .001$. Furthermore, IA was associated with lower energy, $r(180) = -.332$, $p = .002$, lower levels of emotional wellbeing, $r(180) = -.243$, $p = .001$, and social functioning, $r(180) = -.216$, $p = .004$. Lastly, IA was associated with lower

general health scores, $r(180) = -.239$, $p = .001$. Higher overall psychopathy scores were associated with higher scores on the SF-36 scales $r(180) = -.147$, $p = .047$, such that psychopathy was associated with reporting lower levels of pain. To decompose the relationship between pain and psychopathy, a simple slope analysis was conducted. The relationship between FD and pain was assessed separately at 1 SD above and below the mean of IA. There was a significant positive relationship between FD and pain at low ($\beta = .39$, $p < .001$), mean ($\beta = .44$, $p < .001$), and high ($\beta = .49$, $p < .001$) levels of IA.

PTSD was negatively associated with the role of limitations due to physical health, $r(108) = -.268$, $p = .005$, and emotional problems, $r(108) = -.322$, $p = .001$, such that greater PTSD symptomatology was associated with a greater role of limitation in both physical and emotional health. PTSD was also negatively associated with energy, $r(108) = -.524$, $p < .001$, emotional wellbeing, $r(108) = -.552$, $p < .001$, social functioning, $r(108) = -.374$, $p < .001$, and general health, $r(180) = -.261$, $p < .006$. Thus, PTSD is associated with lower energy, less emotional wellbeing, lower levels of social functioning, and overall lower general health.

Table 3

Correlations between Health Factors, PTSD, and Psychopathy

	PTSD	FD	IA	FDxIA
Physical Limitation	-.083	.019	-.082	.000
Role Physical Limit	**-.268****	.112	**-.230****	.006
Role Emotion Limit	**-.322****	.142	**-.272*****	-.052
Energy & Fatigue	**-.524*****	**.290*****	**-.232****	-.066
Emotion Wellbeing	**-.552*****	**.391*****	**-.243****	.053
Social Functioning	**-.374*****	**.180***	**-.216****	-.016
Pain	-.185	.018	-.108	**-.147***
General Health	**-.261****	**.291*****	**-.239****	.005

Note. * = $p < .05$ and ** = $p < .01$, *** = $p < .001$. Health factors were measured using SF-36 subscales, PTSD refers to PCL-C symptom ($n = 110$) severity and FD, IA, and FDxIA ($n = 182$) were computed using MPQ-BF subscales.

When investigating posttraumatic growth (PTGI), coping mechanisms (Brief COPE), and resilience scores, we found that FD was negatively related to negative coping, $r(182) = -.238$, $p = .001$, where individuals higher in FD utilize less negative coping mechanisms. In addition, FD was positively correlated with resilience, $r(112) = .301$, $p = .001$, such that individuals higher in FD had higher levels of resilience to developing PTSD symptoms following trauma exposure. Conversely, both IA, $r(182) = .286$, $p < .001$, and PTSD, $r(182) = .449$, $p < .001$, were positively associated with negative coping, such that individuals with more severe PTSD symptomatology and higher levels of IA are associated with utilizing more negative coping mechanisms.

Table 4

Correlations between Posttraumatic Growth, Coping, Resilience, PTSD, and Psychopathy

	PTSD	FD	IA	FDxIA
PTGI				
Relating with Others	.058	.079	.031	.033
New Possibilities	.134	.096	.066	.048
Personal Strength	.137	.099	.074	.094
Spiritual Change	.112	.080	.138	.001
Appreciates Life	.144	.099	.087	.062
Total Growth	.126	.114	.081	.038
COPE				
Negative Coping	**.449*** **	**-.238** **	**.286*** **	.022
Solution Focused	.064	.089	-.112	-.011
Resilience	**-.764*** **	**.301** **	-.117	.147

Note. * = $p < .05$ and ** = $p < .01$, *** = $p < .001$. PTSD refers to PCL-C symptom ($n = 110$) severity and FD, IA, and FDxIA ($n = 184$) were computed using MPQ-BF subscales.

When examining life orientation and affect, we found that FD was significantly positively associated with PANAS positive affect, $r(181) = .426$, $p < .001$, and negatively associated with PANAS negative affect $r(181) = -.358$, $p < .001$, where higher levels of FD were associated with higher levels of positive affect and lower levels of negative affect. In addition, FD was positively associated with optimism, as measured by the LoTR, $r(183) = .353$, $p < .001$. Furthermore, higher levels of FD, $r(182) = .406$, $p < .001$, and psychopathy, $r(182) = .174$, $p = .081$, were associated with an internal locus of control. To decompose the relationship between locus of control and psychopathy, a simple slope analysis was conducted. The relationship between FD and locus of control was assessed separately at 1 SD above and below the mean of IA. There was a significant positive relationship between FD and locus of control at low ($\beta = .29$, $p = .001$), mean ($\beta = .46$, $p < .001$), and high ($\beta = .63$, $p < .001$) levels of IA.

IA was negatively associated with PANAS positive affect, $r(181) = -.276$, $p < .001$, and positively associated with PANAS negative affect, $r(181) = .224$, $p = .002$, such that IA is associated with higher negative affect and lower positive affect. Furthermore, IA is negatively associated with optimism, $r(183) = -.162$, $p = .027$. Similarly, PTSD was negatively related to PANAS positive affect, $r(109) = -.331$, $p < .001$, and positively related to PANAS negative affect, $r(109) = .448$, $p < .001$, such that more severe PTSD symptomatology was associated with higher negative affect and lower positive affect. PTSD was also negatively associated with optimism, $r(111) = -.265$, $p = .004$, where more severe PTSD symptomatology was associated with lower levels of optimism. Lastly, PTSD was associated with an external locus of control, $r(110) = -.463$, $p < .001$.

Table 5

Correlations between Life Orientation, PTSD and Psychopathy

	PTSD	FD	IA	FDxIA
Positive Affect	**-.331*** **	**.426*** **	**-.276*** **	.036
Negative Affect	**.448*** **	**-.358*** **	**.224** **	-.045
Locus of Control	**-.463*** **	**.406*** **	**-.277*** **	**.174***
Pessimism	.172	-.014	.079	-.016
Optimism	**-.265** **	**.353*** **	**-.162***	-.051

Note. * = $p < .05$ and ** = $p < .01$, *** = $p < .001$. Positive and negative affect were measured using the PANAS and pessimism and optimism were measured using the LoTR. PTSD refers to PCL-C symptom ($n = 112$) severity and FD, IA, and FDxIA ($n = 185$) were computed using MPQ-BF subscales.

When investigating psychopathology, stress, and anxiety, we found that FD was significantly negatively associated with depression, $r(110) = -.248$, $p = .008$, LSAS social anxiety, $r(183) = -.373$, $p < .001$, and LSAS social avoidance, $r(183) = -.250$, $p = .001$, where higher levels of FD are related to lower levels of depression, social anxiety and social avoidance. Furthermore, FD is associated with lower levels of perceived stress, $r(181) = -.343$, $p < .001$. Conversely, IA was positively associated with depression, $r(111) = .332$, $p < .001$, and perceived stress, $r(181) = .250$, $p = .001$, where higher levels of IA were associated with higher levels of depression and perceived stress.

PTSD was significantly positively associated with depression, $r(111) = .689$, $p < .001$, social anxiety, $r(180) = .243$, $p = .010$, social avoidance, $r(111) = .199$, $p = .034$, and perceived stress, $r(109) = .566$, $p < .001$. Thus, more severe PTSD symptoms are associated with higher levels of depression, social anxiety, social avoidance, and perceived stress.

Table 6

Correlations between Psychopathology, Stress, PTSD, and Psychopathy

	PTSD	FD	IA	FDxIA
Depression	**.689*** **	**-.248** **	**.332*** **	-.160
Social Anxiety	**.243** **	**-.373*** **	.003	.034
Social Avoidance	**.199***	**-.250** **	.020	.012
Perceived Stress	**.566*** **	**-.343*** **	**.250** **	.012

Note. * = $p < .05$ and ** = $p < .01$, *** = $p < .001$.

Depression was measured using the IDS-SR, social anxiety and avoidance were measured using the LSAS, and perceived stress was measured using the PSS. PTSD refers to PCL-C symptom (n = 113) severity and FD, IA, and FDxIA (n = 185) were computed using MPQ-BF subscales. When investigating stressful life events and trauma exposure, life events included total combined LEL positive and negative life events, life events were then separated into positive and negative life events. Similarly, LEC-5 trauma consisted of total traumatic events, sexual trauma, assault, and accidents. We found that FD was positively related to total stressful life events, $r(181) = .150$, $p = .043$. When broken down into positive life events and negative life events, FD was only positively related to positive life events, $r(180) = .170$, $p = .021$, such that individuals higher in FD reported experiencing more positive life events. Furthermore, FD was associated with experiencing more traumatic events, $r(184) = .219$, $p = .003$. When broken down by traumatic event type, FD was positively associated with trauma involving assault, $r(184) = .181$, $p = .014$, and accidents, $r(184) = .187$, $p = .010$. Similarly, IA was positively associated with total life events, $r(181) = .276$, $p < .001$, negative life events, $r(181) = .229$, $p = .002$, and positive life events, $r(181) = .250$, $p = .001$. Furthermore, IA was positively associated with total traumatic events, $r(184) = .194$, $p = .008$, sexual trauma, $r(184) = .148$, $p = .044$, and assault, $r(184) = .187$, $p = .010$. No significant relationships emerged between stressful life events and trauma exposure and PTSD (ps range from .059 to .626) or psychopathy (ps range from .081 to .963).

Table 7

Correlations between Daily Stressors, Traumatic Events, PTSD and Psychopathy

	PTSD	FD	IA	FDxIA
LEL				
Positive	.079	**.170***	**.250****	.130
Negative	.108	.130	**.229****	.082
Total	.114	**.150***	**.276*****	.115
LEC-5				
Total	-.156	**.219****	**.194****	.073
Sexual Assault	.046	.136	**.148***	-.020
Physical Assault	-.152	**.181***	**.152***	.111
Accidents	-.178	**.187***	.100	.003

Note. * = $p < .05$ and ** = $p < .01$. PTSD refers to PCL-C symptom severity and FD, IA, and FDxIA were computed using MPQ-BF subscales.

To investigate the relationship between trauma exposure, stress, and resilience we broke trauma exposure into four categories: total trauma exposure, sexual assault, physical assault and accidents as measured by the LEC-5 (Table 8). We found that sexual trauma was positively related to solution focused coping $r(182) = .201$, $p = .006$. Trauma involving accident was negatively associated with depression, $r(111) = -.190$, $p = .043$, and social avoidance, $r(183) = -.164$, $p = .025$.

We found that resilience was positively related to total perceived support, $r(112) = .407$, $p < .001$, such that higher scores in resilience were associated with more perceived support. Furthermore resilience was negatively related to negative coping, $r(110) = -.394$, $p < .001$, where individuals with higher resilience scores utilize less negative coping mechanisms. Next, resilience was positively related to PANAS positive affect, $r(109) = .268$, $p = .004$, and negatively related to PANAS negative affect, $r(109) = -.437$, $p < .001$, such that individuals who

score higher on resilience have lower negative affect and higher positive affect. Resilience was positively related to LoTR Optimism $r(111) = .260$, $p = .005$, and having an internal locus of control, $r(110) = .436$, $p < .001$. Lastly, resilience was negatively related to depression, $r(111) = -.556$, $p < .002$, social anxiety, $r(111) = -.306$, $p = .001$, social avoidance, $r(111) = -.231$, $p = .014$, and perceived stress, $r(109) = -.404$, $p < .001$.

Table 8

Correlations between Trauma, Resilience, and Measures.

	Total Trauma	Sexual Trauma	Physical Assault	Accidents	Resilience
Total Support	.177	.072	.133	.142	**.407*** **
Total PTGI	.048	.056	.000	-.105	-.077
Negative Coping	-.064	.020	-.075	-.109	**-.394*** **
Solution Focused	.125	**.201** **	.078	-.004	.017
Positive Affect	.087	-.056	.116	.132	**.268** **
Negative Affect	-.114	-.013	-.116	-.071	**.437*** **
Locus of Control	.076	-.067	.048	.088	**.436** **
Pessimism	-.053	-.064	-.038	-.076	-.164
Optimism	.122	.110	.093	.009	**.260** **
Depression	-.157	.011	-.129	**-.190***	**-.556*** **
Social Anxiety	-.096	-.023	-.061	**-.164***	**-.231***
Social Avoidance	-.104	-.023	-.063	**-.171***	**-.213***
Perceived Stress	.027	.120	.009	-.024	**-.404*** **

Note. * = $p < .05$ and ** = $p < .01$, *** = $p < .001$. Total Support was measured by ISEL total scores, negative and solution focused coping was measured by the Brief COPE, positive and negative affect were measured by the PANAS, pessimism and optimism were measured by the LoTR, depression was measured using the IDS-SR, social and perceived anxiety were measured using the LSAS, and perceived stress was measured using the PSS. PTSD refers to PCL-C

symptom (n = 113) severity and FD, IA, and FDxIA (n = 185) were computed using MPQ-BF subscales.

Mediation analyses. Bootstrapped mediation analyses (Preacher & Hayes, 2008) were conducted to investigate the role of social support in mediating the relationship between trauma exposure and the psychopathy factors (see Table 9). First, we entered social support (ISEL total scores) as the mediator for the relationships between trauma exposure (LEC-5 total scores) and FD. Social support did not mediate the relationship between trauma exposure and FD. Next, we investigated this same relationship with IA. Social support was a significant mediator in the relationship between trauma exposure and IA. Furthermore, we investigated if trauma exposure relationship of between the psychopathy and PTSD symptoms. We found that trauma exposure only mediated the relationship between IA and PTSD.

Table 9

Mediation of the Relationships between Trauma, Social Support, Gender, PTSD, and Psychopathy

	Relationship between Trauma Exposure and FD		Relationship between Trauma exposure and IA	
Mediator	Point estimate	95% CI	Point estimate	95% CI
Social Support	0.32	[-0.08, .1.19]	-1.33	[-2.87, -0.40]

	FD and PTSD		IA and PTSD	
Trauma	-0.54	[-1.85, 0.23]	1.61	[0.11, 3.70]

Note. FD = Fearless Dominance; IA = Impulsive Antisociality; PTSD = PCL-C total scores, Trauma = LEC-5 total scores. Point estimates represent unstandardized effects and are the means of bootstrapped data.

Sex differences. There were no statistically significant differences between men and women on PCL-C scores, $t(112) = -0.76$, $p = .897$, IA, $t(184) = -0.35$, $p = .727$, or psychopathy, $t(184) = -0.13$, $p = .897$. However, there was a significant difference between the sexes for FD, $t(184) = 3.79$, $p < .001$, where men had higher scores ($M = .23$, $SE = .08$) than did women ($M = -.15$, $SE = .06$).

Social Support

Three measures were used to investigate differences in social support between men and women and if social support moderated the relationship between PTSD and psychopathy. The ISEL was used to measure perceptions of social support in daily life and was used to provide scores for total perceived support, as well as support from four different domains (tangible, appraisal, self-esteem, and belonging). Support was also measured during our laboratory stressor to capture the effect of physical touch on stress reactive cortisol and perceived support was measured using a VAS. To investigate these relationships, we conducted two multivariate analyses of covariance, first to investigate the effect of sex on social support while controlling for psychopathy and then to investigate the same effect when controlling for PTSD.

Perceived social support. When investigating differences in ISEL scores between sexes using psychopathy factors as covariates, there was a significant effect of sex, $F(1, 109) = 13.32$, $p < .001$, $\eta_p^2 = .109$, where women reported higher levels of support ($M = 129.33$, $SD = 16.60$) than did men ($M = 120.57$, $SD = 18.31$).

Furthermore, FD contributed significantly to the variance of total support $F(1, 109) = 3.55$, $p = .062$, $\eta_p^2 = .032$, or psychopathy, $F(1, 109) = 19.64$, $p < .001$, $\eta_p^2 = .153$, where FD was associated with higher levels of perceived support ($r = .247$). There was also a significant

interaction between total ISEL scores and IA, $F(1, 109) = 24.97$, $p < .001$, $\eta_p^2 = .186$, such that IA was associated with less total perceived support ($r = -361$). Psychopathy did not significantly contribute to the variance in social support, , $F(1, 109) = 2.93$, $p = .090$, $\eta_p^2 = .026$. Furthermore, PTSD contributed significantly to variance of the ISEL total score, $F(1, 111) = 31.96$, $p < .001$, $\eta_p^2 = .224$, such that PTSD symptomatology was negatively associated with social support ($r = -.441$).

To further examine whether women and men differ on the kind of support provided (tangible, appraisal, self-esteem, and belonging), a MANCOVA was performed. The omnibus test revealed a statistically significant relationship between the multivariate combination of support variables and sex, $F(4, 106) = 3.52$, $p = .010$, $\eta_p^2 = .117$. Univariate tests revealed a significant difference between the sexes on appraisal support, $F(1, 109) = 11.67$, $p = .001$, $\eta_p^2 = .097$, tangible support, $F(1, 109) = 8.13$, $p = .005$, $\eta_p^2 = .069$, self-esteem support, $F(1, 109) = 4.84$, $p = .030$, $\eta_p^2 = .043$, and belonging support, , $F(1, 109) = 13.06$, $p < .001$, $\eta_p^2 = .107$. Planned pairwise comparisons revealed that women reported higher levels of support in all measured domains, than did men (see Table 9).

Table 10

Pairwise Comparisons for the Differences Between Sexes on ISEL Subscales

Pairwise Comparison		Difference	SE	95% CI for the Mean Difference	
		Type of Support			
Appraisal	Men Vs. Women	-3.42	1.00	-5.40	-1.44
Tangible	Men Vs. Women	-2.68	0.94	-4.55	-0.82
Self-Esteem	Men Vs. Women	-1.55	0.70	-2.94	-0.15
Belonging	Men Vs. Women	-3.18	0.88	-4.93	-1.44

Note. * = $p < .05$, ** = $p < .01$.

Perceived stress. A repeated measures ANCOVA revealed a significant effect of Time, $F(4, 78) = 7.32$, $p < .001$, $\eta_p^2 = .273$ but not a Sex by Time interaction, $F(4, 77) = 0.16$, $p = .958$, $\eta_p^2 = .008$. Planned post hoc pairwise comparisons (see Table 11; Figures 3 and 4) revealed significant differences between measured time points (habituation, support condition, rest, alone condition, and recovery), where perceived stress was lower during recovery compared to any other condition. Participants also reported higher perceived stress during the support condition compared to rest conditions. Lastly, there was a trend towards significance ($p = .056$), where participants reported higher perceived stress during the alone condition compared to the rest condition.

Table 11

Pairwise Comparisons for Perceived Stress During the Stress Task

Pairwise Comparison	Difference	SE	95% CI for the Mean Difference	
		Habituation		
Habituation Vs. Friend	-2.43	2.20	-6.82	1.95
Habituation Vs. Rest	0.63	2.48	-4.31	5.57
Habituation Vs. Alone	-2.36	2.86	-8.05	3.30
Habituation Vs. Recovery	**8.02****	2.71	2.64 13.40	
		Friend		
Friend Vs. Rest	**3.06***	1.53	0.02	6.11
Friend Vs. Alone	0.07	1.95	-3.80	3.95
Friend Vs. Recovery	**10.45****	2.20	6.10 14.81	
		Rest		
Rest Vs. Alone	**-2.99#**	1.54	-.07	6.06
Rest. Vs. Recovery	**7.38****	2.07	6.26 10.76	
		Alone		
Alone Vs. Recovery	**10.38***	2.07	6.26 14.50	

Note. # indicates a trend toward significance with $p = .056$, * = $p < .05$, ** = $p < .01$.

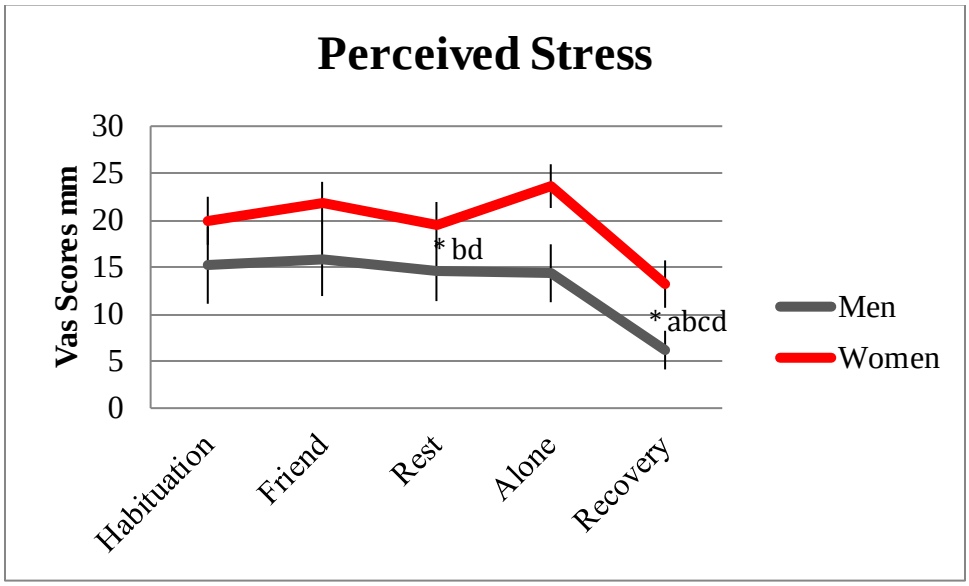

Figure 3. Differences in perceived stress between men and women. Habituation = a, Friend = b, Rest = c, Alone = d, Recovery = e, letters indicate conditions that significantly differ. * $p < .05$.

Next, the effect of sex on perceived stress during support and alone conditions was investigated by conducting two repeated-measures ANCOVAs while controlling for psychopathy factors and PTSD separately. This was done to preserve power because there were fewer respondents on the PCL than there were on the MPQ-BF. We found a significant main effect of time, $F(1, 77) = 6.70$, $p < .001$, $\eta_p^2 = .263$ but no Time by Sex interaction $F(1, 77) = 0.57$, $p = .680$, $\eta_p^2 = .030$. The covariates FD ($p = 145$) and IA ($p = .490$) did not contribute significantly to variance of perceived stress. However there was a significant Time by Psychopathy interaction, $F(1, 75) = 5.54$, $p = .001$, $\eta_p^2 = .228$. Correlations were conducted to investigate the relationship between psychopathy and perceived stress time points. Psychopathy was negatively associated with VAS scores during habituation $r(92) = -.233$, $p = .024$, such that individuals higher in

psychopathy perceived the habituation phase as being less stressful. Further, IA was positively associated with VAS scores during the alone condition, $r(89) = .228$, $p = .030$, where individuals higher in IA perceived the stressor as being more stressful when they were alone.

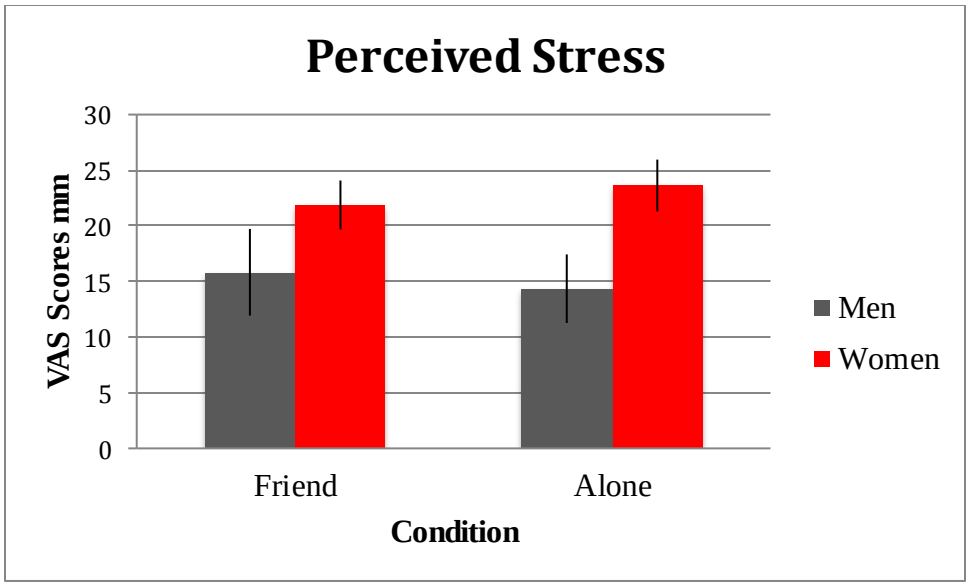

Figure 4. Differences in support between men and women. Analyses conducted on only friend and alone conditions.

When using PTSD scores as a covariate, there was no significant effect of Time, $F(1, 50) = 0.53$, $p = .713$, $\eta_p^2 = .041$, and no significant Sex by Time interaction $F(4, 50) = 0.52$, $p = .721$, $\eta_p^2 = .040$. The covariate did not contribute significantly to variance of perceived stress, $F(4, 50) = 0.06$, $p = .993$, $\eta_p^2 = .005$.

Stress reactive cortisol. Before analysis, data were log transformed to correct for non-normality. A repeated-measures ANOVA was conducted to examine differences between sexes

on cortisol concentrations during each of our five time points (habituation, support, rest, alone, and recovery). There was a significant main effect of Time, $F(4, 84) = 15.98$, $p < .001$, $\eta_p^2 = .432$ and a trend toward a significant Time by Sex interaction $F(4, 84) = 2.34$, $p < .062$, $\eta_p^2 = .100$. Planned pairwise comparisons (Table 12; Figures 5 and 6) revealed that cortisol concentrations during habituation were significantly higher than all other time points. Furthermore, cortisol concentrations during the recovery were lower than the all other conditions. A Statistically significant difference between sexes was only observed during the support condition, $F(1,89) = 5.66$, $p = .020$, $\eta_p^2 = .060$, where women ($M = -.027$ log pg/mL, $SD = .286$) had significantly lower cortisol concentrations than did men ($M = .122$ log pg/mL, $SD = .274$). It should be noted that the mean cortisol concentration in women is negative because we used a log transformation to normalize the data.

Table 12

Pairwise Comparisons For Stress Reactive Cortisol Over Time

Pairwise Comparison	Difference	SE	95% CI for the Mean Difference	
		Habituation		
Habituation Vs. Friend	**.124***	.033	.059	.188
Habituation Vs. Rest	**.161***	.031	.100	.223
Habituation Vs. Alone	**.139***	.030	.080	.199
Habituation Vs. Recovery	**.264***	.034	.196	.333
		Friend		
Friend Vs. Rest	.037	.024	-.009	.084
Friend Vs. Alone	.015	.026	-.037	.068
Friend Vs. Recovery	**.141***	.025	.090	.191
		Rest		
Rest Vs. Alone	-.022	.024	-.069	.025
Rest. Vs. Recovery	**.103***	.025	.052	.154
		Alone		
Alone Vs. Recovery	**.125***	.026	.074	.177

Note. * = $p < .05$

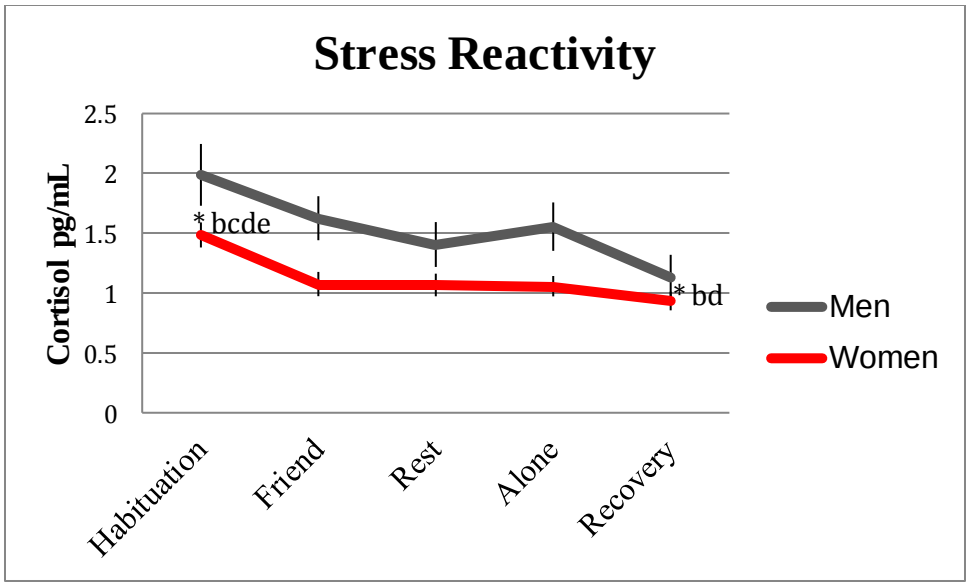

Figure 5. Differences in cortisol concentrations between men and women over time. Habituation = a, Friend = b, Rest = c, Alone = d, Recovery = e. Letters indicate conditions that significantly differ. * = $p < .05$.

Next, two repeated measures ANCOVAs were conducted, first using the factors associated with psychopathy, and then using PTSD as covariates. There was a significant main effect of Time, $F(4, 81) = 14.50$, $p < .001$, $\eta_p^2 = .417$ and a Time by Sex interaction $F(4, 65) = 2.74$, $p = .034$, $\eta_p^2 = .119$, where women (M = -.03 pg/mL, SD = .29) had lower cortisol concentrations during the support condition than did men (M = .12 pg/mL, SD = .27) after controlling for psychopathy. The covariates FD, IA, and psychopathy did not contribute significantly to variance of cortisol (ps range from .278 to .502). PTSD did not contribute significantly to the variance in cortisol concentrations $F(4, 53) = 0.38$, $p = .997$, $\eta_p^2 = .003$.

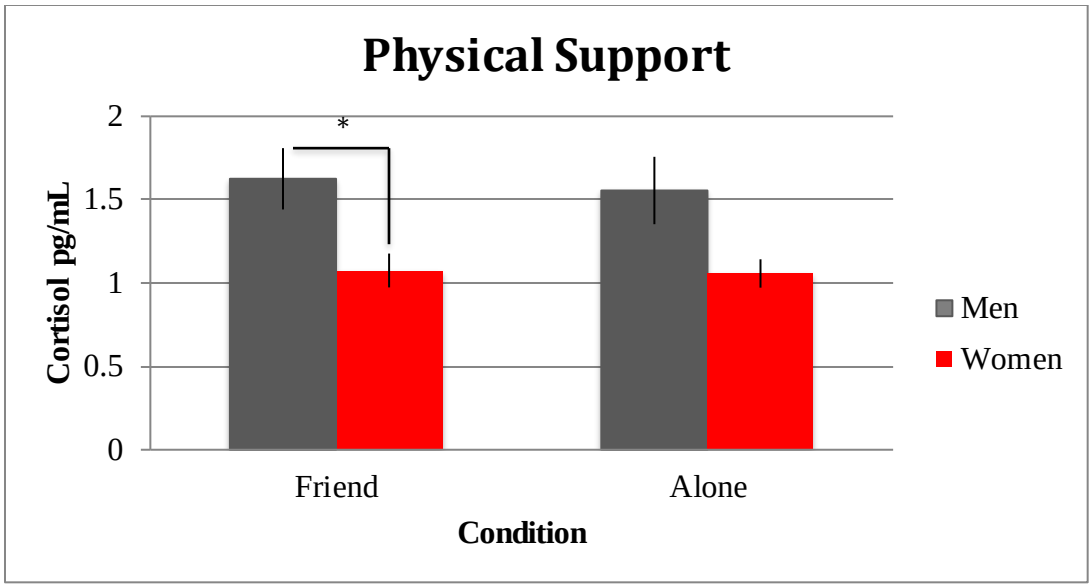

Figure 6. Differences in cortisol concentrations during support between men and women. Analyses conducted on only friend and alone conditions. * = $p < .05$.

FPS. We investigated differences between conditions while controlling for our covariates by conducting two mixed-model ANCOVAs. The first ANCOVA was a 2 (Support: Friend/Alone) x 2 (Focus: AF/TF) x 2 (threat of shock: CS+/CS-) factorial ANCOVA conducted with sex as the between subjects factor and the psychopathy factors (FD, IA, FDxIA) were the covariates. Because the factorial ANCOVA produced 35 *F* tests, all results are presented in Table 12 and only significant results will be discussed hereafter. We found a significant main effect of CS+CS-, $F(1,51) = 9.89$, $p = .003$, $\eta_p^2 = .162$, where the CS+ was associated with higher mean startle magnitude ($M = .005$, $SD = .16$) than the CS- ($M = -.034$, $SE = .18$). There was also a significant interaction of Support by Focus by Sex, $F(1,51) = 4.96$, $p = .030$, $\eta_p^2 = .089$, where women had an attenuated FPS during the TF support condition ($M = .160$, $SE =$

.068) compared to the AF support condition (M = -.100, SE = .069). Furthermore, there was a significant Focus by Threat of Shock by Sex interaction, $F(1,51) = 8.28$, $p = .015$, $\eta_p^2 = .110$,

Table 13

Factorial ANCOVA Results for Differences in FPS and Sex with Psychopathy Covariates

Condition	$F(1,51)$	p	η_p^2
AloneFriend	0.48	.492	.009
AloneFriend x FD	0.63	.431	.012
AloneFriend x IA	0.04	.851	.001
AloneFriend x FDxIA	0.19	.661	.004
AloneFriend x Sex	2.92	.094	.054
AfTf	.008	.929	.000
AfTf x FD	.001	.973	.000
AfTf x IA	0.01	.433	.012
AfTf x FDxIA	0.05	.818	.001
AfTf x Sex	0.07	.796	.001
CS-CS+	**8.01**	**.007**	**.136**
CS-CS+ x FD	0.05	.833	.001
CS-CS+ x IA	1.43	.238	.027
CS-CS+ x FDxIA	0.26	.614	.005
CS-CS+ x Sex	.000	.985	.000
AloneFriend x AfTf	1.59	.213	.030
AloneFriend x AfTf x FD	1.86	.179	.035
AloneFriend x AfTf x IA	0.23	.633	.005
AloneFriend x AfTf x FDxIA	1.32	.257	.025
AloneFriend x AfTf x Sex	**4.96**	**.030**	**.089**
AloneFriend x CS-CS+	0.26	.614	.005
AloneFriend x CS-CS+ x FD	0.64	.428	.012
AloneFriend x CS-CS+ x IA	1.92	.172	.036
AloneFriend x CS-CS+ x FDxIA	0.68	.412	.013
AloneFriend x CS-CS+ x Sex	0.18	.670	.004
AfTf x CS-CS+	0.06	.801	.001
AfTf x CS-CS+ x FD	3.01	.089	.056
AfTf x CS-CS+ x IA	0.26	.610	.005
AfTf x CS-CS+ x FDxIA	0.03	.873	.001
AfTf x CS-CS+ x Sex	**6.28**	**.015**	**.110**
AloneFriend x AfTf x CS-CS+	0.33	.569	.006
AloneFriend x AfTf x CS-CS+ x FD	1.30	.260	.025
AloneFriend x AfTf x CS-CS+ x IA	0.15	.699	.003
AloneFriend x AfTf x CS-CS+ x FDxIA	0.36	.549	.007
AloneFriend x AfTf x CS-CS+ x Sex	1.44	.236	.027

Note. * = $p < .05$. AloneFriend refers to Support, AfTf refers to Focus, and CS-CS+ refers to presence of shock.

such that women had attenuated FPS during the AF CS- condition (M = -.118, SE = .050) compared to the AF CS+ condition (M = -.110, SE = .054). The second ANCOVA using PTSD as a covariate revealed a significant Support x Sex interaction, $F(1,39) = 4.13$, $p = .049$, $\eta_p^2 = .096$, such that women had a significantly attenuated FPS during the friend condition (M = -.137, SE = .054) than during the alone condition (M = .128, SE = .064). All other results can be found in Table 13.

Table 14

Factorial ANCOVA Results for Differences in FPS and Sex with PTSD Covariate

Condition	$F(1,39)$	p	η_p^2
AloneFriend	0.03	.863	.001
AloneFriend x PTSD	.002	.969	.000
AloneFriend x Sex	**4.13**	**.049**	**.096**
AfTf	.008	.930	.000
AfTf x PTSD	0.09	.758	.002
AfTf x Sex	.002	.968	.000
CS+CS-	3.81	.058	.089
CS-CS+ x PTSD	1.58	.216	.039
CS-CS+ x Sex	0.02	.900	.000
AloneFriend x AfTf	2.27	.140	.055
AloneFriend x AfTf x PTSD	1.96	.169	.048
AloneFriend x AfTf x Sex	1.53	.223	.038
AloneFriend x CS-CS+	0.08	.774	.002
AloneFriend x CS-CS+ x PTSD	1.01	.323	.032
AloneFriend x CS-CS+ x Sex	0.35	.559	.009
AfTf x CS-CS+	1.04	.313	.026
AfTf x CS-CS+ x PTSD	1.03	.318	.026
AfTf x CS-CS+ x Sex	2.81	.102	.067
AloneFriend x AfTf x CS-CS+	0.30	.586	.008
AloneFriend x AfTf x CS-CS+ x PTSD	0.35	.555	.009
AloneFriend x AfTf x CS-CS+ x Sex	1.19	.281	.030

Note. AloneFriend refers to Support, AfTf refers to Focus, and CS-CS+ refers to presence of shock.

P3. Visual inspection of the grand average waveforms allowed us to choose the windows for determining the P3 peaks. The P3 component was identified as the maximum peak between 310ms and 530ms after the stimulus onset. The P3 amplitude was measured at the Fz, Cz, and Pz electrode sites. Two 2 (Support: Friend/Alone) x 2 (Focus: AF/TF) x 2 (presence of shock: CS+/CS-) factorial MANCOVA were conducted with sex as the between subjects factor and

psychopathy factors (FD, IA, FDxIA) or PTSD as the covariates (see Tables 14 and 15 for results from all *F* tests). There was a significant main effect of Support, $F(1,70) = 6.63$, $p = .012$, $\eta_p^2 = .086$. The P3 amplitude was significantly lower when the friends were present ($M = 7.53$, $SE = .84$) compared to when the participants were alone ($M = 8.71$, $SE = .62$). FD was found to contribute significantly to the variance of support, $F(1,70) = 5.53$, $p = .024$, $\eta_p^2 = .071$.

Correlations were conducted to examine the significant interaction. There was a trend towards a significant relationship between FD and the difference in magnitude between support and alone conditions, $r(76) = -.211$, $p = .063$, such that FD was associated with a potentiated P3 response during the alone ($r = .198$) condition compared to the support condition ($r = -.038$). There was also a significant main effect of Focus $F(1,70) = 5.46$, $p = .022$, $\eta_p^2 = .072$. The P3 response was lower during the AF condition ($M = 8.54$, $SE = .70$) compared to the TF condition ($M = 7.70$, $SE = .72$). Similarly, there was a significant main effect of Threat of Shock, $F(1,70) = 7.77$, $p = .005$, $\eta_p^2 = .108$, where the presence of the threat of shock was associated with a larger P3 response ($M = 8.47$, $SE = .74$) compared to when threat of shock was not present ($M = 7.77$, $SE = .67$).

Table 15

Factorial ANCOVA Results for Differences in P3 and Sex with Psychopathy Covariates

Effect	$F(1,70)$	p	η_p^2
AloneFriend	**6.61**	**.012**	**.086**
AloneFriend x FD	**5.33**	**.024**	**.071**
AloneFriend x FD	3.14	.081	.043
AloneFriend x FDxIA	0.61	.436	.009
AloneFriend x Sex	0.20	.658	.003
AfTf	**5.46**	**.022**	**.072**
AfTf x FD	0.58	.450	.008
AfTf x FD	0.05	.833	.001
AfTf x FDxIA	0.12	.726	.002
AfTf x Sex	1.52	.221	.021
CS-CS+	**8.49**	**.005**	**.108**
CS-CS+ x FD	0.18	.672	.003
CS-CS+ x FD	1.63	.206	.023
CS-CS+ x FDxIA	2.13	.149	.029
CS-CS+ x Sex	0.58	.448	.008
AloneFriend x AfTf	2.64	.109	.036
AloneFriend x AfTf x FD	2.33	.131	.032
AloneFriend x AfTf x FD	1.01	.319	.014
AloneFriend x AfTf x FDxIA	1.39	.242	.019
AloneFriend x AfTf x Sex	0.36	.550	.005
AloneFriend x CS-CS+	1.26	.266	.018
AloneFriend x CS-CS+ x FD	0.81	.370	.011
AloneFriend x CS-CS+ x FD	1.38	.243	.019
AloneFriend x CS-CS+ x FDxIA	0.21	.652	.003
AloneFriend x CS-CS+ x Sex	0.11	.746	.002
AfTf x CS-CS+	0.02	.904	.000
AfTf x CS-CS+ x FD	0.16	.687	.002
AfTf x CS-CS+ x FD	0.08	.780	.001
AfTf x CS-CS+ x FDxIA	0.14	.713	.002
AfTf x CS-CS+ x Ses	.001	.980	.000
AloneFriend x AfTf x CS-CS+	0.08	.781	.001
AloneFriend x AfTf x CS-CS+ x FD	0.81	.370	.011
AloneFriend x AfTf x CS-CS+ x FD	0.04	.839	.001
AloneFriend x AfTf x CS-CS+ x FDxIA	0.40	.528	.006
AloneFriend x AfTf x CS-CS+ x Sex	.000	.991	.000

Note. AloneFriend refers to Support, AfTf refers to Focus, and CS-CS+ refers to presence of shock.

When PTSD was used as a covariate, significant main effect for Support $F(1,48) = 6.15$, $p = .017$, $\eta_p^2 = .114$, where the P3 amplitude was significantly lower when the friends were present ($M = 6.57$, $SE = 1.21$) compared to when the participants were alone ($M = 8.59$, $SE = .81$). No other significant relationships emerged (see Table 16).

Table 16

Factorial ANCOVA results for differences in P3 and Sex with PTSD Covariate

Effect	$F(1,48)$	p	η_p^2
AloneFriend	**6.15**	**.017**	**.114**
AloneFriend x PTSD	2.68	.108	.053
AloneFriend x Sex	1.32	.256	.027
AfTf	0.63	.430	.013
AfTf x PTSD	0.02	.877	.001
AfTf x Sex	0.34	.561	.007
CS-CS+	0.40	.529	.008
CS-CS+ x PTSD	0.09	.771	.002
CS-CS+ x Sex	0.11	.745	.002
AloneFriend x AfTf	0.16	.689	.003
AloneFriend x AfTf x PTSD	0.09	.768	.002
AloneFriend x AfTf x Sex	0.71	.405	.014
AloneFriend x CS-CS+	0.10	.323	.020
AloneFriend x CS-CS+ x PTSD	2.06	.158	.041
AloneFriend x CS-CS+ x Sex	1.45	.235	.029
AfTf x CS-CS+	0.77	.384	.016
AfTf x CS-CS+ x PTSD	0.48	.494	.010
AfTf x CS-CS+ x Sex	0.05	.826	.001
AloneFriend x AfTf x CS-CS+	3.67	.061	.071
AloneFriend x AfTf x CS-CS+ x PTSD	2.67	.109	.053
AloneFriend x AfTf x CS-CS+ x Sex	0.97	.329	.020

Note. AloneFriend refers to Support, AfTf refers to Focus, and CS-CS+ refers to presence of shock.

Chapter 7: Discussion

Stress, Trauma, and Resilience

We investigated the relationships between PTSD, the factors associated with psychopathy, and several questionnaires that measure different aspects of stress, trauma exposure, psychopathology, and resilience. First, we found that both FD and IA, but not PTSD, were associated with higher levels of trauma exposure. However, IA was associated with more severe PTD symptoms, whereas FD was negatively associated with PTSD symptoms. We found that higher levels of FD were associated with higher levels of total perceived social support; however, higher levels of self-esteem support and belonging support drove this relationship. Higher levels of PTSD and IA were associated with lower perceived support across all domains.

When investigating health factors posttraumatic growth, and coping, we found that FD was associated with having higher energy, better emotional wellbeing, social functioning and general health. Both IA and PTSD were related to having more limitations due to physical and emotional issues, lower levels of social functioning and energy, and worse general health. PTSD but not IA was associated with lower levels of emotional wellbeing. Additionally, we found that FD was associated with using less negative coping mechanisms but IA and PTSD were associated with using more negative coping mechanisms.

When examining factors associated with life orientation, we found that FD was associated with more positive affect and less negative affect, whereas both PTSD and IA were related to less positive affect and more negative affect. Furthermore, FD was associated with higher levels of optimism but IA and PTSD were associated with lower levels of optimism. Moreover, FD was associated with having an internal locus of control; however, IA and PTSD were associated with having an external locus of control.

Next, the relationship between psychopathy, PTSD and psychopathology was explored. Here, we found that individuals higher in FD had lower depression, social anxiety and social avoidance. Individuals with FD also reported lower perceived stress. Conversely, IA and PTSD reported higher levels of depression and perceived stress. However, only PTSD was associated with higher levels of social anxiety and social avoidance.

When examining negative life events and resilience, we found that higher levels of FD were associated with higher levels of total life events; however, this relationship was driven by positive life event, whereas, IA was associated with experiencing more positive and negative life events. We also found that higher levels of FD and IA were associated with more reported traumatic events. Individuals higher in FD reported more traumatic events involving assault and accidents. IA, on the other hand was associated with higher levels of sexual assault and assault.

We also investigated the relationship between trauma, resilience, and our measures. We broke these relationships down by trauma type. This was done because the incidence of PTSD and PTSD symptom severity differs between trauma type, where sexual trauma is the most predictive of developing PTSD or more severe symptomatology (Ullman, 2016). We did not find any significant relationships between total trauma and physical assault exposure and any of our measures. Higher levels of sexual trauma were associated with utilizing more solution focused coping mechanisms. Higher levels of trauma involving accidents were related to lower depression and social anxiety and avoidance. When examining resilience, we found that higher levels of resilience were related to an internal locus of control, higher levels of perceived social support, optimism, and both positive and negative affect. Furthermore, resilience was associated with less perceived stress, lower levels of depression, social anxiety, social avoidance, and using negative coping less.

Taken together, these findings outline a clear relationship between emotional and behavioral factors that underlie both IA and PTSD. Moreover, these factors are opposite to those experienced by FD dominant psychopathy. Previous studies indicate that traumatic experiences during childhood lead to a higher incidence of callous-unemotional traits in youth and antisocial behavior in adulthood (Graham et al., 2012; Blonigen, Sullivan, Hicks, and Patrick, 2012). Although we were unable to directly test the effects of early life trauma exposure on the development of psychopathy and PTSD in our sample, we did find that trauma mediates the relationship between psychopathy and PTSD. However, we only found that levels of current perceived support as measured by the ISEL and PCL-C scales mediated these relationships, thus caution should be used when interpreting these results. Specifically, trauma moderated the relationship between IA, but not FD, and PTSD symptoms. Previous studies have linked trauma to development of psychopathologies like PTSD, depression, and anxiety (Agorastos et al., 2014; Comijs et al., 2013; Klengel et al., 2013). Interestingly, we found that both FD and IA were associated with higher rates of exposure to traumatic events but only IA was associated with more severe PTSD symptoms. We did not find a relationship between trauma exposure and PTSD, but this is likely because around 95% of our sample was exposed to at least one qualifying traumatic event. Furthermore, we had fewer respondents for the PCL-C than the MPQ-BF. Moreover, trauma exposure early in life is associated with developing callous-unemotional in youth (Kimonis et al., 2011), and is likely why we see such a strong relationship between IA and PTSD.

Furthermore, we found that IA and PTSD have similar behavioral and emotional symptomatology that is opposite to that experienced by individuals higher in FD. These results are in line with (Sellbom, 2015) where, when psychopathy is broken down by IA and FD factors,

IA is positively associated with PTSD symptoms and FD is negatively associated with PTSD symptoms. Furthermore, we also found similar patterns affectivity, where both PTSD and IA were associated with higher rates of negative affect and lower rates of positive affect, but the opposite was true of FD. Thus, traits more commonly related negative affect may underlie the propensity for individuals higher in IA to develop comorbid PTSD (Hicks et al., 2012). Indeed, higher levels of negative affect are predictive of developing PTSD following trauma exposure (Weems et al., 2007) and more severe PTSD symptomatology (Vujanovic et al., 2013). Furthermore, the combination of perceived stress and negative affect and appraisal are related to chronic trauma exposure (Besser, Neria, & Haynes, 2009) and predictive of the development of PTSD after trauma exposure (Ehlers, Mayou, & Bryant, 1998; Garey et al., 2016) and mediates the maintenance of PTSD through rumination (Hu, Koucky, Brown, Bruce, & Sheline, 2014). Combined with the lower levels of social support found in our sample, the perceived stress, depression and negative affect associated with both PTSD and IA, likely lead to the increased use of negative coping strategies and more severe PTSD symptoms (Feder et al., 2013).

Our findings indicate that higher levels of FD may provide a protective buffer against developing PTSD. Previous research indicates that FD is negatively associated with social phobia and internalizing disorders (Benning, Patrick, Blonigen, et al., 2005; Sellbom, 2015) and largely unrelated to externalizing disorders (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). The opposite is true when examining the relationship between internalizing disorders and IA. Indeed, we found an opposite relationship between FD and IA, where FD was negatively related to social anxiety and depression. FD was also positively related to our measure of resilience. Over all, this measure revealed opposite patterns of results compared to PTSD. This outlines a constellation of factors that buffers against and aides in the recovery from PTSD. In

our sample, both FD and resilience were related to higher levels of perceived social support, having an internal locus of control, lower levels of perceived stress, depression, social anxiety and avoidance, negative affect and negative coping. Previous research indicates that social support is an important factor in resilience from PTSD (King et al., 1998; Dumont & Provost, 1999; Woodward et al., 2015). Furthermore, having an internal locus of control is associated with resilience and recovery traumatic events (Buddelmeyer & Powdthavee, 2015; Karstoft et al., 2015; Valentine & Feinauer, 1993). Therefore, our measure of resilience is in line with previous findings. Moreover, the negative relationship between resilience and negative affect adds additional support for our hypothesis that traits associated with FD is protective against developing PTSD.

Social Support and Stress Reactivity

Social support was measured in three ways: perceived support as measured by the ISEL, the physical response to stress and support during our laboratory stressor, and differences in the perception of stress during our laboratory stressor. We found that more severe PTSD symptomatology and IA was associated with lower levels of perceived daily social support. Conversely, we found that FD was associated with higher levels of self-esteem and belonging support. Moreover, we found that individuals with low levels of PTSD symptom severity reported significantly higher levels of perceived daily stress than did individuals with moderate and severe symptom severity. There was no difference in perceived stress during our stress task between the sexes; however there was a significant effect of time. Perceived stress was lower after the 30-minute recovery period compared to any other condition. Furthermore, perceived stress levels were higher during the stress task regardless of the presence of physical support compared to the 20-minute rest condition. The FD and PTSD did not contribute to the variance

in perceived stress. However, individuals higher in psychopathy perceived the habituation phase as being less stressful that any other condition. Furthermore, individuals higher in IA perceived the alone condition as being more stressful than the friend condition.

We found differences in self-reported perceived social support between groups but those differences were not preserved during the support conditions of our laboratory stressor. Many studies indicate that physical touch administered by a close friend or family member causes reductions in physical and perceived stress during laboratory stressors (Heinrichs et al., 2003; Smith et al., 2009). However, we only found differences in perceived support during stress in IA, where they reported feeling more stressed without the presence of their friend. Interestingly, IA is associated with alienation and low levels of social closeness (Edens & McDermott, 2010); so this result may be counterintuitive. However, this suggests that, while they report lower levels of socials support, they still benefit from supportive relationships. No study, to our knowledge, has directly assessed how individuals' higher psychopathic traits benefit from social support thus these novel findings might suggest that social support may benefit individuals higher in IA similarly to individuals with PTSD.

In our sample, individuals with PTSD did report differences in perceived stress during support and alone conditions of stressor; however, they did report lower levels of perceived social support. These discrepant findings may be related to differences between the long-term effects of social support and acute social support. In our sample, neither posttraumatic growth nor PTSD symptom severity was associated with self-reported social support. Other studies have found that social support during stressful moments does not directly buffer perceived stress but rather negative support exacerbates perceived stress (Homma et al., 2016).

We also examined the effect of social support on stress-reactive cortisol during the habituation compared to all other conditions. Similar to our perceived stress findings, cortisol concentrations were higher during support and alone conditions compared to the rest condition. Furthermore, there was a significant effect of sex on support compared to alone conditions, whereas women had lower cortisol concentrations during the support condition than did men. Our covariates did not account for any of the variance in stress-reactive cortisol.

Our findings suggest that our stressor was salient, as demonstrated by the higher cortisol concentrations and VAS ratings provided during each condition involving the stressor. We were not expecting cortisol concentrations to be higher at the end of our habituation phase relative to all other phases. This sample was taken 30 minutes after the participant arrived but during the peripheral sensor and EEG cap placement. Sensor placement involves two research assistants cleaning areas of the participants face while they are completing questionnaires. This is a very intimate and awkward process and it is likely that the participants found it to be stressful. The sensor placement takes about 1 hour to complete, thus, the participants likely habituated overtime. Therefore, if future studies utilize both psychophysiological and biological measurements, the baseline saliva sample should be taken after the sensors have been placed.

When examining sex differences in cortisol, we found that women had concentrations during the support condition compared to men. However, when visually examining the data, it does not appear that women were benefiting from the support more than men but that men were more stressed during the support condition. This increase in stress may be due to differences in socialization between men and women. First, men and women may perceive non-reciprocal physical touch differently, where men may associate touch with dominance and assertiveness instead of support and warmth (Major & Heslin, 1982). Furthermore, men perceive physical

touch more negatively than women (Whitcher & Fisher, 1979) and use touch to express negative emotions like anger (Hertenstein & Keltner, 2011). Participants were notified that physical touch was a method to provide a positive type of support; however, there is a great deal of variability in individual differences associated with the perception of physical touch. Therefore, men may have felt more uncomfortable than women with the physical interactions required in our study.

We did not find differences between the sexes during other time points. Some studies do show distinct differences in stress reactive cortisol between males and females that are related to sex hormones, particularly related to the menstrual cycle (Zimmer et al., 2003; Childs, Dlugos, & De Wit, 2010). . However, there are studies that have not found differences between sexes when comparing stress reactive cortisol concentrations (Kidd, Carvalho, and Steptoe, 2014; Kelly et al., 2007) or differences between women during the different phases of the menstrual cycle (Pierce & Pritchard, 2016). We did not control for menstrual cycle phase and do not believe our results would have differed had we included menstrual cycle phase for several reasons. First, we were unable to measure estrogen and progesterone directly. Measuring hormonal fluctuations directly is the best way to test differences in menstrual cycle phase; however, this method was cost prohibitive. Second, we were unable to bring women participants in to participate in the stressor twice and two weeks apart. Our stressor was such that participating multiple times would have decreased the salience of the stressor. Lastly, retrospective reporting of menses can lead to inaccuracies in recall, as well as unequal follicular and luteal groups.

We did not find differences in stress-reactive cortisol between groups when accounting for PTSD symptom severity, FD or IA. Previous studies have provided mixed findings when examining stress reactivity between individuals with PTSD and healthy controls. Most studies have found blunted cortisol reactivity in individuals with PTSD compared to healthy controls

(Boscarino, 1996; Lauc, Zvonar, Vuksic-Mihaljevic, and Flogel, 2004; Friedenberg et al., 2010). However, many studies have found no difference in cortisol reactivity (Bremner et al., 2003; Meewise et al., 2007, Klaassens et al., 2012). Similarly, research examining cortisol concentrations in psychopathic populations are discrepant with some studies finding lower cortisol (Johnson et al., 2014; Platje et al., 2013) and others finding no differences (Loney et al., 2006; Welker et al., 2014) when compared to healthy controls. Therefore, while we did not support our hypothesis that individuals with PTSD and IA would have lower cortisol concentrations than individuals higher in FD, our findings do align with other studies.

Psychophysiology

We found a greater difference in FPS magnitude between the threat of shock condition compared to the condition not associated with shock, indicating the saliency of our threat cue. Next, we found a significant interaction between support, focus, and sex, where women had an attenuated FPS during the TF condition compared to the AF condition. This difference in FPS between the TF and AF condition indicates that women learned the stimuli associations and were likely sensitive to the white noise burst when attention was directed towards the non-threat cue. Lastly, there was a significant focus by threat by sex interaction where women had attenuated FPS during the AF CS- condition compared to the AF CS+ condition. This likely indicates that the potentiated FPS found in the previous interaction was driven by the CS+ condition. We did not find any significant relationships when considering our covariates.

We did not find differences in FPS in individuals higher in PTSD symptomatology or psychopathy factors. This lack of finding may be a result of the stimuli used during fear conditioning. We used white noise bursts to induce FPS, a measure commonly used to investigate differences in fear learning (Costanzo et al., 2016; Fani et al., 2012; Grillon &

Morgan, 1999). Typically, PTSD is associated with both greater FPS to fear-conditioned stimuli and deficits in extinguishing FPS over time (Costanzo et al., 2016; Fani et al., 2012). However, many studies utilize trauma-related imagery paired with intermittent white noise bursts (Sijbrandij, Engelhard, Lommen, Leer, & Baas, 2013; Robison-Andrew et al., 2014). Furthermore, we were unable to clinically diagnose PTSD in our participants; instead, we used continuous symptom severity data as our covariate. Most of our participants endorsed moderate to severe PTSD symptomatology. Most studies compare FPS between individuals with PTSD and healthy controls (Costanzo et al., 2016; Fani et al., 2012; Grillon & Morgan, 1999; Sijbrandij, Engelhard, Lommen, Leer, & Baas, 2013). Therefore, the lack of the relationship between PTSD and FPS may result from the lack of salient emotional stimuli and not having a healthy comparison group. Additionally, we lost FPS data for the first 20 participants due to an issue occurred with how with our stimuli were triggered. Therefore, we encountered a lack of power to detect significant differences and this likely resulted in our null findings.

When investigating differences in the P3 ERP, we found that the P3 amplitude was lower during the presence of physical support compared to being alone during the stress task. Thus, the stimuli cues were more salient when participants were completing the stressor alone than when they were receiving physical support from their friends. P3 amplitude was also lower during the TF condition compared to the AF condition. This suggests that participants learned the cues associated with threat quickly and were thus able to exert less cognitive effort during the TF condition. Conversely, participants were more focused on the cues during the AF condition because they had not learned when to expect the shock during the trials. The presence of stimuli associated with shock was associated with a larger P3 response compare to stimuli that were not paired with shock. Thus, the presence of shock elicited more attention than did trials when shock

was not present. Lastly, FD was associated with a larger P3 response when alone compared to when they were with a friend, indicating that individuals higher in FD benefit from the presence of physical support during times of stress. The covariates IA, psychopathy and PTSD did not contribute significantly to P3 amplitude.

Chapter 8: Limitations and Future Directions

Limitations

This study, to our knowledge, was the first to examine how physical social support on may differentially effect the physiological and subjective response to stress in a individuals higher in IA and FD and how social support may moderate the relationship between trauma, PTSD, and psychopathy. Thus, there were a few limitations that arose, technologically and logistically. Fist, two technological errors occurred that caused us to lose data. First, an error occurred that caused Neuroscan to not trigger FPS stimuli during the first 20 runs. Next, an error in the presentation of our Qualtrics surveys, causing the software to end the survey before the PCL-C, IDS-SR, and ISEL were administered. A modification to our IRB was submitted and approved, allowing us to recontact 52 participants and 25 friends. Thus, our power to detect significant relationships concerning PTSD, depression and perceived social support were diminished.

Next, we did not control for the relationships between our friends and participants. A previous study conducted by our laboratory asked friends to nominate friends to be contacted to provide friendship ratings. This study ran into problems with recruiting a large enough sample size. Thus, we instructed participants to invite a friend with whom they had a close relationship. Previous studies were successful in recruiting friends together rather than vetting relationships provided by nomination (Bagwell et al., 2005). However, in allowing participants freedom in choosing their partner, we received a wide variety of relationships. For example, relationships spanned the spectrum from close relationships (friends, family members, significant others) to those that are not close (acquaintances, and classmates). In the future, studies should exclude relationships wherein the participants closely connected.

Future Directions

Regardless of the limitations, this study provides a strong foundation for the development of interventions and the development of future research projects. Taken together, our findings suggest that a vulnerability to develop PTSD is associated with the personality traits shared by those higher in IA. Thus, when individuals with these characteristics are exposed to trauma, they are more likely to develop more severe PTSD symptoms. Conversely, we also found that FD is associated oppositely to affective, internalizing and behavioral self-report measures when compared to both PTSD and IA. Furthermore, individuals higher in IA, which is associated with social alienation and social isolation did benefit from social support. Thus, this study provides the first evidence that social-based interventions may be beneficial for individuals higher in psychopathic traits. Furthermore, lower levels of social support were associated with the development of IA after being exposed to trauma. Thus, future studies should examine how socially based interventions can be used to prevent the development of maladaptive traits.

Lastly, we did not find meaningful relationships between overall psychopathy and our measures in our sample. This may be an indication that a unified construct of psychopathy may not be useful when investigating the deficits in emotional and behavioral functioning typically associated with psychopathy (Hare, 1991, 2003; Patrick, Hicks, Nichol, & Krueger, 2007). The factors related to general psychopathy are differentially, and sometimes oppositely, associated with broad factors of psychopathology, specifically internalizing and externalizing disorders. These divergent associations illustrate utility of a dual process approach to conceptualizing the personality traits perceived as psychopathic. Our data further supports the use of a dual process model of personality traits associated with psychopathy to investigate the trait that lead to differences in adaptive and maladaptive experiences. We found that two unrelated groups of traits lead to differences in PTSD and resilience factors, rather than psychopathy. For example,

individuals higher in IA may have a greater risk for developing both externalizing and internalizing psychopathologies, whereas traits associated FD may provide a protective buffer against developing both types of disorders. Therefore, this study provides ample evidence in examining how extremes in personality result in a vulnerability to psychopathology. However, our study does not provide evidence for the utility in using psychopathy as a construct when decomposing these relationships.

Appendix A: Demographics Form

1.) What is your age? (in years) 1 = Male 2 = Female

2.) What is your gender? 1 = Male 2 = Female

3.) Do you wear eyeglasses or contact lenses? 1 = No 2 = Yes

4.) Which are you wearing today? 1 = I am wearing glasses. 2 = I am wearing contacts. 3 = I am not wearing glasses or contacts right now.

5.) Is your vision corrected to 20/20 (approximately) with the use of contacts or glasses? 1 = No 2 = Yes

6.) Do you have hearing difficulties? 1 = No 2 = Yes

7.) Please explain your hearing difficulties if you have any.

8.) Which hand do you usually write with? 1 = Right hand 2 = Left hand 3 = Both

9.) Are you currently under a physician's care for a physical or medical condition? 1 = No 2 = Yes

10.) Please describe your physical or medical condition

11.) Have you had any past health problems, including head injuries? 1 = No 2 = Yes

12.) Please describe your past health problems, including head injuries

13.) Are you currently taking any prescription medications? 1 = No 2 = Yes

14.) Please specify your current prescription medications.

15.) How many hours of sleep did you get last night?

16.) What is your approximate height in inches? (for example, 5' = 60, 5'6 = 66, 6' = 72, 6'6 = 78)

17.) What is your approximate weight in pounds?

18.) Have you ever been diagnosed or treated for a psychiatric condition(s)? 1 = No 2 = Yes

19.) Please specify what psychiatric conditions you have been diagnosed or treated for.

20.) What is the maximum number of alcoholic beverages you have ever consumed in a 24 hour period?

21.) How many alcoholic beverages do you consume on average (in any given week)?

22.) How much caffeine (e.g., cups of coffee, tea, or cans of soda) do you consume on average in a day?

23.) Are you Spanish/Hispanic/Latino? 1 = No 2 = Yes, Mexican, Mexican American, Chicano 3 = Yes, Puerto Rican 4 = Yes, Cuban 5 = Yes, other Spanish/Hispanic/Latino

24.) If you identify yourself as other Spanish/Hispanic/Latino, please specify.

25.) Which of these races do you identify with? 1 = White 2 = Black, African American, or Negro 3 = American Indian or Alaska Native 4 = Asian Indian 5 = Chinese 6 = Filipino 7 = Japanese 8 = None of these choices

26.) Which of these races do you identify with? 1 = Korean 2 = Vietnamese 3 = Other Asian 4 = Native Hawaiian 5 = Guamanian or Chamorro 6 = Samoan 7 = Other Pacific Islander 8 = Some other race 9 = Not applicable - I already stated my race.

27.) If you identify yourself as Other Asian, Other Pacific Islander, or some other race, please specify.

28.) How many cigarettes do you smoke in a usual day? 1 = I have never smoked. 2 = 10 cigarettes or less 3 = 11-20 cigarettes 4 = 21-30 cigarettes 5 = 31

cigarettes or more 6 = 10 cigarettes or less, but I don't smoke now. 7 = 11-20 cigarettes, but I don't smoke now. 8 = 21-30 cigarettes, but I don't smoke now. 9 = 31 or more cigarettes, but I don't smoke now.

29.) What is your marital status? 1 = Married 2 = Divorced 3 = Widowed 4 = Engaged 5 = Live-in relationship (more than six months) 6 = Never been married

30.) How many years have you been married? (0-80)

31.) How many times have you been married? 0 = Never 1 = Once 2 = Twice 3 = Three times 4 = Four times 5 = Five times 6 = Six times 7 = Seven times 8 = Eight times or more

32.) How many times have you been divorced? 0 = Never 1 = Once 2 = Twice 3 = Three times 4 = Four times 5 = Five times 6 = Six times 7 = Seven times 8 = Eight times or more

33.) How many live-in relationships of at least six months have you had? 0 = None 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight or more

34.) How many biological children do you have? 0 = None 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight or more

35.) How many non-biological children do you have? (for example, stepchildren or adopted children) 0 = None 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight or more

36.) What is your highest level of education? 1 = Didn't attend high school 2 = Attended but didn't graduate high school 3 = Graduated high school 4 = GED 5 = Some college, but no degree 6 = Two-year college degree (e.g., Associate's degree) 7 = Four-year college degree (e.g, BA or BS) 8 = Master's degree (e.g., MA, MS, MBA) 9 = Doctoral degree (e.g., PhD, MD, JD)

37.) Are you in school now? 1 = No 2 = Yes

38.) What are you studying?

39.) Are you currently employed? 1 = No 2 = Yes

40.) What is your current occupation? (for example, electrical engineer, stock clerk, farmer, homemaker)

41.) What was your most recent occupation? (for example, electrical engineer, stock clerk, farmer, homemaker)

42.) What is your current total household income level to the nearest thousand dollars? (for example, 10000, 35000, 126000)

43.) What was your relationship to the woman who raised you? 1 = Biological mother 2 = Adoptive mother 3 = Stepmother 4 = Not applicable

44.) Is she still alive? 1 = No 2 = Yes

45.) How old is she now? (in years)

46.) What year did she die?

47.) What was her highest level of education? 1 = Didn't attend high school 2 = Attended but didn't graduate high school 3 = Graduated high school 4 = GED 5 = Some college, but no degree 6 = Two-year college degree (e.g., Associate's)

7 = Four-year college degree (e.g, BA or BS) 8 = Master's degree (e.g., MA, MS, MBA) 9 = Doctoral degree (e.g., PhD, MD, JD)

48.) What was her usual occupation when you were growing up? (for example, electrical engineer, stock clerk, farmer, homemaker)

49.) What was your relationship to the man who raised you? 1 = Biological father 2 = Adoptive father 3 = Stepfather 4 = Not applicable

50.) Is he still alive? 1 = No 2 = Yes

51.) How old is he now? (in years)

52.) What year did he die?

53.) What was his highest level of education? 1 = Didn't attend high school 2 = Attended but didn't graduate high school 3 = Graduated high school 4 = GED 5 = Some college, but no degree 6 = Two-year college degree (e.g., Associate's degree) 7 = Four-year college degree (e.g, BA or BS) 8 = Master's degree (e.g., MA, MS, MBA) 9 = Doctoral degree (e.g., PhD, MD, JD)

54.) What was his usual occupation when you were growing up? (for example, electrical engineer, stock clerk, farmer, homemaker)

55.) How many biological siblings do you have? (both brothers and sisters, half-brothers or half-sisters, and including any who are now deceased) 0 = None 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight or more

56.) How many non-biological siblings do you have? (for example, stepbrother or adopted sister) 0 = None 1 = One 2 = Two 3 = Three 4 = Four 5 = Five 6 = Six 7 = Seven 8 = Eight or more

57.) Where are you in the birth order of your siblings? 1 = First or only child 2 = Second 3 = Third 4 = Fourth 5 = Fifth 6 = Sixth 7 = Seventh 8 = Eighth 9 = Ninth or later

58.) Have you ever been arrested? 1 = Yes 2 = No

59.) If yes, please describe the charges.

60.) Have you ever been convicted of a crime? 1 = Yes 2 = No

61.) If yes, please describe the conviction.

Appendix B: Descriptive Statistics for Questionnaires

Questionnaire	N	Mean	SD
ISEL			
Appraisal	113	32.77	5.69
Tangible	113	32.50	5.10
Self-Esteem	113	29.42	4.31
Belonging	113	31.46	5.21
Total Support	113	126.16	17.75
COPE			
Solution Focused	184	35.55	7.21
Negative Coping	184	10.90	3.61
PTGI			
Relating with Others	179	22.73	11.11
New Possibilities	180	14.06	7.16
Personal Strength	179	12.49	5.72
Spiritual Change	179	2.29	1.90
Appreciating Life	179	9.48	4.31
Total Growth	180	59.29	26.38
LoTR			
Pessimism	185	10.55	1.73
Optimism	185	7.83	1.70
PANAS			
Positive Affect	183	37.02	6.85
Negative Affect	183	20.09	6.34
Locus of Control	184	68.83	12.53
SF-36			
Physical Functioning	182	424.45	139.94
Role of Physical Limitations	182	163.19	60.08
Role Emotional Limitations	182	99.31	58.32
Energy and Fatigue	182	102.82	36.40
Emotional Wellbeing	182	170.49	45.48
Social Functioning	178	76.19	23.19
Pain	182	84.93	17.01
General Health	182	173.62	50.05
Resilience	113	.003	1.42
LSAS			
Total	185	24.67	14.03
Avoidance	185	20.63	15.11
LEL			
Positive Events	182	112	1.07
Negative Events	183	2.61	2.15
Total Events	183	3.68	2.82

LEC-5			
Total Events	186	14.64	8.06
Sexual Assault	186	1.49	1.25
Physical Assault	186	2.12	1.57
Accidents	186	2.66	1.56
PSS	183	22.41	6.54
IDS	112	47.33	11.70
PCL	113	37.22	12.54
Psychopathy Factors			
FD	186	0	.69
IA	186	0	.62
FDxIA	186	.06	.46

Note. Participants were given the option to skip questions or questionnaires that were too sensitive in nature. Further, an issue occurred with the employment of our online questionnaire. Thus, questionnaire *n*s are not equal.

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Curriculum Vitae

Meghan E. Pierce
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Education

Doctor of Philosophy in Psychology *Expected May 2017*
Experimental Psychology/Neuroscience
Chair: Stephen D. Benning, Ph.D. University of Nevada, Las Vegas

Certificate in Quantitative Psychology *Expected December 2017*
Chair: Stephen D. Benning, Ph.D. University of Nevada, Las Vegas

Master of Arts Degree *December 2014*
Experimental Psychology/Neuroscience
Chair: Laurel M. Pritchard, Ph.D. University of Nevada, Las Vegas

Master of Sciences Degree *August 2011*
Counselor Education, Clinical Mental Health Counseling/Addictions Counseling
Chair: Larry Ashley, Ed.S. University of Nevada, Las Vegas

Bachelors of Arts Degree *May, 2009*
Psychology, University of Nevada, Las Vegas

Research Experience

08/2014 – 08/2016 **Doctoral Research Graduate Assistant**
- Mentor: Stephen Benning, Ph.D.

11/2012 - 08/2016 **Research Intern, Cleveland Clinic, Lou Ruvo Center for Brain Health**
- Supervisor: Sarah Banks, Ph.D.

06/2014 - 08/2014 **Research Assistant, Nevada Institute for Children's Research and Policy**
- Supervisor: Amanda Haboush-Deloye, Ph.D.

06/2011 - 05/2013 **Graduate Research Assistant**
- Mentor: Laurel Pritchard, Ph.D.

Teaching Experience

University of Nevada, Las Vegas
- Introductory Psychology (PSY 101)
- Psychopharmacology of Abused Drugs (PSY 422)

- Foundations of Physiological Psychology (PSY 303)
- History of Psychology (PSY 308)

Nevada State College

- Physiological Psychology (PSY 403)

Leadership and Clinical Experience

05/2016 - Present **Membership and Volunteers Officer**
- Association for Psychological Sciences Student Caucus

05/2016 - Present **President, Graduate and Professional Student Government**
- Mentor: Kate Korgan, Ph.D.

05/2010 - 08/2011 **Harrah's Graduate Assistant in Problem Gambling Counseling**
- Supervisor**:** Larry Ashley Ed.S, LCADC, CPGC

01/2010 - 08/2011 **Counseling Intern, U.S Veteran's Initiative**
- Supervisor: Shalimar T. Cabrera, MSW

Publications

Pierce, M. E., & Pritchard, L. M. (2016). Blunted Cortisol in Female Veterans Associated with Military Status not PTSD. *Stress*, 1–20. http://doi.org/10.1080/10253890.2016.1217841

Banks, S. J., Sreenivasan, K., Weintraub, D., Baldock, D., **Pierce, M. E**., Noback, M., Frasnelli, J., James, J., Beall, E., Sreenivasan, K. R., Zhuang, X., Cordes, D., Leger, G. C. (2016). Structural and Functional MRI Differences in Master Sommeliers: A Pilot Study on Expertise in the Brain. *Frontiers in Human Neuroscience*, 22.doi:http://dx.doi.org/10.3389/fnhum.2016.00414.

Pierce, M. E. & Pritchard, L. M. (2013). Hypothalamic-Pituitary-Adrenal Axis Dysregulation in Posttraumatic Stress Disorder. In *Psychology of Trauma*, Nova Science Publishers Inc: Hauppauge, NY.

Ashley, L., & **Pierce, M. E.** (2011). Armed Forces. In Kleinman, M., Hawdon., J & Geoffry J. *Encyclopedia of Drug Policy*, Sage Publications: Thousand Oaks, CA.

Ashley, L., & **Pierce, M. E.** (2011). *The Truth about Gambling*. DWJ Books: Sag Harbor, NY.

Submitted

Molina, S. M., **Pierce, M. E.** & Benning, S. D. (Submitted). The Effects of Psychopathic Traits on Social Networks.

Haboush-Deloye, A. L., **Pierce, M. E.,** Picker C. J. (Submitted) Exploring the relationship between exclusive infant feeding practices, weight status, and the consumption of sugar-sweetened beverages.

In Preparation

Benning, S. D. & **Pierce, M. E.** (In Prep). Effects of Framing and Numeracy on Skin Conductance in the evaluation of Risk.

Pierce, M. E., Molina, S. M., & Benning, S. D. (In Prep). The Association between factors of psychopathy, risk taking and risk perception.

Molina, E. M., **Pierce, M. E**., Benning, S. D., Berquist, B. (In Prep). Associations between factors of psychopathy, demographics, externalizing, impulsivity, and sensation seeking.

Pierce, M. E., & Pritchard, L. M. (In Prep). The Effects of gender, math, and social anxiety on Performance during the Trier Social Stress Test.

Pierce, M. E. & Pritchard, L. M. (In Prep). FKPB51 and cortisol response to stress associated with trauma exposure in males and females.

Invited Presentations

Pierce, M. E. (2016). *Blunted Cortisol in Female Veterans Associated with Military Status not PTSD.* Research Week Kickoff Event Program: Lightening Talk Speaker. University of Nevada, Las Vegas.

Presentations

Pierce, M. E. (2015). *The Neural Correlates of Psychopathy*. Three Minute Thesis Competition presented at the University of Nevada, Las Vegas.

Pierce, M. E. (Chair), Pritchard, L. M., Benning, S. D., & Conner, B. T. (2015): *For the Thrill of It: Risk Taking and Psychopathology*. Symposium presented at Western Psychological Association, Las Vegas, NV.

Pierce, M. E. (2014). The Neuroendocrine and Performance Correlates of PTSD in Men and Women. Three Minute Thesis Competition presented at the University of Nevada, Las Vegas.

Pierce, M. (2011). *Posttraumatic Stress and Mental Health Disorders*, Panel expert. Break-in session presented at Conference on Combat Trauma and Addiction, Las Vegas, NV.

Pierce, M. E & Ashley, L. (2011). *The forgotten worker: the veteran*. Plenary Session presented at the EASNA Institute Annual Conference, Las Vegas, NV.

Pierce, M. E. and Ashley, L. (2011). *Working with female veterans.* Learning institute presented at the American Counseling Association Conference and Exposition, New Orleans, LA.

Poster Presentations

** Presentations with an undergraduate research assistant as the lead author*

Molina, S. M., **Pierce, M. E.,** & Benning, S. D. (2016). Postauricular and Startle Blink Reflexes Capture Anticipatory and Consummatory Emotional Deficits in Psychopathy. *Society for Psychophysiological Research*, Minneapolis, MN.

Sreenivasan, K., Zhuang, X., Baldock, D., Weintraub, D., **Pierce, M.,** Frasnelli, J., Beall, E., Deshpande, G., Leger, G.C., Banks, S.J., Cordes, D. (2015) Effective Connectivity Analysis of Olfactory Perception in Sommeliers *Human Brain Mapping https://ww4.aievolution.com/hbm1501/index.cfm?do=abs.viewAbs&abs=3958*

Zhuang, X., Sreenivasan, K., Baldock, D., Weintraub, D., **Pierce, M.,** Frasnelli, J., Beall, E., G., Leger, G.C.,Banks, S.J., Cordes, D. (2015) Functional Connectivity and Insula Partition in Sommeliers https://ww4.aievolution.com/hbm1501/index.cfm?do=abs.viewAbs&abs=2784

Sreenivasan, K., Zhuang, X., Baldock, D., Weintraub, D., **Pierce, M.,** Frasnelli, J., Beall, E., Leger, G.C.,Banks, S.J., Cordes, D. (2015) Brain Activation and Functional Connectivity:

Study of olfactory perception in sommeliers https://ww4.aievolution.com/hbm1501/index.cfm?do=abs.viewAbs&abs=1926

Molina, S. M., **Pierce, M. E.,** & Benning, S. D. (2015). Relationships between psychopathy and friendships, personality, education and health behaviors. Society for the Scientific Study of Psychopathy, Chicago, IL.

Molina, S. M., **Pierce, M. E.,** & Benning, S. D. (2015). Relationships between psychopathy and friendships, personality, education and health behaviors. Western Psychological Association, Las Vegas, NV.

Pierce, M., Koenig, A., Zevallos, C., Egan, J., Orlewicz, M., Schumacher, T., Hensleigh, E., Pritchard, L. (2015). Hormonal Correlates of Posttraumatic Stress Disorder in Female Veterans. UNLV STEM Summit, Las Vegas, NV

Xiaowei, Z., Sreenivasan, K., Baldock, D., Weintraub, D., **Pierce, M.,** Frasnelli, J., Leger, G., Banks, S., Cordes, D. (2014). Insula Parcellation and Functional Connectivity Analysis in Sommeliers. International Society for Magnetic Resonance in Medicine, Toronto, Ontario, Canada.

Sreenivasan, K, R., Zhuang, X., Baldock, D., Weintraub, D., **Pierce, M**., Frasnelli, J., Beall, E., Leger, G. C., Banks, S. J. (2014). Activation and Functional Connectivity Patterns of Olfactory Perception in Sommeliers. International Society for Magnetic Resonance in Medicine, Toronto, Ontario, Canada.

Bradford, A.*, Oettinger, S., Green, K., **Pierce, M. E. (2014).** Menstrual Cycle Phase as a Predictor of Anxiety. UNLV Psi Chi Poster Conference, Las Vegas, NV.

Pierce, M., Koenig, A., Zevallos, C., Egan, J., Orlewicz, M., Schumacher, T., Hensleigh, E., Pritchard, L. (2013). The Hormonal Correlates of Posttraumatic Stress Disorder in Female Veterans. Society for Neuroscience Annual Convention, San Diego, CA.

Dold, K*., Hensleigh, H., **Pierce, M.**, Lynch, S., Fowler, A., Abuali, K., Jager, A., Egan, J., Orlewicz, M., Pritchard, L. (2013). Early Life Stress, Drug Abuse, Exercise Effects on BDNF and Sex-Influenced Exercise Differences. Society for Neuroscience Annual Convention, San Diego, CA.

Pierce, M. E., Hensleigh, E., Egan, J., & Pritchard, L. (2013). The Hormonal Correlates of Stress and Posttraumatic Stress Disorder in Female Veterans. STEM Summit, University of Nevada, Las Vegas.

Pierce, M. E., Hensleigh, E., Egan, J., & Pritchard, L. (2012). The Hormonal Correlates of Stress and Posttraumatic Stress Disorder in Female Veterans. Association of Psychological Sciences Annual Convention, Chicago, IL.

Pierce, M., Egan, J., Jager, A., Schumacher, T, Pritchard, L. (2011). Correlates of Stress Response in Female Veterans with and without Posttraumatic Stress Disorder. Psi Chi Annual Poster Session, Las Vegas, NV.

Hensleigh E, Lynch S, Semmel M, **Pierce M,** and Pritchard LM (2010). The effects of early postnatal separation and sex on methamphetamine reward. Poster presentation presented at *Society for Neuroscience*, 40th annual meeting.

Hensleigh, E., Lynch S., Semmel, M., and **Pierce, M. E.** (2010). *Sex and early maternal separation effects on methamphetamine reward and sensitivity*. Poster session presented at the Translational Research in Methamphetamine Addiction Conference, Bozeman, MT.

Pritchard, L. M., Hensleigh, E., Smith, L., Engel, S., Ridolfi, N., **Pierce, M**., and Dennehy, K. (2009). *Maternal separation produces sex-, dose-, and time-dependent alterations in amphetamine sensitivity*. Poster session presented at the Society for Neuroscience, Chicago, IL

Awards and Honors

Grants

Awarded

INBRE Small Grant, 2013: $4130.00
GPSA Research Grant, 2014: $1114.20
GPSA Travel Grant, 2011: $150.00

Submitted

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Awards and Scholarships

Barrick Fellowship 2016 - 2017
GPSA President Summer Scholarship
GPSA Service Award, 2016
Graduate College Social Media Contest, 2016
3rd Place in Preliminaries, Rebel Grad Slam, 2015
Summer Session Scholarship, 2013, 2016
GPSA Book Scholarship 2013
Patricia Sastaunik Scholarship, 2011, 2013 - 2015
UNLV Access Grant, 2011 - 2017
Chi Sigma Iota, Alpha Omega, Outstanding Research Contribution, 2010

Honors

2007 - 2009 Dean's List

Nominations

UNLV College of Liberal Arts Graduate Student Summer Scholarship, 2016
UNLV College of Liberal Arts Faculty Research Summer Scholarship, 2016
UNLV Foundation Board of Trustees Fellowship Finalist, 2016
Outstanding Graduate Student, Spring 2015 Commencement
Nevada Regents Scholar, 2010, 2016
Chi Sigma Iota, Outstanding Masters Level Student, 2010

Service

2016 - Present President's Advisory Council
2016 - Present **Chair:** GPSA Bylaws Committee
2016 - Present UNLV Athletic Logo and Mascot Refresh Committee
2016 - Present Graduate College Executive Committee
2016 - Present Graduate College Graduate Council

2016 - Present Student Technology Advisory Board
2016 - Present Regents' Academic Advisor Awards Selection Committee
2016 - Present Nevada Student Alliance
2015 - Present UNLV Parking Advisory Committee
2013 - Present Graduate College Program Review Committee
2016 - 2016 **Vice Chair:** U.S. Presidential Debate Workers and Volunteers Committee
2016 - 2016 U.S. Presidential Debate Executive Core Committee
2016 - 2016 U.S. Presidential Debate Rapid Response Committee
2015 - 2016 Student Union Advisory Board
2015 - 2016 **Chair**: GPSA Sponsorship Committee
2015 - 2016 **Chair**: Research Forum Committee
2015 - 2016 College of Liberal Arts Dean Search Committee
2015 - 2016 **Vice President**, Graduate and Professional Student Association
2013 - 2016 **Campus Representative**: Association for Psychological Sciences Student Caucus
2015 - 2016 **Neuroscience Emphasis Representative:** Experimental Students Committee
2014 - 2015 **Treasurer**, Graduate and Professional Student Association
2014 - 2015 **Chair:** GPSA Awards Committee
2014 - 2015 Graduate College New Program Evaluation Committee
2014 - 2015 **Chair:** GPSA Government Relations Committee
2014 - 2014 Director of Graduate Admissions & Records Search Committee
2013 - 2014 **Secretary**, Graduate and Professional Student Association
2013 - 2014 Graduate College Curriculum Committee
2013 - 2014 **Chair**: GPSA Publications Committee
2013 - 2014 **Chair:** GPSA Social Media
2013 - 2014 **President**: Experimental Students Committee
2012 - 2014 **Peer Reviewer**: RISE award, Association for Psychological Sciences
2010 - 2014 **Secretary**: State of Nevada Association of Addiction Professionals
2012 - 2013 **Secretary**: Experimental Students Committee
2011 - 2012 **First Year Cohort Representative**: Experimental Students Committee
2010 - 2011 **President**: Student Organization of Addiction Professionals

Ad-Hoc Peer Reviewer

Psychoneuroendocrinology
Assessment
Sage Publications
APS Rise Research Award
APS Student Grant Competition
Nevada State Undergraduate Research Journal

Professional Affiliations

2016 - Present Society for Personality and Social Psychology
2014 - Present Western Psychological Association
2011 - Present Society for Neuroscience
2008 - Present Association for Psychological Sciences

2010 - 2013 The Association for Addiction Professionals (NAADAC)
2010 - 2013 State of Nevada Association of Addiction Professionals (NAADAC affiliate)
2009 - 2012 American Counseling Association