Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter now, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Maureen Ascona April 9, 2018

Psychopathy, Emotional Processing, and Aggression: The Role of Fearless Dominance

by

Maureen Ascona

Scott Lilienfeld, Ph.D.
Adviser

Department of Neuroscience and behavioral Biology

Scott Lilienfeld, Ph.D.

Adviser

Keith Easterling, Ph.D.

Committee Member

Gary Motley

Committee Member

2018

Psychopathy, Emotional Processing, and Aggression: The Role of Fearless Dominance

By

Maureen Ascona

Scott Lilienfeld, Ph.D.

Adviser

An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Sciences with Honors

Department of Neuroscience and Behavioral Biology

2018

Abstract

Psychopathy, Emotional Processing, and Aggression: The Role of Fearless Dominance
By Maureen Ascona

Introduction: There are various measures to assess psychopathy, but the field has increasingly moved from a unitary to a multifaceted conceptualization of the disorder. The Psychopathic Personality Inventory (PPI) has been important for evaluating psychopathic levels from a multidimensional perspective. Within the PPI, the subfactor of Fearless Dominance has been an important measure in targeting fearlessness, stress immunity, and social influence, although some question the validity of this subfactor as a measure of psychopathy. In this study, we measure fearless dominance as it potentially influences pain responses, emotional processing, and aggression responses. We also examine whether emotional processing serves as a mediator between psychopathy and aggression levels.

Methods: The data were gathered from an existing dataset of 166 men from the University of Georgia collected in 2008. Testing occurred on 2 days: On the first day, participants received a series of questionnaires, then performed the lexical decision task. On the second day, subjects participated in the Response Choice Aggression Paradigm (RCAP) shock paradigm.

Results: Fearless Dominance was significantly positively correlated with pain tolerance levels, impaired lexical facilitation for fear and disgust words, and heightened levels of self-reported aggression. Nevertheless, emotion processing did not mediate the relation between psychopathy and shock-related aggression variables.

Discussion: Fearless dominance altered emotion processing, pain tolerance levels, and self-report aggression, but unlike our hypotheses, laboratory levels of aggression were unrelated, and we did not observe mediation. Exploring different models for aggression and emotional processing might be an important step in identifying a mediation between psychopathy, aggression and emotion processing.

Psychopathy, Emotional Processing, and Aggression: The Role of Fearless Dominance

By

Maureen Ascona

Scott Lilienfeld, Ph.D.

Adviser

A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Sciences with Honors

Department of Neuroscience and Behavioral Biology

2018

Acknowledgements

I would like to give special thanks Dr. Scott Lilienfeld for guiding and supporting me throughout my time in the Lilienfeld lab and for sharing his vast knowledge and expertise while being all too humble. I would like to thank Shauna Bowes for guiding me through the data and for being so helpful and cheerful through the good and the bad. I would also like to give special thanks Dr. Allison Waters for guiding me all throughout my research experience here at Emory and for being so inviting into the world of research. I would like to thank Dr. Keith Easterling for instructing me on science writing and forcing me to think critically about the science behind the manuscript. And I would like to give special thanks to Gary Motley for teaching me that without patience and hard work, nothing can be accomplished in this world.

Table of Contents

ABSTRACT

Introduction: There are various measures to assess psychopathy, but the field has increasingly moved from a unitary to a multifaceted conceptualization of the disorder. The Psychopathic Personality Inventory (PPI) has been important for evaluating psychopathic levels from a multidimensional perspective. Within the PPI, the subfactor of Fearless Dominance has been an important measure in targeting fearlessness, stress immunity, and social influence, although some question the validity of this subfactor as a measure of psychopathy. In this study, we measure fearless dominance as it potentially influences pain responses, emotional processing, and aggression responses. We also examine whether emotional processing serves as a mediator between psychopathy and aggression levels.

Methods: The data were gathered from an existing dataset of 166 men from the University of Georgia collected in 2008. Testing occurred on 2 days: On the first day, participants received a series of questionnaires, then performed the lexical decision task. On the second day, subjects participated in the Response Choice Aggression Paradigm (RCAP) shock paradigm.

Results: Fearless Dominance was significantly positively correlated with pain tolerance levels, impaired lexical facilitation for fear and disgust words, and heightened levels of self-reported aggression. Nevertheless, emotion processing did not mediate the relation between psychopathy and shock-related aggression variables.

Discussion: Fearless dominance altered emotion processing, pain tolerance levels, and self-report aggression, but unlike our hypotheses, laboratory levels of aggression were unrelated, and we did not observe mediation. Exploring different models for aggression and emotional

processing might be an important step in identifying a mediation between psychopathy, aggression and emotion processing.

INTRODUCTION

Psychopathy

Canadian psychologist Dr. Robert Hare, an expert on psychopathic personality (psychopathy), has described this condition as a "*syndrome* - a cluster of related symptoms" (Hare 1993, pp.34). These symptoms include an absence of delusions and other signs of irrational thinking, superficial charm and the appearance of high intelligence, an absence of neurotic manifestations in which patients experience little anxiety and worry over their actions, unreliability, untruthfulness and insincerity, a lack of remorse as well as a lack of guilt, adult antisocial behavior, poor judgement and perseveration in negative behavior, narcissism and incapacity for object love, shallow affective reactions, anosognosia (an introspective lack of insight towards the degree or presence of mental illness), unresponsiveness with interpersonal relationships, sexual detachment, low levels of suicidal ideation, inexplicable behavior as a result of alcohol consumption, and failure to plan ahead (Cleckley 1941, pp. 338-364; Lykken, 1995). Supplementary literature has added characteristics of superficiality, impulsivity, manipulativeness, thrill-seeking and early behavioral deviance (Hare 1993, p.34).

Controversy and Changes Throughout Psychopathy

As the body of literature and interest on psychopathy has grown, so have ongoing debates concerning its conceptualization. As the disorder has become better understood, literature has begun to alter its definition, although many fundamental disagreements remain. These general arguments are present in the approach to psychopathy, which can be characterized as either personality based (rooted in personality traits, such as selfishness and guiltlessness) or behavior based (rooted in observable behaviors, such as vandalism and lying). Earlier authors like Cleckley, Hare, Lykken, and McCord perceived psychopathy as personality based but many

modern authors like Robins, Endicott, and Spitzer have adopted the behavior-based approach, although modern interpretations have combined personality and behavior approaches. Others have disputed the role of negative affectivity, distinctiveness between fearfulness as anxiety, the dimensional versus taxonical approach to psychopathy, the covariation between psychopathy and other personality disorders, and the use of self-report scales as valid assessments for diagnosis (Lilienfeld, 1994).

Negative affectivity (NA) has been among the most highly debated controversies. NA is a mood-dispositional dimension marked by such traits as anxiety-proneness, anger, guilt, sadness, sense of rejection, scorn, self-dissatisfaction, and revulsion (Watson *et al.*, 1984). This dimension is ubiquitous in measures for psychopathy like the MMPI, including its Psychopathy deviate scale, which correlate with NA markers such as trait anxiety. Although NA is highly correlated to other types of neurotic as well as psychiatric conditions (Lilienfeld, 1994), there is still debate on the extent to which NA relates to psychopathic personality constructs. Skepticism arises because NA is so prevalent among psychopathy inventories (Tellegen, 1985) that it saturates and therefore jeopardizes psychopathy measures from distinguishing psychopathy from other neurotic or psychiatric disorders (Lilienfeld, 1994). Albeit, an alternative to the skepticism behind NA has been to use something like the Psychopathy deviate scale while also testing NA traits to differentiate levels of trait anxiety in psychopathy.

Hervey Cleckley (1941) described psychopathy, in his classic book *The Mask of Sanity*, as a dichotomous diagnosis in which one was either a psychopath or not, but increasing evidence demonstrates otherwise (Cleckley, 1941). Cleckley's categorical dichotomy lacks validation and tends to result in a loss of statistical power, which may contribute to negative findings in an insignificant number of studies (Lilienfeld, 1994). Psychopathy is now widely accepted as a

continuous, multifaceted dimensional spectrum and therefore research has deviated from the need for a "genuine" psychopath as psychopathy is now evaluated as a spectrum with varying degrees of severity. To verify the dimensional nature of psychopathy, Edens et al. (1994) analyzed the psychopathy scores of prison inmates using taxometric procedures (Meehl & Yonce, 1994; Waller & Meehl, 1998) and found no compelling evidence suggesting the categorical nature of the disorder. The varying degrees of psychopathic tendencies observed in general populations have called for the inclusion of continuous levels of symptoms within basic research, thereby eliminating the need for the standard case-control approach. Using the case-control approach, psychologists collected data largely from prison populations, and, to a lesser extent, psychiatric hospitals. By drifting from this methodological approach samples have become more representative of the general population and potentially express a larger degree of variance than other populations observed.

Biological Basis

Although not a central point of the thesis, I feel that biological mechanisms are essential for understanding the deficits commonly expressed in psychopathy and for understanding how these deficits interact with one another, therefore this next section will expand on the neuropathology of psychopathy. Psychopathy has behavioral correlates that demonstrate various impairments within the brain. Certain brain systems are related to some of the behavioral abnormalities exhibited in individuals with high levels of psychopathic traits. Fear (defensive) response systems are aberrant in psychopathy. The fear response system notably originates from sensory organs, then to the thalamus which then projects to the lateral nucleus of the amygdala, then the central amygdala (CA). By bypassing the cortex, the CA projects to the periaqueductal (central) gray, which is responsible for freezing (in mice) and the fight or flight response. The

CA also projects to the nucleus reticularis pontis caudalis responsible for potentiated startle responses. Other projections reach the lateral hypothalamus and alter blood pressure and other autonomic responses. Finally, the amygdala projects to the paraventricular nucleus, which alters hormones within fear conditioning (Le Doux, 1990; Lang *et al.*, 1998; Medina *et al.*, 2002). Variations to fear conditioned behaviors are considered relevant in the fearless dominant (boldness) subdimension of psychopathy. Therefore, researchers have devised methods to test defensive action mobilization from signals projected from the central amygdala by observing changes in fear-potentiated startle responses (Patrick in press, pp. 8; Patrick et al, 2009; Patrick & Drislane, 2015).

Startle reflex priming is a phenomenon in which aversive stimuli will elicit an enhanced avoidance response and appetitive stimuli will elicit an inhibited response. This priming behavior is modulated as either appetitive or aversive. If the nature of the startle reflex is defensive, the subject should be primed to respond faster to defend themselves from aversive stimuli. This system begins with either acoustic, auditory or tactile feedback that activates the pontine startle circuit. Unconditioned aversive stimuli activate the defensive motivation system, which augments the pontine startle system and potentiate a magnified startle reflex. Similarly, when unconditioned appetitive stimuli are presented, the appetitive motive system is activated and inhibits the pontine startle system. Nevertheless, this motivation priming effect is not observed in subjective assessments on psychopathic populations. Therefore, there is believed to be a deficit in the aversive motivational system of psychopaths (Lang *et al.*, 1998; Lykken, 1957; Patrick in press, pp. 7-8).

Similarly, the mesolimbic and neostriatal dopamine reward motivational systems seem to be altered within more psychopathic individuals. Dopaminergic neurons project to the caudate

nucleus, ventral striatum, nucleus accumbens, and to the prefrontal cortex (Arias-Carrión *et al.*, 2010). Projections to the striatum and other dopaminergic pathways have been essential for the role of voluntary movement and emotion processing. The reward mechanism that produces motivation in behavior is hypothesized to initiate from increases in dopaminergic neuronal activity. Because of this association, authors hypothesized that psychopathic traits are associated with dysfunctional mesolimbic dopamine system activity. Research has demonstrated that dopaminergic hyperactivity within the nucleus accumbens is selective to impulsive-antisocial dimensions of psychopathy (Buckholtz *et al.*, 2010).

The projections of the amygdala to the anterior insula and anterior cingulate cortex in conjunction with the basolateral amygdala have also demonstrated abnormal processing in the brains of high psychopathic individuals. This dysfunction is associated with more callous behavior as well as affective-face processing deficits. Bilateral Amygdala and cingulate dysfunction have also been related to deficits in empathic responsiveness to others' pain. Studies conducted on youths have demonstrated that individuals who have higher levels of psychopathic traits tend to have hypoactivation in the rostral anterior cingulate cortex (ACC), the ventral striatum, and the amygdala and decreased empathic response to pain sensitivity in others (Marsh *et al.*, 2013; Patrick in press, pp. 9). Also, altered ACC response in both behavioral and neuroimaging data, in conjunction with the PFC, increased error and perseveration in higher psychopathic personalities.

The hippocampus has multiple projections from the amygdala, the dopaminergic reward systems, and other areas of the prefrontal cortex. Because these neural associations are aberrant in psychopathy, they suggest impairments from afferent projections on hippocampal activity. Rat studies have demonstrated that lesions to the hippocampus have removed contextual fear

learning (Phillips & LeDoux, 1992). These findings collaborate with other studies demonstrating deficits in fear conditioning in psychopathic participants. Results have exhibited decreased hippocampal activity and lower volumes of the bilateral posterior hippocampi in high-psychopathic individuals (Laakso *et al.*, 2001).

Dopaminergic reward, memory and other systems project to frontal, higher cognitive processing areas that also demonstrate altered behavioral and neuroimaging data in individuals with psychopathic traits. These higher cognitive areas are responsible for memory production, executive functioning, decision making, emotion processing, moderating social behavior and mediating rational behavior among other things. Within psychopathy, ventromedial prefrontal cortex (VmPFC) dysfunction has been associated with moral impairment and an increase in antisocial behavior (Blair, 2007). The ventromedial prefrontal cortex is also believed to play a role in instrumental and reactive aggression (Blair, 2010), emotional regulation, and encoding outcome information, which are all critical for decision making. In participants with high levels of psychopathy, there is evidence of reduced activity in the VmPFC and the bilateral amygdala, perhaps contributing to impairments in decision making and reversal learning (Blair, 2008a). Other studies have demonstrated aberrant function within the dorsolateral prefrontal and the orbitofrontal cortex (OFC). Medial OFC dysfunction, with connections to the amygdala, hippocampus, hypothalamus and perirhinal cortex, has been linked to impairments in prediction error signaling and stimulus-reinforcement learning, which in turn translates into issues with socialization and decision making (Blair, 2007). The dorsolateral prefrontal cortex is involved in the expression of physical aggression and has been related to higher levels of psychopathy (Giancola, 1995), although it should be noted that the two are very different constructs. The dorsolateral PFC has also shown to be involved with working memory tasks and inhibition, and

behavioral regulation tasks (Patrick in press, pp. 10; Goldman-Rakic, 1996; Petrides, 2000). Nevertheless, while many studies have found extensive correlations between altered brain areas and psychopathic traits, there is no singular neural signature.

The measurement of psychopathy.

There are a myriad of measures to assess psychopathy. Hare (1980) created one of the measures of psychopathy, the Psychopathy Checklist (PCL; Hare 2011, p. 31). Originally 22 items, this measure now comprises a 20-item scale used by professionals (typically trained forensic psychologists or psychiatrists) to assess psychopathy, which detects the main traits and behaviors in psychopathy. The total range is from 0 to 40 and typically 30 is the cutoff for diagnosis. The assessment was revised to include an interview and a background file review, if available. The PCL-R (revised) is often divided into a two-factor structure. Factor 1 reflects interpersonal and affective deficits, such as Glibness/superficial charm and lack of remorse, whereas Factor 2 reflects socially deviant behaviors, such as the need for stimulation and poor behavioral controls (Archer & Wheeler, 2013). This structure laid the groundwork for the bi-dimensional characteristics of many of psychopathic scales like the Self-Report Psychopathy Scale (SRP) and the Levenson Self-Report Psychopathy Scale (LSRP). Eventually, psychopathy became characterized by three main traits: interpersonal features, which incorporate manipulative and narcissistic qualities; affective traits, which incorporate lack of empathy and lack of guilt; and behavioral features, which incorporate qualities of impulsivity and antisocial behaviors ostensibly stemming from it (Pardini *et al.*, 2007).

In 1985, Hare devised the Self-Report Psychopathy Scale: version III (SRP-III; Paulhus, *et al*., in press) as a self-report analog to the PCL-R. This 64-item scale is divided into factor 1 and factor 2. Factor 1 involves Interpersonal facets (manipulativeness, selfishness, and

superficial charm) and Affective facets (Emotional deficiency, no remorse, guilt, and empathy), whereas factor 2 is characterized by lifestyle facets (recklessness, sensation-seeking behavior, and impulsiveness) and antisocial facets (criminal behavior and substance abuse) (Reidy, 2008). Because our data has been extracted from an existing dataset, the SRP along with the LSRP (see below) will not be analyzed as these were the primary foci of the study.

The Levenson Self-Report Psychopathy Scale (LSRP) was also based on the PCL but was created to target nonforensic samples. This is a 26-item self-report scale that is divided into two factors. Factor 1 assesses manipulative, selfish, and callous behaviors. Factor 2 assesses impulsivity and antisocial behaviors (Levenson *et al.*, 1995; Reidy, 2008). The LSRP was also used in the preexisting dataset but will not be analyzed in the current study as it was the primary focus of the original dissertation.

The Triarchic Model of Psychopathy focuses on three main elements that contribute to psychopathy: disinhibition, boldness, and meanness (Patrick *et al.*, 2015). Disinhibition is associated with emotional volatility, irresponsibility, and behavioral restraint. Boldness is associated with emotional stability and resilience, social dominance, and venturesomeness, while meanness is associated with callousness, selfishness, and exploration (Patrick in press, pp. 4).

One of the leading measures is the Psychopathic Personality Inventory (PPI), now revised (PPI-R). The PPI contains 3 higher order factors: Fearless Dominance, Self-Centered Impulsivity, and Coldheartedness. Fearless dominance and self-centered impulsivity are the two main factors of the PPI, therefore coldheartedness is often removed from statistical analyses (Neumann *et al*., 2008). Fearless dominance is defined by fearlessness, social influence, and stress immunity. Self-centered impulsivity incorporates rebellious nonconformity, Machiavellian egocentricity, blame externalization, and lack of planning (Lilienfeld *et al*., 2005).

Coldheartedness encompasses lack of empathy, guilt, and deep-seated social emotions (Berg *et al*., 2015). The PPI will be the primary focus of this study, specifically fearless dominance.

As this thesis covers many of the measures previously addressed but the primary focus is the PPI and Fearless dominance, it must be noted that there are clear relationships between these scales and the PPI. For instance, there is a correlation between Fearless Dominance (PPI-FD) and PCL-R Factor 1 that ranges from .2 to.45. Similarly, PPI-FD shows a high association with factor 1 of the SRP, with a correlation of .53 (Lilienfeld *et al*., 2012). From the Triarchic Model, fearless dominance relates to boldness, self-centered impulsivity to disinhibition, and coldheartedness to meanness, although coldheartedness is more relevant to the absence of emotional sensitivity and empathic concern (Patrick *et al*., 2012). Additionally, fearless dominance is sometimes significantly correlated to Factor 1 of the Levenson Primary and Secondary Psychopathy (LPSP) scale, although the correlation is fairly weak (Levenson *et al*., 1995; Lilienfeld *et al*., 2012).

Multiple studies have demonstrated associations between fearless dominance and reduced fear reactivity. Fear response deficiency is believed to be partially responsible for perseveration errors and other learning deficiencies (Lykken 1957; Schmauk, 1970; Patrick in press, pp. 20). This deficit in fear response is illustrated in startle reflex priming (see above). When observing for priming responses towards aversive and appetitive stimuli, the affect-startle modulation paradigm has been a successful tool for testing this expected deficiency. Within this paradigm, the participant is presented with pleasant, unpleasant (typically aversive), and neutral images as well as noxious stimulus like loud noise or shock (or visual cues about shock or noise). Simultaneously, eyeblink responses are recorded. Participants with high psychopathy scores exhibit smaller blink averages when presented with aversive images and noise probes as

compared to non-aversive or non-threatening responses. When presented with pleasant images, non-psychopathic participants experience smaller blinks compared with neutral stimuli. Studies show that psychopaths show inhibited responses to both pleasant and unpleasant stimuli (Patrick *et al.*, 1993). Specifically, individuals who have higher levels of Factor 1, but not Factor 2, of the PCL-R demonstrate these smaller blink responses and because studies have shown correlations between factor 1 of the PCL-R and PPI-FD, albeit low, it can be assumed that individuals who rate high in PPI-FD might also show these responses. Ultimately, results have indicated that individuals who rated higher in Fearless Dominance exhibited these muted responses compared with those who had higher levels of self-centered impulsivity (Benning, Patrick & Iacono, 2005). Another study using shock and the PPI reported reduced electrodermal response after the presentation of a visual cue indicating shock in individuals who rated high in fearless dominance (López *et al.*, 2013). These studies have demonstrated a correlation with deficits in fear reactivity and perseveration with fearless dominance; therefore, we would expect individuals with higher levels of fearless dominance to exhibit muted fear responses. Due to these interesting findings, our main hypotheses will be based on the effects of fearless dominance on behavior.

Aggression and Psychopathy

One of the central consequences of psychopathy is altered aggression, in this section, we will explore the intertwined relationship between aggression and psychopathy. Aggression was defined by Dollard et al. (1939) as "an act whose goal response is injury to another organism" (Dollard *et al*. 1939, pp. 11). This definition focuses on the intent of the perpetrator. Buss (1961) proposed that aggression had 2 major characteristics: the transmission of noxious stimuli and social interaction, therefore aggression would be defined as the transmission of noxious behavior upon another. Others have offered varying definitions that include different facets of aggression.

Bandura and Berkowitz advanced the inclusion of psychological distress on victims as part of aggression, although Bandura posed that aggression was motivated by goal-driven behavior with the intent of injury, while Berkowitz posed that aggression was a hostile reaction to threatful stimuli (Bandura, 1973; Berkowitz, 1993; Porter & Woodworth, 2006). Bandura also defined aggression in a more social and general sense as "injurious and destructive behavior that is socially defined as aggressive on the basis of a variety of factors, some of which reside in the evaluator rather than the responder" (Bandura, 1973, pp. 8).

There are a few ways to conceptualize aggression: as verbal, physical, direct, indirect, active, and passive. Verbal aggression can be defined as verbal abuse, criticism, rejection, threat or any verbal comment that delivers an aversive response in an interpersonal fashion. Physical aggression, in contrast, can be defined as injurious behavior against another with either the use of a weapon or the body. Physical aggression has two consequences, the removal of a barrier through violence or the infliction of pain. There is a link between psychopathic personality and physical aggression, although further studies are necessary (Reidy *et al.*, 2011). Direct aggression can be defined as either verbal or physical, and directed specifically to a target, where the target is present. Indirect aggression can be defined as verbal or physical aggression directed towards a target, their possessions or loved ones, that is not physically present. Active aggression can be either verbal or physical and occurs when the perpetrator delivers noxious stimuli towards the victim. Passive aggression is often direct, where the perpetrator blocks the behavior of the victim and the presence of the perpetrator is often considered aversive (Buss, 1961).

Anger and hostility are also important components of aggression. Anger is associated with an autonomic physiological response as well as facial and postural changes. Facial and postural changes can be seen mostly in children during temper tantrums, although they tend to be

more inhibited in adults. Autonomic responses are characterized by elevated pulse, respiration rate, blood pressure, and so on. Due to this increased state of arousal, many consider anger a drive state. Anger tends to intensify aggression and is seen as one of the drive states that motivates aggression (Buss, 1961). Hostility, in contrast, is expressed as a negative evaluation of people and events. It is usually accompanied by the desire to cause harm and is often implicit. It is considered a combination of feelings of anger, disgust, resentment, and indignation (Kaufman, 1970; Barefoot, 1992). While hostility is seen in aggression, aggression is not necessary for hostility and hostility is not necessary for aggression (Buss, 1961).

Other research from Vaillancourt and Sunderani (2011) found a strong correlation between high affective, interpersonal psychopathic traits and indirect aggression. Other studies have demonstrated that psychopathy scores from the PCL-R were robust predictors of aggressive behavior in inpatient adolescents (Stafford & Cornell, 2003). As we will see, researchers have shown that high-psychopathic individuals are more likely to commit proactive aggression than individuals with low levels of psychopathy (Williamson *et al.*, 1987).

Barratt (1991) devised a 2-factor model for assessing aggression, Barratt initially observed three different types of aggression: impulsive aggression, premeditated aggression, and psychopathology/medically-related aggression which would be removed from the two-factor model. Impulsive aggression was defined as impulsive, spontaneous aggression with a lack of self-control, guilt, and behaviorally uncontrolled responses to provocation. Premeditated aggression was defined by planned aggression, with goal-driven incentives of financial reward or dominance. Psychopathology/medically-related aggression was agitation based on a mental health problem or injury (Douglas, 2010; Barratt, 1991). Long, Felton, Lilienfeld, and Lejuez found that fearless dominance was positively correlated with premeditated aggression but not

impulsive aggression. They also found self-centered impulsivity (PPI-SCI) to be positively correlated with impulsive and premeditated aggression while coldheartedness (PPI-CH) was not significantly related to either factor (Long *et al.*, 2014).

Another 2-factor model for aggression, constructed by Kingsbury et al (1997), focused on hostile and instrumental aggression. The authors defined hostile aggression as increased arousal and angry behavior based on affective rage and frustration. They also described instrumental aggression as a goal-driven, incentive-based aggression with expected reward. Kingsbury et al. hypothesized that these two types of aggression were positively correlated (Kingsbury *et al.*, 1997; Douglas, 2010). Similarly, Reidy et al. examined the relationship between hostile and instrumental aggression and the LSRP. Findings demonstrated that interpersonal and detachment facets (factor 1) were related to both hostile and instrumental aggression. In contrast, antisocial and lifestyle facets (factor 2) were related to hostile aggression only (Reidy *et al.*, 2007).

Dodge and Coie (1987) created the 2-factor aggression model of proactive and reactive aggression, which was initially used for young children. Proactive aggression was determined by any aggressive behavior that was driven by a perceived anticipated reward. Reactive aggression was addressed as any aggressive behavior that was a direct response to a perceived threat (Dodge & Coie, 1987; Douglas, 2010). Reidy, Shelley-Tremblay, and Lilienfeld (2011) found strong evidence for a relationship between psychopathic personality and instrumental violence, and provisional evidence that protective factors serve against reactive aggression (Reidy *et al.*, 2011). From the proactive and reactive models arose the Reactive-Proactive Aggression Questionnaire (RPQ), which assesses antisocial, psychological and personality measures in adolescents.

Emotional Processing and Psychopathy

It has been understood that psychopathy is associated with emotional shallowing, and its characteristics include callousness, lack of guilt, remorse, and empathy. (Hare, 1991). Other research has indicated that individuals with high levels of psychopathic traits have demonstrated affective empathy dysfunction for sad and fearful emotions (Blair, 1995). Additionally, some studies have demonstrated that the emotional deficits seen in these individuals are more pervasive than verbal deficits in sadness and fear. Dawel et al. (2012) conducted a meta-analysis that tested 6 emotions: happiness, sadness, disgust, fear, anger, and surprise against 3 different modalities: vocal, facial and postural to determine the trajectory of this deficit. The data demonstrated that there were deficiencies across emotions for both children and adult subjects that transcended the vocal and facial modalities (Dawel *et al.*, 2012). Although Blair described a clear distinction between cognitive (Theory of Mind) empathy and emotional empathy; he described cognitive empathy as "used to apply to situations where the individual represents the internal mental state of another individual" and emotional empathy as a motivated response for rewarding and aversive stimuli. Blair clarified that psychopaths only show impairments in emotional empathy but not cognitive empathy (Blair, 2008b, pp. 159). Williamson, Harpur, and Hare (1991) studied abnormal emotional processing in the verbal modality with the lexical decision task and event-related potentials[1]. In the lexical decision-making task, participants are presented with either a word (emotional or neutral) or a nonword and are asked to press a button indicating if the string of letters is a word. The amount of time it takes the participant to respond is recorded. In this task, findings show a shorter response time in identifying a word versus a nonword if the word presented is emotional. The findings of the study by Williamson et al. showed that for psychopathic individuals, this emotional facilitation is not present or weakened

[1] Event-related potentials in the general population shows larger amplitudes when presented with affective verbal material (Williamson *et al*, 1991)

and there is no increase in the amplitude of event-related potentials (Williamson *et al.*, 1991). Intrator et al. also demonstrated that while processing emotional words, high-psychopathic individuals showed aberrant PET scan activation (Intrator *et al.*, 1997).

Another characteristic attributed to psychopathy is trait inhibition (otherwise called externalizing liability). Many studies have found significant interconnections between cognitive control and emotional processing (Blair *et al.*, 2007; Pessoa *et al.*, 2002). These interconnections are present in participants engaged in demanding cognitive tasks. Higher-order cognitive activation, in populations low on psychopathy, shows inhibitory effects on emotional activation in the brain as well as physiological and behavioral responses to emotional stimuli; in psychopathy, however, we do not see this inhibition. These findings are exhibited in inhibitory control task such as antisaccade, Stroop interferences, and stop signal task (Young *et al.*, 2009). Similarly, emotionally laden situations have the potential to alter the intensity of cognitive processing and inhibitory control. In psychopathy, we see a correlation between factor 2, impulsive-antisocial facets, and abnormal inhibition during cognitive control (Morgan & Lilienfeld, 2000). Verona et al., gathered psychopaths and individuals diagnosed with Antisocial Personality Disorder (APD) and tested for these inhibitory anomalies in a Go/No-Go with ERPs and found that high-psychopathic individuals showed no difference in task performance for neutral or emotional words in the Go/No-Go task (Verona *et al.*, 2012). Evidence has shown that people with psychopathic personality also have reduced amplitude of P3 response to stimuli in tasks like the choice-feedback, visual oddball, picture/startle and visual oddball tasks (Patrick *et al*, 2005; Nelson *et al*., 2011; Perkins *et al*., 2017; Patrick *et al*., 2013; Patrick in press, pp.13).

As previously discussed, one also observes emotional impairments in the form of reduced fear reactivity as seen from startle reflex modulation studies (see “Psychopathy: Biological

Basis"). While some studies have reported deficits in sadness and fearfulness, others have found deficits in anxiety and other processes. A study by Levenston, Patrick, Bradley, and Lang tested affect-startle modulation in psychopathic subjects using the International Affective Picture System (IAPS). The IAPS is used to investigate attention and emotion. Participants are presented with a series of images and are asked to rate their valence and arousal towards the images presented. Criteria for these image selections include a large sample of emotional content, a clarity of what is presented in the image with easy resolutions and a clear, simple storyline (for example, this image is clearly about two men fighting over a woman), and the image must be in color (Lang *et al.*, 2005). Findings from the Levenston study revealed inhibited startle reflex to images of victim crime scenes for psychopathic personality. Additionally, findings showed higher rates of blink inhibition, higher rates of attention, and milder ratings of fear (Levenston *et al.*, 2000). Another study by Serafim et al. tested the emotional response of forensic psychopaths to IAPS images. Results demonstrated lower levels of anxiety and reduced variation in heart rate for this group (Serafim *et al*., 2009).

Dissertation

Dr. Dennis Reidy, the author of the study at hand, addressed certain predictions about psychopathy by exploring the relationship between unprovoked aggression and emotional processing. Psychopathy measures were subdivided into factor 1 and factor 2 of the SRP. Factor 1 is marked by shallowness, lack of remorse, the absence of empathy, lack of shame, manipulation, charm, grandiosity, lying, and low anxiety. Factor 2, in contrast, is marked by more antisocial qualities like impulsivity, substance abuse, aggression, high sensation seeking, low socialization, irresponsibility, proneness to boredom, lack of concern for the future, early childhood problems with behavior and low motivation (Reidy, 2008). The author assessed the

correlations between factor 1 and unprovoked aggression, sadism, and emotional processing in terms of happiness and sadness affiliation in association to violence. The participants filled out a series of assessments: the Self-Report Psychopathy Scale: Version III (SRP-III), the Levenson Self-Report Psychopathy Scales (LSRP), the Psychopathy Personality Inventory (PPI), the Positive and Negative Affective Schedule (PANAS), the Buss Aggression Questionnaire (BAQ), the Reactive-Proactive Aggression Questionnaire (RPQ), the Response Choice Aggression Paradigm (RCAP), the Behavioral Inhibition/Behavioral Activation Scales (BIS/BAS) among other assessments were evaluated. Other tasks were also administered : the lexical decision task in which participants were shown a screen with either words or nonwords and they were asked to identify whether the words provided were English words, a visual stimuli task was given to determine valence and arousal from a series of violent images, and a shock task was used to determine levels of unprovoked aggression, provoked aggression, and inhibited aggression (Reidy, 2008). Because this dataset neglected to explore all the correlations related to its multiple questionnaires, it contains a wealth of untapped data that the Lilienfeld lab is exploring. In this study, I will focus on the relations among the PPI, particularly fearless dominance, on the one hand, and emotional processing and aggression, on the other.

Hypotheses

In this study, I investigate the PPI and more specifically the subdimension of fearless dominance, or boldness. Fearless dominance has been linked to social potency, venturesomeness, and immunity to social discomfort (Lilienfeld et al, 2012), as well as fearlessness and resistance to stress. Higher psychopathy, principally the traits reflected in the fearless dominance factor, are predicted to be correlates of abnormal responses to pain, aggression, and emotional processing.

1. Following the findings of Sellbom et al., who found significant correlations between PPI-FD and the MMPI-2 Aggressiveness scale, and correlations with clinically rated aggression and features from ASPD (Sellbom *et al.*, 2005; Sellbom *et al.*, 2011), I predict overall levels of aggression will be higher for individuals who are higher in PPI-FD. Therefore, I expect to see correlations with flashpoint latency (FP; the number of trials before the first shock is administered), flashpoint intensity (FPI; the intensity of the first shock), flashpoint duration (FPD; shock time duration of the first shock), and shock frequency (SF; the number of times shock was administered) from the RCAP paradigm because these four indices reflect the magnitude of aggressive responding (Zeichner *et al.*, 1999).
2. Because previous data on behavioral tasks have demonstrated that higher PPI-FD is associated with deficits in fear reactivity and the findings from Miller et al. (2014) showed that psychopathic traits are associated with measures of pain tolerance, I predict that reduced fear reactivity will be related to an increased pain tolerance towards shock because decreased fear will minimize the perception of pain (Lykken 1957; Patrick in press, pp. 20; Miller *et al.*, 2014; Schmauk, 1970).
3. Consistent with the findings of Hicks and Patrick, Fearless Dominance (in correlation with PCL-R Factor 1) is unrelated to anger-hostility (Hicks & Patrick, 2006). Therefore, the BAQ variables of anger and hostility should be unrelated to fearless dominance. On the other hand, a study by Edens et al. showed modest associations between fearless dominance and verbal and physical infractions, therefore I predict moderate correlations with verbal and physical aggression.

4. Based on the findings of Kimonis et al, fearless dominance is correlated only .10 with the ICU; therefore, I do not expect FD to be significantly related to the ICU or its subdimensions (Kimonis *et al*., 2013).
5. Consistent with the findings of Williamson et al., 1987; Long et al., 2014; Reidy et al., 2011, I predict that fearless dominance will be positively related to proactive aggression.
6. Similar to the findings from Benning et al., who found individuals with high PPI-FD showed decreased skin conductance reactions to aversive images, I hypothesize that individuals with high levels of fearless dominance will show higher valence and lower arousal ratings towards aversive images from the IAPS (Benning *et al*., 2005).
7. Consistent with literature on emotional processing (Hare, 1991; Blair, 1995; Dawel *et al*., 2012; Williamson *et al*., 1991; Intrator *et al*; 1997), I predict that fearless dominance will be linked to impaired facilitation of emotion, specifically fear and sadness, in the lexical decision-making task.
8. As demonstrated in previous studies, psychopathy correlates with deficits in emotional processing in the form of fear reactivity, shallow affect, and trait disinhibition (Hare, 1991; Blair, 1995; Nelson *et al*., 2011; Patrick in press, pp.13; Patrick *et al.*, 2005; Perkins *et al*., 2017; Patrick *et al*., 2013; Williamson et al., 1991). Fear reactivity deficiencies are associated with perseveration errors (Lykken 1957; Patrick in press, pp. 20; Schmauk, 1970), shallow affect, in empathy, relates to limited effects in conditioning using punishment to suppress negative behavior (Gough 1960, pp. 23-30; Lykken 1995), and trait disinhibition relates to failure to associate events to response outcomes (either goals or consequences) (Patterson & Newman, 1993). These impairments are all associated with poor impulse control, a common feature of aggression. Therefore, I predict that these emotional deficits will be mediators

between psychopathy and RCAP-related aggression. Because these emotional deficits are often found in the lexical decision task, I expect to find correlations between LDT impairments and RCAP levels of aggression.

METHODS

The participants were gathered from a Ph.D. dissertation by Dr. Dennis Reidy of the University of Georgia (UGA) in 2008.

Participants were protected in accordance with UGA IRB protocol. When preparing for the shock paradigm, the individual pain threshold for each participant was evaluated to guarantee that the participant was not experiencing more pain than he could tolerate. Although deception was involved in the study (see below), participants were immediately debriefed after the task was completed. Participants could terminate their role at any point within the study and any participant experiencing distress was referred to a mental health provider.

Participants

One hundred and sixty-six males were recruited from the University of Georgia. From the sampled data, the average age was 19.2, the average years of education were 14.3(1.3) years. In terms of ethnicity, 81.3% of participants were Caucasian, 7.2% identified as Asian, 6% identified as Black/African-American, 1.2% identified as Hispanic/Latino, and 4.2% as some other ethnicity. The majority of participants had an average family income of $70,000+ and all participants were given partial class credit for taking part in the study. Women were excluded from the study because men typically exhibit more psychopathic personality traits compared to women (Dolan & Völlm, 2009; Levenson *et al*., 1995; Lilienfeld and Andrews, 1996). Overall,

29 participants were removed from the dataset due to withdrawal after day one, computer error, fear of shock, or lack of deception in the shock paradigm.

Experimental Design

The main focus of our study was to assess the relationships between the Fearless Dominant subdimension of the Psychopathic Personality Inventory (PPI-FD) and generalized aggression, as well as the potential mediation of emotional processing via the lexical decision-making task (LDT) on aggression. We examined the interrelations among fearless dominance, emotional impairment in relation to the lexical decision task, and the responses presented in the RCAP shock paradigm. All variables were treated as continuous. Degree of psychopathy was assessed using the short form of the Psychopathic Personality Inventory (PPI; Lilienfeld, 2005), SRP and LSRP results were omitted as they were the primary variables observed in the original manuscript. Affect activation was established using the lexical decision-making task as well as the Positive and Negative Affective Schedule (PANAS: Watson, Clarke & Tellegen, 1988).

Materials

Demographic Form: Each participant completed a demographic survey that gathered their race, age, level of education, and yearly income to observe for confounding variables.

Psychopathic Personality Inventory-Short form (PPI; Cale & Lilienfeld, 2006; Lilienfeld, 1990). The PPI-short form is a 56-item questionnaire that measures the characteristic traits of psychopathy. Because the PPI observes the continuous, dimensional aspect of psychopathy, it can be used in both forensic[2] or nonforensic[3] samples. Individuals respond to questions on a 4-

[2] Clinical or incarcerated population samples

[3] Nonclinical general population samples. often college students.

point Likert scale (1= false, 2=mostly false, 3=mostly true, 4=true) that address 3 higher order factors: Fearless Dominance, Self-Centered Impulsivity, and Coldheartedness (Neumann *et al*, 2008). The total scale score is composed of eight subscales: 1. Social Potency, 2. Coldheartedness, 3. Fearlessness, 4. Impulsive Nonconformity, 5. Stress Immunity, 6. Machiavellian Egocentricity, 7. Blame Externalization, and 8. Carefree Nonplanfulness (Lilienfeld &Andrews, 1996). Cronbach's α for reliability statistics was .805.

Reactive-Proactive Aggression Questionnaire (RPQ). This is a 23-item self-report assessment that observes proactive (12 questions) and reactive (11 questions) aggression. Each Item is rated 0 (never), 1 (sometimes), or 2 (often) (Raine *et al.*, 2006). The reliability statistic alpha for proactive aggression was .826 and the alpha for reactive aggression was .818. The total RPQ aggression alpha was .887.

Buss Aggression Questionnaire (BAQ). The BAQ is a 29-item self-report scale that is divided into four subdimensions: Verbal aggression, physical aggression, anger, and hostility. Each participant was asked to rate items as either 1 (extremely uncharacteristic of me) to 5 (extremely characteristic of me) (Buss & Perry, 1992). Cronbach's alpha for the BAQ was .91.

Inventory of Callous and Unemotional Traits (ICU). The ICU is a 24-item self-report scale that is divided into four subsections: Careless, callous, unemotional and uncaring. In this study, the Careless subsection was omitted. When presented with each item, the participant is asked to rate each item using a four-point Likert scale of 0 (Not at all true) to 3 (Definitely true) (Kimonis *et al*., 2008). The Cronbach's alpha for reliability in the ICU for this sample is .772.

International Affective Picture System (IAPS). Participants were instructed to inspect 10 violent images in which an aggressor was inflicting physical harm upon another, after, the

participant was asked to rate the valence of the photograph and then rate the victim's level of arousal (Lang *et al.*, 2005). Valence was rated on a -4 to 4 scale as a positive or negative reaction to the imagery presented. Arousal was rated on a 0 to 10 scale of how much pain the participant perceived the victim to be experiencing in the image.

Lexical Decision-Making Task (LDT). In the lexical decision-making task, a participant is seated in front of a computer screen and is presented with two keys for "words" or "nonwords." The participant is told to focus on a fixation point and when the time comes, a word will be presented on the screen. The participant is instructed to ascertain whether the word is an English word or a pseudoword. After they have made their decision on the word presented, they are instructed to press either the "word" or "nonword" button as soon as possible; response times are recorded. There are 10 initial mock trials in which the participant can become familiar with the procedure. The fixation point is presented, 500 ms later, a word or nonword appears and the participant responds; after 3000 ms, if the participants have not responded, the next intermittent 200 ms break begins before the next word is presented. Also, any participants who responded before 350 ms and after 1000 ms was removed from the analysis (n=2). Nevertheless, because there were no significant outcome differences before and after omitting these outliers, analyses were reconducted with them included to increase statistical power.

From the emotional words presented, each word represents happiness, sadness, anger, fear, or disgust. The number of neutral words provided was equivalent to the number of emotional words and word length remained constant throughout words. (Grant & Logan, 1993).

Response Choice Aggression Paradigm (RCAP). This paradigm is used to measure physical aggression and has been a valid measure for examining the role of aggression in psychopathy (Reidy *et al*, 2007). Thirty timed reaction trials are arranged, in which a participant

can shock his or her opponent and will also receive a shock. The participants can control the intensity of the shock he or she administers from a scale of 1 to 10. Shocks are administered from electrodes attached to two fingers on the non-dominant hand. In this study, subjective pain threshold assessments were performed on the participants to verify that the shock administered was not intolerable.

There are 7 indices that address aggressive behavior within the shock paradigm. The first is shock intensity (SI), which is the mean shock intensity that the participants administers. The second is shock duration (SD), the mean shock-time duration for trials at which the participant administers a shock (indirect aggression). The third is provocation of highest shock (P10), which is the number of times the participant uses the highest shock available relative to all shock trials. Fourth is flashpoint latency (FP), the number of trials that expire before participant administers the first shock. Flashpoint intensity (FPI) is the intensity of the first shock administered. Flashpoint duration (FPD) is the shock time duration of the first shock. Finally, shock frequency (SF) is the number of trials in which a shock was administered. Indices 4 through 7 indicate the ability to refrain from responding aggressively but also reflect the magnitude of aggressive responding (Zeichner *et al.*, 1999).

Procedure

Testing stretched across two days; the first day was focused on self-report assessments and emotional processing reports, and the second day was focused on the shock paradigm.

Day 1: Participants provided consent and were then debriefed on the purpose of the study. Then, a series of measures were administered, which were followed by the IAPS visual

task. After the IAPS, subjects were asked to complete the lexical decision-making task. This concluded day one.

Day 2: Participants were instructed to enter a different lab with different experimenters, this was done to limit confounding variables from possible experimenter bias or to limit participants from attempting to impress male experimenters with higher levels of pain tolerance. To prepare for the shock paradigm, subjects were deceived into believing that they were competing in a timed reaction task against a male opponent located in a different room. No such opponent was present. The subject was informed that when they were presented with a green light, they had the option of administering a shock to the opponent within a timed trial. Whoever reacted the fastest to the green light cue was the winner of the trial, although the subject was informed that he was under no obligation to administer a shock. All participants were video recorded all throughout the experiment to measure behavioral responses. The participant was provided with (bogus) auditory feedback of the reaction elicited by the "opponent" after shock administration. This auditory feedback was automated by a computer to enhance deception. After the task was completed, the subject was asked a series of questions to ascertain if deception was successful. They were asked such questions as "How did you feel about administering shock?" and "Did you recognize the voice of your opponent as someone you know?" Afterward, all participants were thoroughly debriefed on the experiment and were provided partial course credit.

RESULTS

Psychopathy and RCAP variables

To determine if fearless dominance was associated with higher levels of aggression in the shock paradigm, bivariate analyses were conducted, whereby the dataset was imputed into 5 groups to account for missing data and the pooled samples were compared between the PPI and the RCAP variables. Two-tailed tests were used for all analyses. Results demonstrated no significant correlations between fearless dominance and any of the RCAP variables. Interestingly, self-centered impulsivity (PPI-SCI) displayed a significant correlation to shock frequency (SF; Pearson r =.184). Additionally, although not predicted, PPI-SCI displayed significant correlation to flashpoint latency (FP; Pearson r = -.243). Coldheartedness (PPI-CH) was not significantly correlated to any of the RCAP variables. (see Appendix A, table 1).

Fearless Dominance and Pain Tolerance

To determine whether the studies by Lykken, Schmauk, and Patrick on fear reactivity in Fearless Dominance affects the perception of pain, as well as pain tolerance, correlational analyses were again conducted using pooled imputations. The data showed that there was a significant positive correlation with a Pearson r-value of .289 between Fearless Dominance and max pain threshold. Therefore, the higher the levels of fearless dominance, the higher the pain threshold. There were no other significant correlations between Self-Centered Impulsivity or Coldheartedness against low or high thresholds of pain (see Appendix A, table 2).

Fearless Dominance and the Buss Aggression Questionnaire

Next, I examined whether the BAQ subscales for hostility and anger were nonsignificantly related to fearless dominance, as reported by Hicks and Patrick (2006). Analyses also focused on the associations between the PPI and the verbal and physical aggression subsections of the BAQ. Findings showed that, as expected, there were moderate

correlations between fearless dominance and verbal and physical aggression. Verbal aggression exhibited a significant positive Pearson correlation of r=.207 with PPI-FD and physical aggression had a significant Pearson correlation of r=.247 with PPI-FD. In terms of anger, as expected, there were no significant correlations but unexpectedly, there was a significant negative correlation of r=.221 between PPI-FD and hostility. Although not predicted, PPI-SCI was significantly correlated to all subscales of the BAQ, with a Pearson correlation of r=.339 to physical aggression, r=.291 to verbal aggression, r=.32 to anger, and r=.392 to hostility. Coldheartedness was not significantly related to any of the subsections of the BAQ (see Appendix A, table 3).

Fearless Dominance and the Inventory of Callous and Unemotional Traits

Next, I examined the relations between PPI subdimensions and those of the ICU. For PPI-FD, there were no significant correlations between callousness and uncaring subfactors. but contrary to my hypothesis, there was a significant negative correlation between PPI-FD and ICU unemotionality (Pearson r = -.208). Although not predicted, PPI-SCI was significantly positively correlated with uncaringness (Pearson r = .45) and callousness (Pearson r = .403), with no significant correlations with unemotionality. PPI-CH was not significantly related to any of the ICU variables (see Appendix A, table 4).

Fearless Dominance and the Reactive-Proactive Aggression Questionnaire

To test my hypothesis that fearless dominance is associated with proactive aggression, we conducted correlational analyses. From the pooled sample, Fearless Dominance was significantly positively related to both proactive and reactive aggression with a Pearson r-value of .165 for reactive and .158 for proactive aggression. Additionally, while not predicted, Self-Centered

Impulsivity was also significantly positively related to both reactive and proactive aggression with a Pearson r-value of .287 for reactive and .42 for proactive aggression (see Appendix A, table 5).

Fearless Dominance and International Affective Picture System

Based on the findings of Benning et al (2005), showing decreased physical responses to aversive images among a young adult male community sample, we tested whether fearless dominance affects valence and arousal ratings. In contrast to my hypothesis, there were no significant correlations between PPI-FD and self-valence (valence) or the perception of pain in others (arousal) from the IAPS. Significant correlations emerged between PPI-SCI and self-valence with a Pearson r of .256 and a significant negative correlation with a Pearson r of .208 between PPI-SCI and perception of pain in others. There were no significant correlations between coldheartedness and any of the subdimensions of the IAPS (see Appendix A, Table 6).

Fearless Dominance and the Lexical Decision Task

To test the hypothesis that fearless dominance is related to impairments in fear and sadness facilitation in the lexical decision-making task, emotional words were subtracted from neutral words to isolate the level of facilitation and remove variance, thereby standardizing the findings. The results were correlated to the subfactors of the PPI, and as expected, there was a negative correlation (Pearson r = -.166) between fearless dominance and fear words. Although not predicted, there was also a negative correlation (Pearson r = -.235) between PPI-FD and disgust words. There were no impairments in any of the other emotional words, contrary to the conclusions of Williamson, Harper, and Hare (1991) who found global impairments in emotional

facilitation for the LDT. In contrast, there were no significant correlations between PPI-SCI or PPI-CH and the emotional words from the LDT (see Appendix A, table 7).

Emotional Processing as a Mediator of the Link Between Psychopathy and Aggression

Bivariate correlations were performed between normalized emotions of the LDT and variables of the RCAP shock paradigm. The variables observed were flashpoint latency (FP), flashpoint intensity (FPI), flashpoint duration (FPD), and shock frequency (SF) because these variables reflect levels of aggression. Contrary to predictions, none of the emotional minus neutral responses correlated with any of the 4 perceived RCAP measures of response aggression. There was one positive correlation between sadness and the P10, the number of times that participants used the highest shock available relative to other trials. This finding provisionally suggests that less sadness facilitation, identified by a slower reaction time relative to a neutral word, is associated with an increase in the number of times where the participants administered maximum shock. Because of the lack of consistent significant associations between fearless dominance and shock variables, the conditions for mediation – which require significant associations among all variables in the equation (Baron & Kenny, 1986) – were not satisfied. Hence, mediational analyses were not conducted.

DISCUSSION

The impetus for the study was to replicate and extend the existing literature of psychopathy as it relates to emotional processing and aggression. We placed particular emphasis on fearless dominance and its implications for aggression and altered emotion. We also evaluated whether emotion processing mediates the relations between psychopathy and shock-related aggression by using lexical decision-making as a provisional mediator.

Aggression Findings

Although Miller and Lynam (2012) posited that fearless dominance is not correlated with aggression and in fact is protective against aggression, this research, as well as the findings from Lilienfeld et al (2012) and Sellbom (2005, 2011), support my hypotheses that fearless dominance is associated to higher levels of at least self-report aggression. Consistent with the findings of Edens et al., we observed moderate positive correlations between Fearless Dominance and both physical and verbal aggression. We also observed a negative correlation between Fearless Dominance and hostility in the BAQ. This finding could imply fearless dominance as a protective measure against hostile aggression. This result makes sense given that hostility relates to feelings of disgust (Kaufman, 1970; Barefoot, 1992), and Fearless Dominance displayed relations with disgust impairments in this study. Because Fearless Dominance is not associated with anger and callous behavior, our findings demonstrated that Fearless Dominance was not correlated to callous or uncaring factors of the ICU but was negatively correlated to unemotionality. This finding might suggest that fearless dominance could be protective against unemotionality. Moreover, similar to the findings of Williamson et al., 1987; Long et al., 2014; Reidy et al., 2011, and my predictions, there was a significant positive correlation between Fearless Dominance and proactive aggression. There was also a significant positive correlation between Fearless Dominance and reactive aggression, implying overall increases in aggression responses with higher levels of fearless dominance. An unexpected result was the absence of significant correlations between fearless dominance and any of the 7 indices from the RCAP paradigm, perhaps reflecting the low ecological validity of the latter. These negative results precluded the use of mediational analyses.

Emotion Processing Findings

Emotional deficits have long been posited to be fundamental impairments in psychopathy. Reduced fear reactivity, trait disinhibition, and shallow affect are well documented among individuals with psychopathic personality (Blair, 1995; Hare, 1991; Nelson et al., 2011; Patrick et al, 2005; Patrick et al., 2013; Patrick in press, pp.13; Perkins et al., 2017; Williamson et al., 1991). Because reduced fear reactivity is related to fearless dominance (Benning, Patrick & Iacono, 2005; López et al., 2013), I expected similar results. This hypothesis was confirmed in that fearless dominance was significantly negatively correlated with impairments of fear and disgust words in the lexical decision-making task. Although I did not advance a prediction for disgust words, this word impairment is notable because few labs have studied disgust facilitation. Although some researchers have found correlations between psychopathy dimensions, such as callous/unemotional traits, and disgust (Kosson, Suchy, Mayer, & Libby, 2002; Sylvers, Brennan, & Lilienfeld, 2009), more research is necessary to understand disgust impairments in psychopathy. Intriguingly, there were no significant findings for sadness words, and although some studies have found general deficits in total emotion (Hastings, Tangney, & Stuewig, 2008; Williamson, Harper & Hare 1991), emotional impairments in psychopathy may be restricted to certain emotions, such as fear and perhaps disgust. Also, because individuals with higher levels of psychopathy tend to show shallow affect and decreased fear reactivity, we expected deficiencies in the perception of pain of others. Nevertheless, the findings demonstrated that Fearless Dominance did not show any impairments in the perception of pain of others (arousal) or self-valence within the IAPS.

The fear reactivity impairments, commonly found in individuals with high levels of Fearless Dominance, were hypothesized to be related to altered pain tolerance within the shock paradigm. As predicted, fearless dominance was positively correlated with maximum pain

tolerance. This finding is important because it suggests that fearless dominance may enhance the pain threshold, probably because this threshold in part reflects people's willingness to tolerate stimuli that most people find to be threatening.

Emotion Processing as a Mediator

The preliminary analyses preceding mediation investigations showed no support for the interaction between emotion processing and aggression. When I observed the findings from the RCAP variables compared with the LDT variables, there were no significant correlations (see Appendix A, table 8). The only significant result found in the study was the positive correlation between sadness minus neutral and P10. This finding is interesting because increases in reaction times for sad words relative to neutral, or decreases in sadness facilitation, is a characteristic commonly found in individuals who have higher levels of psychopathy. Therefore, impairments in sadness facilitation are associated with more maximal aggression when administering shock. While this finding is provisionally compelling, there does not appear to be enough data to confirm emotional processing is a mediator between psychopathy and RCAP levels of aggression. For this model to hold, there would have to be significant correlations between each factor of the model, thus emotional processing variables (LDT), aggression variables (RCAP), and psychopathy variables (PPI) would all have to be correlated with one another to proceed. Because there were no significant correlations between the LDT variables and the RCAP variables of response aggression, we saw no further reason to run mediation analyses and partial correlations.

Future Directions

Further directions for this research could be to modify the RCAP paradigm. Although the RCAP was meant to improve upon the Taylor Competitive Reaction Time Task (TCRTT) given that the TCRTT did not contain a nonaggressive response option, fundamental issues with this paradigm remain. For example, any person who administers a shock before they themselves have been shocked is considered an unprovoked aggressor, although the paradigm instructions already inform participants that this is a competition. Consequently, the participant is aware that he or she will be shocked and might want to be prepared to retaliate accordingly. With funding, I would like to devise a paradigm void of these errors.

In addition, the LDT is an indirect measure of emotional facilitation. Because the task focuses on the distinction between words versus nonwords, it might not be as accurate in assessing emotional processing. Hence, in future work, it may be useful to supplement the LDT with assessments like the Emotion Recognition Task (ERT), in which video clips of facial expressions are presented to subjects to measure recognition of basic emotions (Montagne *et al*., 2007), or watching emotional videos and recording skin conductance responses as a measure of emotional arousal. Another method to gather emotional processing data could be to show participants emotionally laden images while simultaneously putting them under an fMRI scanner to see changes in brain activity.

Another potential direction for this research could be to make the study a longitudinal study. Longitudinal studies are more successful at capturing changes over time, which could be beneficial in determining long-term characteristics of aggressive and emotional alterations from levels of fearless dominance.

Limitations

This study was marked by several limitations. First, the analyses were constrained by a relatively small sample size, a function of our use of a pre-existing dataset. Furthermore, our sample was homogeneous in that all the participants were males who came from broadly similar economic backgrounds, similar age ranges, and education levels with limited ethnic diversity. As a result, the generalizability of the results requires further examination. Future studies could address these issues by expanding the study to a general population, exploring different countries and cultures, and including women. Additionally, clinically pathological samples were not collected, thereby limiting the range of psychopathy scores, especially at the high end of the distribution. Thus, the study would also benefit from the inclusion of a forensic sample to expand the range of psychopathic scores, as the scores gathered were fairly low within this restricted college population.

Further, the PPI Coldheartedness scale did not display many of the expected correlations seen in previous studies. For example, a study by Kimonis et al. (2013) demonstrated that Coldheartedness exhibited a correlation of .51 with total ICU, .56 with uncaring, .18 with unemotional, and .32 with callous but there were no significant correlations with the ICU in this study. The reason for this could be associated with the use of the short form of the PPI, which omits a number of questions relevant to the Coldheartedness construct. Also, a study by Kastner, Sellbom and Lilienfeld (2012) showed that Coldheartedness (as well as 3 other subscales) did not meet the criteria for satisfactory internal consistency in the short form compared with the full, 156-item version (Kastner, Sellbom & Lilienfeld, 2012).

Another potential limitation is reliance on self-report scales. There are several fundamental shortcomings of self-report scales. For example, psychopathic participants may be more inclined to lie than other participants, especially about maladaptive characteristics. In

addition, psychopathic individuals often experience anosognosia (lack of insight) into their psychopathology (Lilienfeld, 1994). Furthermore, this study did not use informant reports in conjunction with self-report scales to increase the reliability and validity of the results. Balsis, Cooper, and Oltmanns (2016) examined the validity of informant reports and how they compared with self-report scales. Their results indicated that informant reports had higher average interitem correlations and higher Cronbach's α scores when compared to self-report, therefore informant reports had greater internal consistency (Balsis *et al*., 2016), and if used, they could have addressed many of the limitations associated to self-report scales in this study.

Additional limitations include laboratory paradigms, such as the RCAP, that are not representative of real-life scenarios. Also, this study is correlational and does not allow for causal inferences, therefore we cannot establish causality.

In summary, because there is controversy surrounding the relationship between fearless dominance and psychopathy (Miller & Lynam, 2012), this study demonstrates that fearless dominance is linked to impaired fear reactivity and that FD is a valid predictor of pain, self-report aggression, and certain emotional responses potentially relevant to psychopathy. Although emotional processing did not operate as a mediator between psychopathy and aggression, future research should explore this hypothesis by administering measures that may better mirror real-world emotions and aggressive behavior.

References

Archer, R. P., & Wheeler, E. M. (2013). Forensic uses of clinical assessment instruments. New York: Routledge, Taylor & francis Group.

Arias-Carrión, Oscar et al. "Dopaminergic Reward System: A Short Integrative Review." *International Archives of Medicine 3* (2010): 24. PMC. Web. 3 Mar. 2018.

Balsis, S., Cooper, L. D., & Oltmanns, T. F. (2015). Are informant reports of personality more internally consistent than self reports of personality?. *Assessment*, *22*(4), 399-404.

Bandura, A. (1973*). Aggression: A social learning analysis*. Englewood Cliffs, N. J.: Prentice Hall.

Barefoot, J.C., 1992. Developments in the measurement of hostility. In: Friedman, H.S. (Ed.), Hostility, Coping and Health. American Psychological Association, Washington, DC.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.

Barratt, E. S. (1991). Measuring and predicting aggression within the context of a personality theory. *Journal of Neuropsychiatry*, 3(2), S35-S39.

Benning, S. D., Patrick, C. J., & Iacono, W. G. (2005). Fearlessness and underarousal in psychopathy: Startle blink modulation and electrodermal reactivity in a young adult male community sample. Psychophysiology, 42, 753-762.

Berkowitz, L. (1993). Aggression: Its causes, consequences, and control. New York: McGraw-Hill.

Berg, J. M., Hecht, L. K., Latzman, R. D., & Lilienfeld, S. O. (2015). Examining the correlates of the coldheartedness factor of the Psychopathic Personality Inventory-Revised. Psychological Assessment, 27(4), 1494-1499. doi:10.1037/pas0000129

Blair, R. J. R., Mitchell, D. G. V., Peschardt, K., Colledge, E., Leonard, R. A., Shine, J. H., et al. (2004). Reduced sensitivity to others' fearful expressions in psychopathic individuals. *Personality and Individual Differences*, 37, 1111–1122.

Blair, K. S., Smith, B. W., Mitchell, D. G. V., Morton, J., Vythilingam, M., Pessoa, . . . Blair, R. J. R. (2007). Modulation of emotion by cognition and cognition by emotion. *NeuroImage, 35,* 430–440. doi:10.1016/ j.neuroimage.2006.11.048

Blair, R. J. R. (1995). A cognitive developmental approach to morality: Investigating the psychopath. *Cognition*, 57, 1–29.

Blair, R. J. R. (2007), Dysfunctions of Medial and Lateral Orbitofrontal Cortex in Psychopathy. *Annals of the New York Academy of Sciences*, 1121: 461–479. doi:10.1196/annals.1401.017

Blair, R. (2007). The amygdala and ventromedial prefrontal cortex in morality and psychopathy. Trends in Cognitive Sciences, 11(9), 387-392. doi:10.1016/j.tics.2007.07.003

Blair, R. (2008a). The amygdala and ventromedial prefrontal cortex: functional contributions and dysfunction in psychopathy. Philosophical Transactions of the Royal Society B: Biological Sciences, 363(1503), 2557-2565. doi:10.1098/rstb.2008.0027

Blair, R. J. R. (2008b) Fine cuts of empathy and the amygdala: Dissociable deficits in psychopathy and autism, The Quarterly Journal of Experimental Psychology, 61:1, 157-170, DOI: 10.1080/17470210701508855

Blair, R. J. R. (2010), Psychopathy, frustration, and reactive aggression: The role of ventromedial prefrontal cortex. *British Journal of Psychology*, 101: 383–399. doi:10.1348/000712609X418480

Buckholtz, J. W., Treadway, M. T., Cowan, R. L., Woodward, N. D., Benning, S. D., Li, R., . . . Zald, D. H. (2010). Mesolimbic dopamine reward system hypersensitivity in individuals with psychopathic traits. *Nature Neuroscience*, 13(4), 419-421. doi:10.1038/nn.2510.

Buss, A. H. (1961). *The psychology of aggression*. New York: J. Wiley.

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of personality and social psychology*, *63*(3), 452.

Cale, E. M. & Lilienfeld, S. O. (2006). Psychopathy factors and risk for aggressive behavior: A test of the "threatened egotism" hypothesis. *Law and Human Behavior, 30,* 51-74.

Cleckley, H. M. (1941). *Mask of sanity*. Penguin Books.

Dawel, A., O'Kearney, R., McKone, E., & Palermo, R. (2012). Not just fear and sadness: meta-analytic evidence of pervasive emotion recognition deficits for facial and vocal expressions in psychopathy. *Neuroscience & Biobehavioral Reviews*, *36*(10), 2288-2304.

Dodge, K. A. & Coie, J. D. (1987). Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Personality and Social Psychology*, 53, 1146-1158.

Dollard, J., Doob, L. W., Miller, N. E., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.

Dolan, M., & Völlm, B. (2009). Antisocial personality disorder and psychopathy in women: A literature review on the reliability and validity of assessment instruments. *International Journal of Law and Psychiatry*, 32, 2–9.

Douglas, R. L. (2010). *Instrumental and reactive violence: the role of mental health factors and maltreatment history in the manifestation of violent offending* (Unpublished doctoral dissertation).

Edens, J. F., Marcus, D. K., Lilienfeld, S. O., & Poythress, N. G., Jr. (2006). Psychopathic, not psychopath: Taxometric evidence for the dimensional structure of psychopathy. *Journal of Abnormal Psychology*, 115(1), 131-144.

Edens, J. F., Poythress, N. G., Lilienfeld, S. O., Patrick, C. J., & Test, A. (2008). Further evidence of the divergent correlates of the Psychopathic Personality Inventory factors: Prediction of institutional misconduct among male prisoners. *Psychological assessment*, 20(1), 86.

Giancola, P. R. (1995), Evidence for dorsolateral and orbital prefrontal cortical involvement in the expression of aggressive behavior. Aggr. Behav., 21: 431–450. doi:10.1002/1098-2337(1995)21:6<431::AID-AB2480210604>3.0.CO;2-Q

Goldman-Rakic, P. S. (1996). The prefrontal landscape: Implications of functional architecture for understanding human mentation and the central executive. Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences, 351, 1445-1453.

Gough, H. G. (1960). Theory and measurement of socialization. *Journal of Consulting Psychology, 24*, 23-30.

Grant S. C. & Logan, G. D. (1993). The loss of repetition priming and automaticity over time as a function of degree of initial learning. *Memory & Cognition 21,* 611-618.

Hare, R. D. (1991). *The Hare Psychopathy Checklist-Revised*. North Tonawanda, NY: Multi-Health Systems.

Hare, Robert D. Without Conscience: The Disturbing World of the Psychopaths Among Us. New York, NY: The Guilford Press, 1993.

Hastings, M. E., Tangney, J. P., & Stuewig, J. (2008). Psychopathy and identification of facial expressions of emotion. *Personality and Individual Differences*, 44, 1474–1483

Hicks, B. M., & Patrick, C. J. (2006). Psychopathy and negative emotionality: analyses of suppressor effects reveal distinct relations with emotional distress, fearfulness, and anger-hostility. *Journal of abnormal psychology*, 115(2), 276.

Intrator, J., Hare, R., Stritzke, P., Brichtswein, K., Dorfman, D., Harpur, T., ... & Rosen, J. (1997). A brain imaging (single photon emission computerized tomography) study of semantic and affective processing in psychopaths. *Biological Psychiatry*, *42*(2), 96-103.

Kastner, R. M., Sellbom, M., & Lilienfeld, S. O. (2012). A comparison of the psychometric properties of the psychopathic personality inventory full-length and short-form versions. *Psychological Assessment*, 24(1), 261.

Kaufmann, H., 1970. Aggression and Altruism. Rinehart and Winston, Holt.

Kimonis, E. R., Branch, J., Hagman, B., Graham, N., & Miller, C. (2013). The psychometric properties of the Inventory of Callous–Unemotional Traits in an undergraduate sample. *Psychological Assessment*, 25(1), 84.

Kimonis, E. R., Frick, P. J., Skeem, J. L., Marsee, M. A., Cruise, K., Munoz, L. C., ... & Morris, A. S. (2008). Assessing callous–unemotional traits in adolescent offenders: Validation of the Inventory of Callous–Unemotional Traits. *International journal of law and psychiatry*, 31(3), 241-252.

Kingsbury, S. J., Lambert, M. T., & Hendrickse, W. (1997). A two-factor model of aggression. *Psychiatry, 60(3),* 224-232.

Kosson, D. S., Suchy, Y., Mayer, A. R., & Libby, J. (2002). Facial affect recognition in criminal psychopaths. *Emotion*, 2, 398–411.

Laakso, M. P., Vaurio, O., Koivisto, E., Savolainen, L., Eronen, M., Aronen, H. J., . . . Tiihonen, J. (2001). Psychopathy and the posterior hippocampus. *Behavioural Brain Research*, 118(2), 187-193. doi:10.1016/s0166-4328(00)00324-7

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1998). Emotion, motivation, and anxiety: brain mechanisms and psychophysiology. *Biological Psychiatry*, 44(12), 1248-1263. doi:10.1016/s0006-3223(98)00275-3

Lang, P. J., Bradley, M. M. & Cuthbert, B. N. (2005). International affective picture system (IAPS): Digitized photographs, instruction manual and affective ratings (Tech. Rep. No. A-6). Gainesville, FL. The Center for Research in Psychophysiology, University of Florida

LeDoux JF (1990): Information flow from sensation to emotion plasticity in the neural computation of stimulus values. In: Gabriel M, Moore J, editors. *Learning and Computational Neuroscience: Foundations of Adaptive Networks*. Cambridge, MA: Bradford Books/MIT Press, pp 3–52.

Levenston, G. K., Patrick, C. J., Bradley, M. M., & Lang, P. J. (2000). The psychopath as observer: Emotion and attention in picture processing. *Journal of Abnormal Psychology, 109,* 373–385. doi:10.1037/0021-843X.109.3.373

Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology*, 68, 151-158.

Lilienfeld, Scott O., (1994). Conceptual problems in the assessment of psychopathy, *Clinical Psychology Review*, Volume 14, Issue 1, 1994, Pages 17-38, ISSN 0272-7358, https://doi.org/10.1016/0272-7358(94)90046-9. (http://www.sciencedirect.com/science/article/pii/0272735894900469)

Lilienfeld, S. O., & Widows, M. R. (2005). Psychopathic Personality Inventory-Revised (PPI-R) professional manual. Lutz, FL*:* Psychological Assessment Resources.

Lilienfeld, S. O., & Andrews, B. P. (1996). Development and preliminary validation of a self-Report measure of psychopathic personality traits in noncriminal populations. *Journal of Personality Assessment, 66,* 488–524.

Lilienfeld, S. O., Patrick, C. J., Benning, S. D., Berg, J., Sellbom, M., & Edens, J. F. (2012). The role of fearless dominance in psychopathy: Confusions, controversies, and clarifications. Personality Disorders: Theory, Research, and Treatment, 3(3), 327-340. doi:10.1037/a0026987

Long, K., Felton, J. W., Lilienfeld, S. O., & Lejuez, C. W. (2014). The role of emotion regulation in the relations between psychopathy factors and impulsive and premeditated aggression. Personality Disorders: Theory, Research, and Treatment, 5(4), 390.

López, R., Poy, R., Patrick, C. J., & Moltó, J. (2013). Deficient fear conditioning and self-reported psychopathy: The role of fearless dominance. *Psychophysiology*, 50, 210-218.

Lykken, D. T. (1957). A study of anxiety in the sociopathic personality. Journal of Abnormal and Clinical Psychology, 55, 6–10.

Lykken, D. T. (1995). *The antisocial personalities*. Hillsdale, NJ: Erlbaum.

Marsh, A. A., Finger, E. C., Fowler, K. A., Adalio, C. J., Jurkowitz, I. T. N., Schechter, J. C., Pine, D. S., Decety, J. and Blair, R. J. R. (2013), Empathic responsiveness in amygdala and anterior cingulate cortex in youths with psychopathic traits. J Child Psychol Psychiatry, 54: 900–910. doi:10.1111/jcpp.12063

Medina, Javier F., Christopher Repa, J., Mauk, Michael D., LeDoux, Joseph E., Parallels between cerebellum- and amygdala-dependent conditioning. Nature Reviews Neuroscience, 2002/02/01/online, 3, 122, Nature Publishing Group, http://dx.doi.org/10.1038/nrn728.10.1038/nrn728.

Meehl, P. E., & Yonce, L. J. (1994). Taxometric analysis: I. Detecting taxonicity with two quantitative indicators using means above and below a sliding cut (MAMBAC procedure). *Psychological reports*.

Miller, J. D., & Lynam, D. R. (2012). An examination of the Psychopathic Personality Inventory's nomological network: A meta-analytic review. *Personality Disorders: Theory, Research, and Treatment*, 3, 305–326. doi:10.1037/a0024567.

Miller, J. D., Rausher, S., Hyatt, C. S., Maples, J., & Zeichner, A. (2014). Examining the relations among pain tolerance, psychopathic traits, and violent and nonviolent antisocial behavior. *Journal of Abnormal Psychology*, 123(1), 205-213. http://dx.doi.org/10.1037/a0035072

Montagne, B., Kessels, R. P., De Haan, E. H., & Perrett, D. I. (2007). The emotion recognition task: A paradigm to measure the perception of facial emotional expressions at different intensities. *Perceptual and motor skills*, 104(2), 589-598.

Morgan, A. B., & Lilienfeld, O. (2000). A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review, 20,* 113–156. doi: 10.1016/S0272-7358(98)00096-8

Nelson, L. D., Patrick, C. J., & Bernat, E. M. (2011). Operationalizing proneness to externalizing psychopathology as a multivariate psychophysiological phenotype. *Psychophysiology*, *48*, 64-72.

Neumann, C. S., Malterer, M. B., & Newman, J. P. (2008). Factor Structure of the Psychopathic Personality Inventory (PPI): Findings from a Large Incarcerated Sample. *Psychological Assessment*, 20(2), 169–174. http://doi.org/10.1037/1040-3590.20.2.169

Pardini, D. A., & Loeber, R. (2007). Interpersonal and Affective Features of Psychopathy in Children and Adolescents: Advancing a Developmental Perspective Introduction to Special Section. Journal of Clinical Child & Adolescent Psychology, 36(3), 269-275. doi:10.1080/15374410701441575

Patrick, C. J., Bradley, M. M., & Lang, P. J. (1993). Emotion in the criminal psychopath: Startle reflex modulation. *Journal of Abnormal Psychology*, *102*, 82–92. doi:10.1037/0021-843X.102.1.82

Patrick, C. J., Hicks, B. M., Krueger, R. F., & Lang, A. R. (2005). Relations between psychopathy facets and externalizing in a criminal offender sample. *Journal of Personality Disorders*, *19*, 339-356.

Patrick, C. J. (n.d.). Cognitive and emotional processing in psychopathy. In (Vol. 18, pp. 1-52).

Patrick, C. J. & Drislane, L. E. (2015), Triarchic Model of Psychopathy: Origins, Operationalizations, and Observed Linkages with Personality and General Psychopathology. J Pers, 83: 627–643. doi:10.1111/jopy.12119

Patrick, C. J., Venables, N. C., Yancey, J. R., Hicks, B. M., Nelson, L. D., & Kramer, M. D. (2013). A construct-network approach to bridging diagnostic and physiological domains: Application to assessment of externalizing psychopathology. *Journal of Abnormal Psychology*, *122*, 902-916.

Patterson, C. M., & Newman, J. P. (1993). Reflectivity and learning from aversive events: Toward a psychological mechanism for the syndromes of disinhibition. *Psychological Review, 100*, 716-736.

Paulhus, D. L., Hemphill, J. D., & Hare, R. D. (in press). Self-report psychopathy scale: Version III. Toronto: Multi-Health Systems.

Perkins, E. R., Yancey, J. R., Drislane, L. D., Venables, N. C., Balsis, S., & Patrick, C. J. (2017). Methodological issues in the use of individual brain meaures to index trait liabilities: The example of noise-probe P3. *International Journal of Psychophysiology*, *111*, 245-255.

Pessoa, L., McKenna, M., Gutierrez, E., & Ungerleider, L. G. (2002). Neural processing of emotional faces requires attention. *PNAS, 99,* 11458–11463. doi:10.1073/pnas.172403899

Petrides, M. (2000). Dissociable roles of mid-dorsolateral prefrontal and anterior inferotemporal cortex in visual working memory. Journal of Neuroscience, 20, 7496-7503.

Porter, S., & Woodworth, M. (2006). Psychopathy and aggression. Handbook of psychopathy, 481-494.

Phillips, R. G., & LeDoux, J. E. (1992). Differential contribution of amygdala and hippocampus to cued and contextual fear conditioning. *Behavioral Neuroscience*, 106(2), 274-285.

Raine, A., Dodge, K., Loeber, R., Gatzke-Kopp, L., Lynam, D., Reynolds, C., ... & Liu, J. (2006). The reactive-proactive aggression questionnaire: Differential correlates of reactive and proactive aggression in adolescent boys. *Aggressive behavior*, *32*(2), 159-171.

Reidy, D. E., Zeichner, A., Miller, J. D., & Martinez, M. A. (2007). Psychopathy and aggression: Examining the role of psychopathy factors in predicting laboratory aggression under hostile and instrumental conditions. Journal of Research in Personality, 41(6), 1244-1251.

Reidy, D. E. (2008). Psychopathy, sadism, and unprovoked aggression: pleasure as intrinsic motivation to aggress (Doctoral dissertation, University of Georgia, 2008) (pp. 1-112). Athens, GA.

Reidy, D. E., Shelley-Tremblay, J. F., & Lilienfeld, S. O. (2011). Psychopathy, reactive aggression, and precarious proclamations: A review of behavioral, cognitive, and biological research. *Aggression and Violent Behavior*, 16(6), 512-524.

Schmauk, F. J. (1970). Punishment, arousal, and avoidance learning in sociopaths. Journal of Abnormal Psychology, 76, 325-335.

Sellbom, M., Ben-Porath, Y. S., Lilienfeld, S. O., Patrick, C. J., & Graham, J. R. (2005). Assessing psychopathic personality traits with the MMPI-2. *Journal of Personality Assessment*, 85, 334 –343. doi:10.1207/s15327752jpa8503_10

Sellbom, M., Ben-Porath, Y. S., Patrick, C. J., Wygant, D. B., Gartland, D. M., & Stafford, K. P. (2011). Development and construct validation of MMPI-2-RF indices of global psychopathy, fearless-dominance, and impulsive-antisociality. *Personality Disorders: Theory, Research, and Treatment*. Advanced online publication. doi:10.1037/ a0023888

Serafim, A. D. P., Barros, D. M. D., Valim, A., & Gorenstein, C. (2009). Cardiac response and anxiety levels in psychopathic murderers. *Revista Brasileira de Psiquiatria*, *31*(3), 214-218.

Smith, J. L., Johnstone, S. J., & Barry, R. J. (2008). Movement-related potentials in the Go/No-Go task: The P3 reflects both cognitive and motor inhibition. *Clinical Neurophysiology, 119,* 704–714. doi:10.1016/ j.clinph.2007.11.042

Stafford, E., & Cornell, D. G. (2003). Psychopathy scores predict adolescent inpatient aggression. Assessment, 10(1), 102-112.

Taylor, S. P. (1967). Aggressive behavior and physiological arousal as a function of provocation and the tendency to inhibit aggression. *Journal of Personality, 35*, pp. 297–310.

Tellegen, A. (1985). Structure of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Tuma &J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 681-706). Hillsdale, NJ: Erlbaum.

Vaillancourt, T., & Sunderani, S. (2011). Psychopathy and indirect aggression: The roles of cortisol, sex, and type of psychopathy. Brain and Cognition, 77(2), 170-175.

Verona, E., Sprague, J., & Sadeh, N. (2012). Inhibitory control and negative emotional processing in psychopathy and antisocial personality disorder. *Journal of abnormal psychology*, *121*(2), 498.

Waller, N. G., & Meehl, P. E. (1998). *Multivariate taxometric procedures: Distinguishing types from continua*. Sage Publications, Inc.

Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. Psychological Bulletin, 96(3), 465-490.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality & Social Psychology, 54, 1063-1070.

Williamson, S., Hare, R. D., & Wong, S. (1987). Violence: Criminal psychopaths and their victims. Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 19(4), 454.

Williamson, S., Harpur, T. J., & Hare, R. D. (1991). Abnormal processing of affective words by psychopaths. *Psychophysiology*, *28*(3), 260-273.

Young, S. E., Friedman, N. P., Miyake, A., Willcutt, E. G., Corley, R. P., Haberstick, B. C., & Hewitt, J. K. (2009). Behavioral disinhibition: liability for externalizing spectrum disorders and its genetic and environmental relation to response inhibition across adolescence. *Journal of Abnormal Psychology, 118*, 117-130.

Zeichner, A., Frey, F. C., Parrott, D. J., & Butryn, M. F. (1999). Measurement of laboratory aggression: A new response-choice paradigm. *Psychological Reports*, *85*(3_suppl), 1229-1237.

APPENDIX A

TABLES

Table 1.

PPI versus RCAP variables of Aggression

		SF	FPD	FPI	FP	P10	MSD	MSI
PPI_FD	Pearson r	.064	.155	.105	-.139	.033	-.008	.047
	Sig	.459	.070	.221	.106	.704	.926	.583
PPI_SCI	Pearson r	.184*	.134	.139	-.243**	.118	.049	.139
	Sig	.032	.118	.105	.004	.170	.567	.106
PPI_CH	Pearson r	.055	-.064	.015	-.044	-.142	.084	-.001
	Sig	.524	.459	.860	.607	.097	.328	.989

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 2. Pain Perception and the PPI

		First Perception of Shock	Max Pain Tolerance
PPI_FD	Pearson r	.007	.289**
	Sig	.934	.001
PPI_SCI	Pearson r	-.045	-.113
	Sig	.602	.194
PPI_CH	Pearson r	.099	.011
	Sig	.254	.897

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 3

The BAQ against the PPI

		PPIFD_Imp	PPISCI_Imp	PPICold_Imp
Physical Aggression	Pearson r	.247**	.339**	-.023
	Sig	.001	.000	.766
Verbal Aggression	Pearson r	.207**	.291**	-.021
	Sig	.007	.000	.793
Anger Aggression	Pearson r	.075	.320**	-.029
	Sig	.342	.000	.710
Hostility Aggression	Pearson r	-.221**	.392**	-.174*
	Sig	.004	.000	.025

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 4

ICU against the PPI

		ICU Callous	ICU Uncaring	ICU Unemotional
PPI_FD	Pearson r	.126	-.078	-.208*
	Sig	.149	.376	.017
PPI_SCI	Pearson r	.403**	.450**	.167
	Sig	.000	.000	.055
PPI_CH	Pearson r	.030	.037	.049
	Sig	.730	.671	.574

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 5

RPQ against the PPI

		PPI_FD	PPI_SCI	PPI_CH
Reactive Aggression	Pearson r	.165*	.287**	-.024
	Sig	.034	.000	.760
Proactive Aggression	Pearson r	.158*	.420**	-.054
	Sig	.042	.000	.495

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 6.

The PPI against the IAPS

		PPI_FD	PPI_SCI	PPI_CH
Self-Valence	Pearson r	.090	.256**	-.058
	Sig	.250	.001	.461
Arousal	Pearson r	-.146	-.208**	.100
	Sig	.063	.007	.203

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 7

LDT variables against the PPI

		Anger	Sadness	Fear	Disgust	Happiness
PPI_FD	Pearson r	-.075	.026	-.166*	-.235**	-.062
	Sig	.339	.739	.033	.002	.405
PPI_SCI	Pearson r	-.009	.127	.048	-.122	-.070
	Sig	.911	.104	.545	.117	.373
PPI_CH	Pearson r	.100	-.059	.043	-.047	.017
	Sig	.203	.453	.586	.552	.826

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)

Table 8.

LDT variables against RCAP variables

		MSI	MSD	P10	FP	FPI	FPD	SF
Angry	Pearson r	.021	-.020	.041	-.047	.006	-.056	-.033
	Sig	.804	.819	.633	.588	.940	.518	.699
Sad	Pearson r	.070	-.055	.192*	.025	.023	.106	-.063
	Sig	.415	.522	.025	.769	.790	.219	.466
Fear	Pearson r	-.119	-.022	-.062	.114	-.129	-.002	-.063
	Sig	.168	.801	.473	.188	.135	.983	.467
Disgust	Pearson r	.050	.008	.120	.008	.101	-.050	-.003
	Sig	.565	.923	.166	.924	.241	.559	.974
Happy	Pearson r	.106	-.003	.110	-.085	.058	.066	.071
	Sig	.218	.971	.202	.324	.506	.448	.409

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01level (2-tailed)

Sig - significant (2-tailed)