THE EFFECT OF PSYCHOPATHY, EMPATHY AND GENDER ON GAZE PATTERNS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

THE EFFECT OF PSYCHOPATHY, EMPATHY AND GENDER ON GAZE PATTERNS

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Previous research shows that adolescent males high in callous-unemotional (CU) traits have aberrant gaze-patterns when viewing fearful stimuli. This study sought to extend and replicate previous findings, to see if the affective deficits (i.e., CU traits) of psychopathy have a similar relationship to gaze patterns in a non-clinical population. Participants were given self-report measures of psychopathy and empathy and shown norm rated stimuli from the International Affective Picture System (IAPS) while gaze-patterns were recorded. Results show the only significant relationship between psychopathy, empathy and gaze-patterns was for the impulsive factor of psychopathy in males.

CHAPTER 1: INTRODUCTION

Psychopathic individuals were described by Cleckley (1941) as absent of psychopathology but manipulative, incapable of love, lacking inhibitions, unable to empathize, glib and remorseless. Psychopaths have also been described as "intra-species predators," capable of using instrumental violence remorselessly to realize their goals (Hare, p.196, 2002). The prevalence rate of psychopathy has been reported to be approximately 1-2% in the general population (Neumann & Robert, 2008). While a small percentage of the total population, those rated highly in psychopathy were almost twice as likely to have committed goal oriented, and premeditated homicide (Woodworth & Porter, 2002).

A widely used measure of psychopathy, the Psychopathy Checklist and its revision, the Psychopathy Checklist Revised (PCL-R), were derived from Cleckley's (1941) original criteria. Exploratory factor analysis of the PCL-R, suggests that psychopathy as measured by the PCL-R, is not a unidimensional construct, and can be represented by a two-factor model which includes the interpersonal and affective facets of psychopathy (Hare, 2003; Harpur, Hakistan, & Hare, 1988). A later analysis using 13 of the 20 PCL-R items arrived at three factors: interpersonal, affective and antisocial/ impulsive (Cooke, Michie, & Hart, 2006).

Following the proposal of the three factor framework and a review of historic and contemporary conceptualizations of psychopathy, researchers proposed the Triarchic Psychopathy Model (TriPM; Patrick, Fowles, & Krueger, 2009). The TriPM was created to effectively encompass the interpersonal, affective, and antisocial-impulsive traits of psychopathy. The TriPM defines three factors present in psychopathy as Boldness,

Meanness, and Disinhibition (Patrick, Fowles, & Krueger, 2009). The interpersonal and affective (i.e., Boldness and Meanness, respectively) features of psychopathy are theorized to be caused by an underlying lack of fear (Lykken, 1995). There are two prominent etiological theories explaining the general lack of fear, a top-down attentional "bottleneck" and bottom-up amygdala dysfunction (Blair, 2003).

Top-down processing refers to executive functioning of the frontal lobes, allowing for the conscious focusing of attention (LeDoux, 1996). Bottom-up processing refers to areas of the limbic system namely the amygdala that promotes attention to affectively salient stimuli (LeDoux, 1996). Currently, the evidence is mixed regarding which type of processing deficit accounts for the features of psychopathy. Some data support the top-down attentional bottleneck hypothesis (e.g., Baskin-Sommers, Curtin, & Newman, 2011) and others the bottom-up processing deficit hypothesis (Dadds, El Masry, Wimalaweera, & Guastella, 2008). The top-down and bottom-up hypotheses have been examined with a wide variety of experimental paradigms. Some of these studies include fear-conditioning, functional Magnetic Resonance Imaging (fMRI), auditory event-related potentials, Stroop-like tasks, emotion recognition and eye-tracking (e.g., Baskin-Sommers, Curtin, & Newman, 2011; Dadds, El Masry, Wimalaweera, & Guastella, 2008; Kiehl, et al., 2001; Muñoz, 2009; Patrick, 1994). Of the measures used in psychopathy studies, eye-tracking remains understudied. Eye-tracking is useful because it provides a unique opportunity to examine how visual information is acquired during situations in which empathy or fear are elicited, and could indicate whether a bottom-up or top-down processing deficit is present. Moreover, research in psychopathy has largely been focused on males, leaving a gap in the literature that focuses on gender

differences (Cale & Lilienfeld, 2002), and this gap extends to studies examining bottom-up/top down processing deficits hypotheses. The current study aims to contribute evidence in the bottom-up or top-down processing deficit debate, in addition to filling a gap in the literature on the relationship between gaze-patterns and psychopathy in females.

CHAPTER 2: LITERATURE REVIEW

Historical Conceptualizations

Accounts of psychopathy can be traced back two and half millennia to ancient Greece (Millon, Simonsen, & Birket-Smith, 2002). Theophrastus, a pupil of Aristotle, describes "The Unscrupulous Man," as a man who: "When marketing reminds the butcher of some service he has rendered him and, standing near the scales, throws in some meat, if he can, and a soup-bone. If he succeeds, so much the better; if not, he will snatch a piece of tripe and go off laughing" (Millon, et al., p. 3, 2002). The type of individual Theophrastus described was proposed to be mentally ill by physicians such as Prichard and Pinel starting in the nineteenth century (Bonfigli, 1880). Pinel described the disorder he observed as "*manie sans délire*" which roughly translates to mania without delirium (Bonfigli, 1880). Pinel described this disordered person as "a distinct species…characterized by an exclusive alteration of the sentiments and instincts, without lesion of the intelligence" (Bonfigli, p. 226, 1880).

The idea of normal intelligence with a poverty of morals was described in depth for the first time by Cleckley in *The Mask of Sanity* (Cleckley, 1941). Cleckley was the first to use the term psychopath for the "morally insane" individuals that Pinel and Prichard described (Cleckley, 1941). In this work Cleckley defines psychopathy as having 16 criteria including: superficial charm and good intelligence, absence of delusions or irrational thinking, absence of anxiety, unreliability, insincerity, rarely carried out suicide, failure to plan ahead, poverty of affect, a lack of insight and a lack of remorse (Cleckley, 1941).

Despite the acceptance of the Cleckley criteria as main components of psychopathy, the Diagnostic and Statistical Manual of Mental Disorders (DSM), in its previous four revisions, has used different conceptualizations and nomenclature. The first DSM-I included a Sociopathic Personality Disturbance with the modifiers of Antisocial reaction and Dyssocial reaction (American Psychiatric Association, 1952). The distinction between Antisocial and Dyssocial was the inability of the Antisocial individual to "profit from punishment," and to be incapable of making strong loyalties to any group, including even predatory criminal groups (APA, p. 38, 1952). The conceptualization of Antisocial and Dyssocial in the DSM-I is remarkably similar to what later researchers would describe as psychopathy and sociopathy, respectively (Lykken, 1995). The DSM-II amalgamated the distinctions between Antisocial and Dyssocial reactions into Antisocial personality. According to the diagnosis, individuals who met criteria for this disorder, were incapable of significant loyalty, were grossly selfish, callous, irresponsible, impulsive and did not feel guilt (APA, 1968). The next edition of the DSM, the DSM-III, included Antisocial Personality Disorder which was defined mainly by *behaviors* deemed antisocial (e.g., failure to honor financial obligations, failure to accept social norms, failure to plan ahead; APA, 1980). This conceptualization of Antisocial Personality Disorder, with mainly behavioral criteria, is maintained in the DSM up to the current edition (APA, 2013).

Differences between Psychopathy & Antisocial Personality Disorder

Psychopathic personality consists of traits which cluster into factors including interpersonal, affective and behavioral manifestations (Lykken, 1995). Persons with psychopathic personality have, on the surface, normal cognitive functioning but engage

in antisocial behavior (Cleckley, 1941). A general lack of fear has been theorized to cause the observed interpersonal and affective traits which include remorselessness, callousness, lack of empathy, manipulativeness, superficial charm, good intelligence, insincerity, egocentricity and an inability to love (Cleckley, 1941). The distinction between Antisocial Personality Disorder (ASPD) and psychopathy is the presence of the interpersonal and affective deficits, only antisocial behavior is not sufficient to warrant a diagnosis of psychopathy (Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012).

The current Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) does not include psychopathy as a formal personality disorder (although it is included in the alternative section; APA, 2013). The closest diagnosis to psychopathy in the DSM-5 is Antisocial Personality Disorder (APA, 2013). The criteria for ASPD in the previous DSM (DSM-IV-TR) include conning others, being indifferent to or rationalizing having hurt, mistreated, or stolen from another, repeated failure to honor obligations and engagement in repeated physical fights or assaults (APA, 2000). The result of the predominantly behavioral loading of the diagnostic criteria for ASPD is a high rate of diagnosis in correctional settings (i.e., 50 – 80%; Hare, 2003). Moreover, of those who are diagnosed with ASPD in these settings, less than half have a significant arrest record indicating that a heterogeneous group of individuals meet the full criteria (Coid & Ullrich, 2010). Because serious and less serious offenders are diagnosed with ASPD, the diagnosis loses predictive validity for decisions such as parole, especially if one individual with ASPD could be a situational offender while another, a psychopath who uses violence instrumentally. Alternatively, the construct of psychopathy has been shown to provide a greater level of discriminant and predictive validity.

Facets of Psychopathy

The Psychopathy Checklist Revised (PCL-R) based on Cleckley's (1941) original diagnostic criteria, is commonly used to assess psychopathic personality in clinical populations and has shown to be a predictor of future violent or antisocial behavior (Hare, 2003; Hare & Neumann, 2006). Cleckley's diagnostic criteria were based on patients of the hospital in which he worked, therefore the criteria more extensively reflect the pathological aspects of psychopathy and to a lesser extent the positive adjustment aspects (e.g., low incidence of suicide and social adeptness; Cleckley, 1941; Patrick, et al., 2009). To administer the PCL-R, twenty items are scored on a three point scale (0 = *item doesn't apply*, 1 = *item applies somewhat*, 2 = *item fully applies*), then a total score is calculated (Hare, 2003). The calculated total score of the PCL-R was intended to depict on which part of the dimension of psychopathy an individual lies (Hare, 2003).

The PCL-R originally measured psychopathy with a unidimensional scale, but exploratory factor analysis indicated that items loaded on two factors (Hare, 2003). The two factors include Factor 1, interpersonal and affective aspects and Factor 2, the antisocial and impulsive behavioral tendencies (Hare, 2003). Researchers later parsed Factor 1 into separate interpersonal and affective components (Cooke, et al., 2006). The parsing of Factor 1 created the three factor model, with factors representing an "impulsive and irresponsible behavioral style," a "deficient affective experience," and an "arrogant and deceitful interpersonal style" (Cooke, et al., p. 94, 2006). To create the three factor model, 13 of the 20 items of the PCL-R were used because the researchers, using confirmatory factor analysis (CFA) and item-response theory (IRT), concluded that those were the only non-redundant items that definitively measured psychopathy (Cooke,

et al., 2006). The use of only 13 of the 20 PCL-R items to derive factors has been disputed, and other researchers argue that the CFA and IRT analyses were interpreted incorrectly and all 20 items should be used (Hare & Neumann, 2006). After factor analyzing all 20 items, a four factor model has been proposed. This four factor model includes interpersonal, affective, lifestyle and antisocial facets of psychopathy (Hare & Neumann, 2006).

Nonetheless, the three factor model remains influential and, in addition to other work, helped lead to the recently proposed Triarchic Model of Psychopathy which includes the interpersonal, affective and behavioral factors as the defining traits of both clinical and nonclinical psychopathy (Patrick, et al., 2009).

Triarchic Model of Psychopathy

The Triarchic Model of Psychopathy (TriPM) was proposed in order to encompass the different presentations of psychopathy and to create a framework for the study of the neuropsychological and developmental underpinnings of psychopathy (Patrick, et al., 2009). The TriPM names the interpersonal, affective and behavioral factors of psychopathy, Boldness, Meanness and Disinhibition, respectively. These facets and the traits associated with the facets are presented in Table 1. Boldness can be understood as the ability to perform confidently and remain calm in high pressure situations, Disinhibition can be described as impulsivity combined with a general lack of planning. Meanness is to lack empathy, remorse and to manipulate others (Patrick, et al., 2009). Considered part of Meanness, a lack of empathy is a central feature of the second facet of psychopathy.

Table 1. *Summary of the Triarchic Model of Psychopathy Facets*

1. Boldness: Interpersonal facet
    a. Glib/superficial charm
    b. Grandiose sense of self-worth
    c. Tendency to manipulate others
    d. Social acumen

2. Meanness: Affective facet
    a. Marked lack of empathy
    b. Remorselessness
    c. Inability to love

3. Disinhibition: Behavioral Facet
    a. Impulsivity
    b. Failure to follow a life plan
    c. Irresponsibility

Note: Adapted from Patrick, Fowles & Krueger, 2009.

Etiological Theories of Psychopathy

Amygdala dysfunction has been proposed as a mediating factor of the affective deficits and interpersonal features in psychopathy. One of the proposed functions of the amygdala is to bias finite attentional resources towards emotional stimuli and glean its emotional valence (Blair, 2006; Kryklywy, Nantes, & Mitchell, 2013). Case studies show that amygdala dysfunction is associated with a deficit in fear processing. For example, a 42-year old patient with bilateral amygdala damage exhibited a deficient ability to correctly label faces showing fear (Spezio, Huang, Castelli, & Adolphs, 2007). However, this patient was able to accurately label the emotions once she was instructed to look at the eye-region of the faces provided (Adolphs, et al., 2005). Studies have found reduced amygdala activity when processing affective stimuli in psychopathic incarcerated

individuals using functional Magnetic Resonance Imaging (fMRI), supporting notion that the amygdala is implicated in the affective deficits in psychopathy (Kiehl, et al., 2001). Vocal emotion recognition tasks show similar patterns. For example, when listening to non-emotional words said with affective intonation, individuals high in psychopathy were less effective at recognizing fearful tones (Blair, Mitchell, Richell, Kelly, & Leonard, 2002). Similarly, youth high in callous-unemotional traits (CU; including a lack of empathy) show reduced amygdaloidal responses when viewing affective stimuli, suggesting that the relationship between amygdala dysfunction and affective deficits is present in early development (Marsh, et al., 2008).

The aforementioned research suggests that a bottom-up (i.e., amygdala) fear processing deficit is present, a conclusion that has been replicated well in many experiments (Blair, 2006; Fowles & Dindo, 2005). However, whether a stimulus is attended to or not is both a function of bottom-up and top-down processes and therefore other researchers hypothesize that a top-down attentional bottleneck is the mediating factor of fearlessness in psychopathy (Blair, 2006; Newman & Lorenz, 2003). While there are many theories of attention, a current popular theory parses attention into three different typologies including an alerting, an executive, and an orienting network (Raz & Buhle, 2006). The alerting network acts to keep attention focused and cues the attentional system when a new stimulus is sensed. The executive network is concerned with processing tasks such as mediating between stimulus incongruences such as in a Stroop task (Raz & Buhle, 2006). The orienting network selects which stimuli are important among a group and shifts the focus of attention from one stimulus to another (Posner & Peterson, 1990; Raz & Buhle, 2006). A top-down fearlessness hypothesis, known as the

response modulation hypothesis (RMH), theorizes that while most stimuli can be automatically processed, emotional stimuli require a shift in attention to respond appropriately based on past experience and to process contextual information (Newman & Lorenz, 2003). The RMH could be could be thought of as similar to the attentional orienting system which is hypothesized to be dysfunctional in psychopathy.

Evidence supporting this hypothesis has been found through a variety of experimental designs such as an early experiment by Jutai and Hare (1983) which used auditory event-related potential (aERP). Event-related potential is measured with an electroencephalograph (EEG), and is a measurement of brain activity immediately following the presentation of a stimulus (Kalat, 2009). Auditory ERP has been used as a measure of attentional allocation to an auditory stimulus (Jutai & Hare, 1983). In this experiment, participants were divided into two groups: One in which psychopathic individuals played a video game and intermittently heard a tone in both ears, and another in which psychopathic individuals only heard the tone. The group that was playing the video game was told that the sound was irrelevant. The researchers found that the participants, who were told the sound was irrelevant, showed significantly smaller N100 responses to the auditory stimulus while playing the video game. The N100 response is a negative wave function that occurs 100 MS after a stimulus is presented. A smaller N100 response to the auditory stimulus suggests that the participants told that the tone was irrelevant, were able to maintain focus of cognitive resources on the goal, in this case a video game. This study suggests that psychopathic individuals may be more able to hone their attention on what they intend to focus on while ignoring outside stimuli considered irrelevant, implying a dysfunctional orienting attentional network. Similarly, another

study found that psychopathic individuals outperformed controls when extraneous stimuli were presented with colored words during a Stroop-like task (i.e., made fewer errors reporting what color was shown; Hiatt, Schmitt, & Newman, 2004). The results of this study support the hypothesis that psychopathic individuals are more able to focus on the current stimulus involved in their goal to the neglect of peripheral stimuli.

Fear potentiated startle (FPS) is another psychophysiological measure used in psychopathy research. Fear potentiated startle measures autonomic arousal 50 MS after a fearful (or conditioned fearful) stimulus is presented (Patrick, 1994). This autonomic reaction is considered to measure fear directly and is considered superior to other methods because fear can be conditioned without conscious awareness (Davis, Falls, Campeau, & Kim, 1993; Patrick, 1994). A recent study of individuals in a high security prison using a FPS paradigm found that individuals high in psychopathy showed an attenuated fear reaction when given a non-fearful stimulus to focus on (Baskin-Sommers, et al., 2011). The authors concluded that this was caused not by a general hyporeactive fear reaction but by a top-down attentional bottleneck, resulting in the neglect of secondary contextual (i.e., fear) information.

In summary, current research into the bottom-up fearlessness and attentional aberrance hypotheses show evidence for both perspectives across methodology and thus, more evidence is needed – using novel experimental designs to further clarify whether one or both perspectives are the etiological causes of psychopathy (see Figure 1 for a summary of these hypotheses).

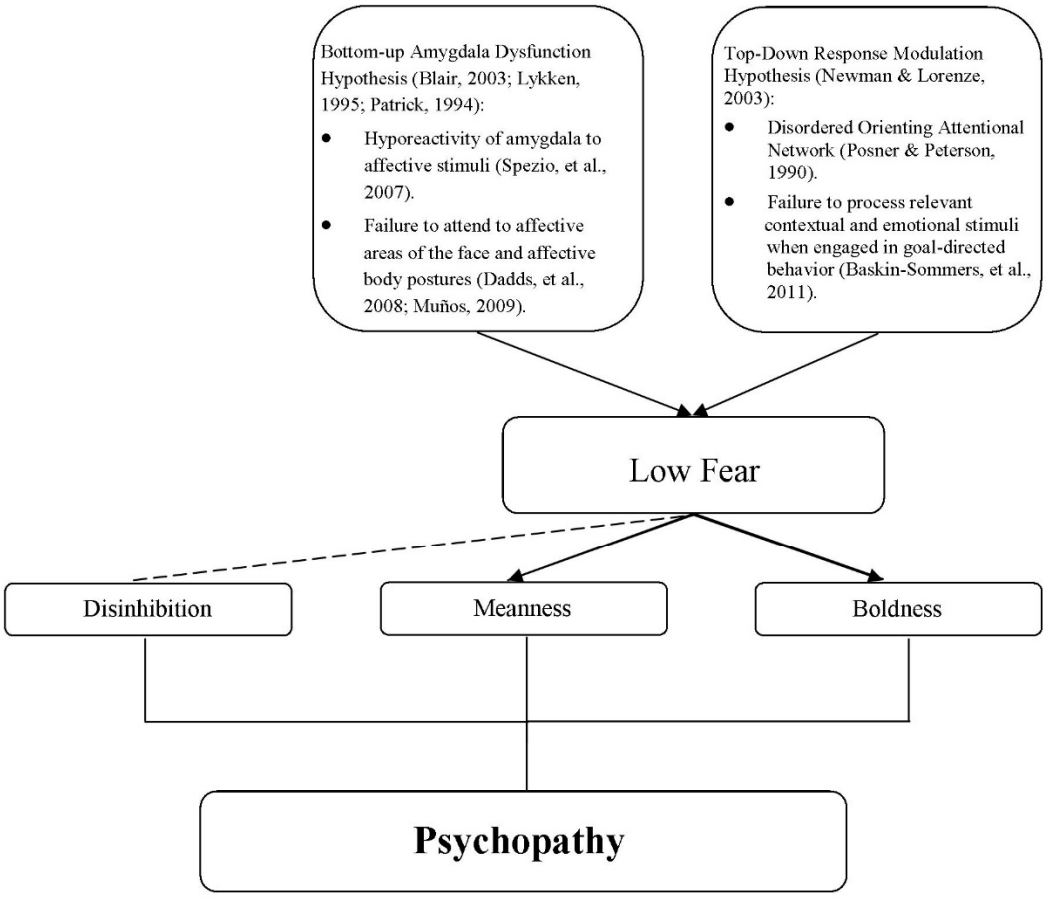

Figure 1. A diagram representing how the three facets of the Triarchic Model of Psychopathy relate to the Low Fear Hypothesis (Patrick, et al., 2009). Boldness and Meanness are thought to be more directly related to the hypothesized Low Fear, although because of shared variance, Disinhibition is also hypothesized to be related to innate Low Fear albeit to a lesser extent. (Patrick, et al., 2009).

Empathy

Empathy has been defined as the sharing of an affective state between organisms without direct connection to the affective stimulus by the empathizing organism (Singer, 2006). Empathy is generally regarded to be best represented by two main components: cognitive empathy (the ability to *understand* what someone else is feeling), and emotional empathy (the ability to *feel* the same emotional state as another; Davis, 1980).

To measure cognitive and emotional empathy, Davis (1980) created a preliminary measure assessing these two constructs, and performed an exploratory factor analysis of the data. The results showed that the cognitive and emotional empathy factors were each comprised of two sub-factors (Davis, 1980). Cognitive empathy was comprised of Fantasy (the tendency to identify strongly with fictitious characters) and Perspective-Taking (the tendency to adopt the perspectives of others). Emotional empathy was comprised of Empathic Concern (experiencing compassion for others who are suffering) and Personal Distress (feeling discomfort and anxiety when witnessing the negative experiences of others; Davis, 1980). The resulting measure created from the aforementioned process is the Interpersonal Reactivity Index (IRI; Davis, 1980).

Lack of empathy is regarded to be a central feature of psychopathy (Hare, 2003; Lykken, 1995) but the majority of the extant literature does not usually parse the psychopathic lack of empathy into the previously summarized affective and cognitive factors. Of the studies that do parse empathy into different factors findings have been mixed. One study with incarcerated and non-incarcerated individuals, found that emotional empathy was elicited in psychopathic individuals when reading vignettes but not when viewing facial stimuli (Lishner, et al., 2012). From a neurobiological perspective, one explanation for this finding could be the involvement of not only the amygdala but the insula and temporal cortex in the processing of emotional words likely buffering the effects of amygdala dysfunction when processing emotional words (Blair, 2006). In addition to measuring the facets empathy, the effect of gender is also an understudied phenomenon in psychopathy research.

Gender Differences in Psychopathy

Historically, psychopathy has been studied mainly in males, and less is known about the presentation of psychopathy in females. Studies have found prevalence rates of psychopathy for incarcerated females to range from 6 – 22% (Jackson, Rogers, Neumann, & Lambert, 2002; Salekin, Rogers, & Sewell, 1997; Warren, et al., 2003) whereas prevalence rates for incarcerated men have been reported to be between 15-30% (Cale & Lilienfeld, 2002). A recent literature review found that the interpersonal and affective facets of psychopathy are apparent in female psychopathy, but the disinhibited features present differently than males, which could explain the differences in reported prevalence rates (Dolan & Völlm, 2009). Moreover, while the PCL-R has been shown to be an effective predictor of violent recidivism in males (Hare & Newman, 2006), evidence is mixed for the validity of the two-factor structure (i.e., interpersonal/affective and antisocial-impulsivity) measured by the PCL-R for use in females (Vitale & Newman, 2006). For example, one study found that 90% of women who recidivated were classified as non-psychopathic whereas the recidivism rates for non-psychopathic men are reported at 40% (Serin, 1996; Verona & Vitale, 2006). These findings show clear gender differences making gender an important parsing variable when studying psychopathy.

Nonetheless, similarly to males, females previously diagnosed with conduct disorder and females from a forensic population who met PCL-R criteria for psychopathy have been reported to be less able to accurately label emotional stimuli (Eisenbarth, Alpers, Segre, Calogero, & Angrilli, 2008; Fairchild, Stobbe, van Goozen, Calder, & Goodyer, 2010). Another study in which unpleasant, neutral and pleasant pictures were presented to incarcerated females found that autonomic response to emotional stimuli,

especially fearful or threatening, is also deficient in female psychopathy (Sutton, Vitale & Newman, 2002). These studies suggest that female psychopathy may be caused by mechanisms similar to those of male psychopathy, namely amygdala dysfunction. Finally, while deficits in promoting attention to the eye-regions of affective faces have been demonstrated in adolescent males (Dadds, et al., 2008), to our knowledge, no studies to date have looked at the relationship between psychopathy and gaze-patterns among females. Due to the sensitivity to gonadal hormones in the amygdala *in utero,* men generally have larger amygdalae than women (Goldstein, et al., 2001). The gender difference in size of the amygdala may have an effect on the orienting function of the amygdala based on gender, further supporting the contention that gender is an important variable to consider in studying the top down and bottom up hypotheses of psychopathy. Little attention has been given to the patterns of the amygdala orienting function psychopathy, regardless of gender. One such method that can provide insight into this orienting phenomenon is eye-tracking.

Eye-tracking

Eye-tracking is a non-invasive, behavioral measure that tracks eye movement on a computer screen. One benefit of using an eye-tracker is that stimuli can be presented to simulate situations in which psychopathic deficits are theorized to be most pronounced. Despite this advantage, only one study has used eye-tracking to study psychopathy. One study found that adolescents high in CU traits fixated less on the eye-region of affective faces (Dadds, et al., 2008). The lack of attention allocated to the eye-region of the faces suggests a disordered orienting network, theorized to be caused by the amygdala dysfunction (Dadds, et. al, 2008). A similar study (which did not use eye-tracking but

extended the previous findings) found that adolescents high in CU traits were less accurate at identifying fearful states when asked to label emotional faces and body postures (Muñoz, 2009). In this study the CU traits were significantly negatively correlated to accurate labeling of the fearful faces and body postures, however antisocial behavior was not significantly correlated to accurate labeling (Muñoz, 2009). The aforementioned studies support the bottom-up hypothesis of psychopathy but it is unclear whether this effect will extend to females or a non-clinical population, therefore further research is needed.

Statement of the Problem

As mentioned previously, more evidence is needed to examine if the fearlessness hypothesis of psychopathy is best described by the top-down response modulation hypothesis or the bottom-up amygdala dysfunction hypothesis. Secondarily, there are no studies examining how females attend to affective stimuli. Measuring gaze-patterns could provide insight into whether or not there is a difference in the underlying neurological underpinnings of psychopathy in males and females.

To examine these hypotheses participants were presented normed affective stimuli to elicit fear, empathy, happiness, and neutral pictures while gaze-patterns were recorded. Empathy and psychopathic traits were measured using the TriPM and IRI, respectively. The TriPM, in comparison to other measures of psychopathy, is based on a three factor structure that measures variations of psychopathic personality traits, which excludes antisocial behaviors. The separate interpersonal and affective factors, combined with the exclusion of an antisocial behavior factor, makes the TriPM the preferred measure of psychopathy in non-forensic populations. Using a measure that focuses on

psychopathic personality traits allows for the examination of how emotional information is acquired at varying levels of these traits. In addition, the TriPM has shown to be a valid assessment of psychopathy in both forensic and undergraduate female populations (Sellbom & Phillips, 2013).

Hypotheses

Hypothesis 1: It was hypothesized that gender would best predict total fixation duration of experimenter defined affective areas because of the reported gender differences in amygdala sizes and presentation of psychopathy (Goldstein, et al., 2001; Vitale & Newman, 2006).

Hypothesis 2: Based on evidence showing reduced activation of the amygdala when viewing affective stimuli, it was expected that Meanness would best predict the number of fixations to the affective areas of the threatening and empathy eliciting stimuli for both genders (Kiehl, et al., 2001).

Hypothesis 3: We expect the stimuli to quickly evoke empathy, therefore we hypothesize that Perspective-Taking will be a strong negative predictor of total fixation duration for our empathy eliciting stimuli and positively related to pleasant stimuli.

Hypothesis 4: Based on evidence showing differences in disinhibited presentation it is hypothesized that, for males only, the disinhibited factor of the TriPM will best predict time to first fixation for fearful and threatening stimuli (Dolan & Völlm, 2009).

Hypothesis 5: Based on the nature of emotional empathy it is hypothesized that Perspective-Taking will be a positive predictor of the total fixation duration of the pleasant and happy stimuli (Davis, 1980).

CHAPTER 3: METHODOLOGY

Participants

Participants were recruited from a southeastern university through the psychology department's research participation pool. The sample consisted of 67 males and 79 females whose ages ranged from 18–44 years. The majority of participants were between the ages of 18 and 22 (95.89%). The majority of participants were Caucasian (85.6%), with the next largest group African American (5.5%), followed by American Indian (2.1%), Asian (1.2%) and Hispanic (1.2%) and Multiracial (0.04%).

Measures

Psychopathy was measured using the Triarchic Psychopathy Inventory, a 58-item measure that provides three scores for the three factors of Triarchic Psychopathy Model, Boldness, Meanness and Disinhibition. The response format of the TriPM is a 4-point Likert scale (1 = *true*, 2 = *mostly true*, 3 = *mostly false*, 4 = *false*). Reliability analyses were conducted for each gender for both the TriPM and the IRI. For the men the TriPM was found to have an acceptable level of reliability ($\alpha = .83$), and the reliability of the TriPM for women was also found to be acceptable ($\alpha = .80$).

Empathy was measured using the 28-item Interpersonal Reactivity Index (IRI) which measures two domains of empathy, emotional empathy and cognitive empathy (Davis, 1980). These two domains are parsed into Empathic Concern, Perspective Taking, Fantasy and Personal Distress (Davis, 1980). The IRI was found to have a low level of reliability ($\alpha = .24$). Items 13 and 21 were found to negatively affect the overall reliability of the IRI and were removed, as a result reliability for the IRI for the men was

brought to a satisfactory level ($\alpha = .74$). For the women the IRI was found to be sufficiently reliable ($\alpha = .68$), no items were found to contribute poorly enough to the overall reliability to warrant omission, the highest level of reliability that would be achieved from omission was not sufficiently higher than the original reliability ($\alpha = .69$). Test-retest reliability for the IRI has been reported after a 60-75 day interval. The three scales showed test-retest reliability of $a > .60$ (Davis, 1980). The IRI has been found to have strong predictive and discriminant validity (Sze, Gyurak, Goodkind & Levinson, 2012). Participants respond to each item of the IRI on a 5-point Likert scale (1 = *does not describe me* to 5 = *describes me very well*).

Apparatus and Stimuli

To measure gaze-patterns a Tobii TX300 Binocular Eye-Tracker (1920 x 1080 pixels) was used running Tobii Studio 3.0.0 for experimental presentation and gaze-pattern recordings. Pictures were presented in a slide show format where each picture was presented for a total of seven seconds. The entire paradigm took 3:49.315 which included pictures, slideshow transitions and instructions.

A total of 29 pictures were presented, 10 unpleasant, 10 neutral and 10 pleasant. Pictures were selected from the International Affective Picture System (IAPS) based on normed ratings of pleasantness, unpleasantness or neutrality (Lang, Bradley, & Cuthbert, 2008). The IAPS numbers for presented pictures by category are: Neutral: 2214, 2215, 2393, 2441, 2580, 5395, 7035, 7186, 7235, and 7236; Unpleasant: 1300, 1525, 2141, 2312, 2800, 2900, 3300, 3350, 6250, and 6260; Pleasant: 2020, 2040, 2070, 2071, 2208, 2224, 2303, 2395, 2550, and 4624. Of the pictures presented the pictures that were chosen for analysis include a malnourished infant (2800), hospitalized infant (3300), a Pit

Bull lunging (1300), a man with a gun (6250), a man smiling (2020), a chair (7235), and a glass (7035). The two infant pictures were used as empathy eliciting pictures, the Pit Bull and man with a gun pictures were chosen as threat conditions (unconditioned and conditioned, respectively), the man smiling, chair and glass were chosen to see if there was an effect of picture valence (i.e., unpleasant vs. pleasant vs. neutral).

Analyses

First, to define affective areas of the chosen pictures, normative heat-mapping was used to average across all participant gaze-pattern means. The affective areas, as indicated by heat-mapping, were considered the areas of interest (AOI). The AOI feature in Tobii studio was used to calculate sums for the chosen metrics. The same method used to define affective areas for the unpleasant pictures were used for the neutral and pleasant pictures as well. After this, the total fixation duration, time to first fixation and fixation count data were exported using the on-board statistics engine in Tobii studio. The eye-tracker data were found to have a high level of skew and kurtosis, some of the data had z-scores of up to 7. Therefore, all of the eye-tracker data were Winsorized and the outliers greater than 3 *SD* above the mean were converted to a z-score of 3 (Tukey, 1962).

CHAPTER 4: RESULTS

Sums for each eye-tracking metric were exported and were correlated with each facet of the Triarchic Psychopathy Measure and the Interpersonal Reactivity Index. The Fantasy scale of the IRI was used because the instrument showed a satisfactory level of reliability overall. The TriPM and IRI were correlated and the relationships found were consistent with the relationships reported in the literature (Patrick, Fowles, & Krueger, 2009). Means and standard deviations for the TriPM and IRI are presented for men and women in Table 2.

Table 2
Means and Standard Deviations for the TriPM and IRI for Men and Women

Self-Report Facets	Mean (Standard Deviation)	
	Men	Women
Boldness	56.45 (6.87)	51.30 (7.56)
Meanness	39.74 (4.96)	34.17 (4.27)
Disinhibition	38.65 (6.64)	35.26 (6.46)
Perspective Taking	21.89 (4.09)	23.84 (4.16)
Fantasy	19.54 (5.44)	22.26 (5.59)
Empathic Concern	19.69 (4.06)	24.23 (3.67)
Personal Distress	13.74 (3.61)	16.44 (4.39)

Correlations were run between each eye-tracker metric and each factor of the TriPM and IRI for both genders (see Appendix A). Any significant correlations that were found were then regressed to test our hypotheses. Total fixation duration and time to first fixation were found to be significantly negatively related for all stimuli.

Men

For time to first fixation, a significant negative correlation was found between Meanness and the happy man picture. There was also a negative relationship between Empathic Concern and the hospitalized infant picture (Table A5 in Appendix A).

Meanness was significantly positively correlated with the total fixation duration (Table A6 in Appendix A) to the neutral chair and hospitalized infant pictures. Disinhibition was found to be significantly positively correlated to the total fixation duration to the malnourished infant and the hospitalized infant pictures. Empathic Concern was found to be significantly positively related to both the malnourished infant and man with a gun pictures. Disinhibition and Empathic Concern were regressed onto the total fixation duration of the malnourished infant picture because of the significant relationships between the three. Results of the multiple regression show that both Disinhibition and Empathic Concern are significant predictors of total fixation duration for the malnourished infant.

The total fixation duration of the hospitalized infant was significantly correlated with both Meanness and Disinhibition. These two facets were regressed onto the total fixation duration and the results show that Meanness did not contribute significantly to the model. Also, no significant interactions were found for Disinhibition and Meanness.

For the fixation count metric (see Table A7 in Appendix A) Boldness was significantly negatively correlated to the Pit Bull picture and Disinhibition was significantly positively correlated to the malnourished infant picture.

Women

For the time to first fixation metric (see Table A8 in Appendix A), a significant negative correlation was found between Fantasy and the Pit Bull stimulus. For the total fixation duration (see Table A9 in Appendix A) metric Personal Distress was significantly positively correlated with the hospitalized infant picture. For the fixation count (see Table A10 in Appendix A) metric Disinhibition was related significantly negatively correlated to both the happy man picture and the neutral chair picture. Perspective taking was significantly negatively correlated to the neutral glass picture.

Gender

Regressions were done with the hospitalized infant and the malnourished infant (these stimuli were chosen because Disinhibition was already found to be a significant predictor). For the hospitalized infant picture gender was a significant predictor of the total fixation duration. Disinhibition did not add significantly to the model. For the malnourished infant, both gender and Disinhibition were significant predictors of the total fixation duration. Results show men were found to have taken significantly longer to fixate on the AOI for the Malnourished Infant and fixated for significantly less time than women, no other statistically significant differences were found.

CHAPTER 5: DISCUSSION

Previous studies have shown deficits in fear processing in individuals with psychopathy. This aberrant processing of fear has been implicated as the cause of observed psychopathic traits. Studies using adolescent males have found that CU traits are related to a lack of attention to the eyes viewing fearful stimuli (Dadds, et al., 2008; Muñoz, 2009). To date no studies have examined if this phenomenon extends to an adult population or how gender might relate to this phenomenon. The purpose of this study was to examine if gender, empathy and non-clinical elevations of psychopathic traits affect gaze patterns when viewing affective stimuli.

First, it was hypothesized, that gender would be a significant predictor of gaze patterns for the total fixation duration of the affective areas. This hypothesis was supported and is consistent with the extant literature on gender differences in psychopathy and neuroanatomy (Cale & Lilienfeld, 2002; Gong, He, & Evans, 2011). Overall, there were fewer significant relationships between gaze patterns, and psychopathic or empathic traits for women suggesting that these traits may have less of an effect on gaze patterns than in men. Second, it was also hypothesized that Meanness would be related to fixation count for both genders, but no such relationship was found. An explanation for this finding could be that individuals in our sample did not have a sufficiently high level of Meanness to show a clear relationship with gaze patterns. However, this explanation is unlikely given that both the men and women in our sample had scores similar to those of incarcerated men and women (Sellbom & Phillips, 2012; Stanley, Wygant, & Sellbom, 2012). The men in our sample exceeded the mean score for

Boldness in the same incarcerated sample but not for Disinhibition which could be explained by the settings each sample are in (Stanley, Wygant, & Sellbom, 2012). It was also hypothesized that Perspective-Taking would be negatively related to total fixation duration for the empathy eliciting stimuli for both genders. This hypothesis was not supported for either gender. In fact, the hypothesis that Perspective-Taking would be positively related to the total fixation duration of the pleasant stimulus was not supported either. Perspective-Taking was only related to fixation count of the neutral glass stimulus for women. These findings suggest that cognitive empathy may have less of an influence on gaze patterns than emotional empathy, as emotional empathy was related to gaze patterns for two of the metrics in the male sample.

It was also hypothesized that Disinhibition would best predict time to first fixation of fearful and threatening stimuli for men. This hypothesis was not supported, but for men, Disinhibition appears to have a significant effect on total fixation duration for empathy eliciting stimuli. These relationships with Disinhibition are even stronger than for either Empathic Concern or Meanness (which the latter had a stronger relationship to the neutral stimulus than to the affective stimuli). This finding is consistent with the results of a recent meta-analysis regarding the predictive ability of the PCL-R. The authors found that the antisocial/impulsive factor predicted future violence better than the interpersonal and affective facets of the PCL-R. The interpersonal and affective factors did not contribute significantly to successful prediction of antisocial behavior (Kennealy, Skeem, Walters, & Camp, 2010). This article suggests that antisocial behavior is the effect of atypically elevated levels of Disinhibition (Kennealy, et al., 2010). Consistent with the contention that Disinhibition presents differently in women our data did not

show any clear relationships between Disinhibition and any of the eye-tracking metrics for women (Dolan & Völlm, 2009).

Conclusion

Overall the data suggest that both gender and Disinhibition moderate gaze patterns to a greater degree than the interpersonal and affective factors of psychopathy, at least in a non-clinical population. Disinhibited traits appear to affect the processing of fearful stimuli at the level of sensation, a relationship not previously elucidated. These findings support the contention that Disinhibition may be the moderating factor that accounts for antisocial behavior (including the affective deficits) in psychopathy (Kennealy, Skeem, Walters, & Camp, 2010). Future research should use incarcerated individuals (both men and women) who are elevated, not only in Meanness and Boldness but in Disinhibition to see if these effects are exacerbated (Stanley, Wygant, & Sellbom; Sellbom & Philips, 2013).

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APPENDIX A

Table A1. *Multiple Regressions of Total Fixation Duration for the Malnourished Infant.*

Predictor	ΔR^2	β^a	*P*
Step 1	.15		
Disinhibition		.38	.00
Step 2	.09		
Disinhibition		.34	.00
Empathic Concern		.30	.02
Total R^2	.24		
n	57		

Note. [a] *signifies a standardized beta coefficient.*

Table A2. *Multiple Regressions of Total Fixation Duration for the Hospitalized Infant.*

Predictor	ΔR^2	β^a	*P*
Step 1	.25		
Disinhibition		.50	.00
Step 2	.26		
Disinhibition		.46	.00
Meanness		.09	.52
Step 3	.02		
Disinhibition		.41	.01
Meanness		.10	.47
Meanness X Disinhibition		.13	.31
Total R^2	.53		
n	54		

Note. [a] *signifies a standardized beta coefficient.*

Table A3. *Regression of Gender and Disinhibition for the Total Fixation Duration of the Hospitalized Infant.*

Predictor	ΔR^2	β^a	*P*
Step 1	.04		
Gender		.19	.04
Step 2	.02		
Gender		.23	.02
Disinhibition		.16	.10
Total R^2	.06		
n	117		

Note. [a] *signifies a standardized beta coefficient.*

Table A4. *Regression of Gender and Disinhibition for the Total Fixation Duration of the Malnourished Infant.*

Predictor	ΔR^2	β^a	*P*
Step 1	.07		
Gender		.27	.00
Step 2	.12		
Gender		.34	.00
Disinhibition		.22	.02
Total R^2	.19		
n	117		

Note. [a] *signifies a standardized beta coefficient.*

Table A5. *Correlations Between the TriPM, the IRI and Time to First Fixation of Affective Pictures for Men.*

Time to first fixation	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit bull	.20	-.07	-.11	-.05	.02	-.06	.08
Happy man	-.04	-.26*	-.21	.14	.12	-.02	.05
Malnourished infant	.08	.13	.00	-.06	.10	.01	-.08
Hospitalized infant	.20	-.05	-.22	-.01	-.15	-.32*	.04
Man with a gun	-.06	-.00	.00	.10	.03	-.09	-.08
Glass	-.05	.00	-.23	.00	.04	.05	-.08
Chair	.13	-.16	-.25	-.00	-.08	.01	.03

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$

Table A6. *Correlations Between the TriPM, the IRI and Total Fixation Duration of Affective Pictures for Men.*

Total fixation duration	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit Bull	-.14	.09	.22	-.07	.04	.16	-.01
Happy man	.02	.08	.11	-.10	-.03	.19	-.04
Malnourished infant	-.11	.07	.38**	-.07	.05	.35**	.01
Hospitalized infant	-.17	.28*	.50**	.01	.18	.25	-.01
Man with a gun	.11	.13	.22	.03	-.11	.35**	-.06
Glass	-.04	-.02	.09	-.16	.01	.03	.03
Chair	-.01	.41**	.25	-.17	.01	.12	.06

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$

Table A7 *Correlations Between TriPM, IRI and Fixation Count of Affective Pictures for Men*.

Fixation count	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit Bull	-.37**	-.21	.11	-.09	.14	-.02	.04
Happy man	-.00	.05	.12	.00	.00	.07	.02
Malnourished infant	-.17	.15	.26*	.02	.05	.06	.04
Hospitalized infant	-.03	.13	.20	-.04	.04	.19	-.04
Man with a gun	.07	-.07	-.02	.02	.05	-.03	-.00
Glass	-.09	-.11	-.02	-.10	.02	-.01	-.04
Chair	-.19	.14	.07	-.11	.06	-.10	.04

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$

Table A8 *Correlations Between TriPM, IRI and Time to First Fixation of Affective Pictures for Women.*

Time to first fixation	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit Bull	.11	.03	-.18	-.08	-.33**	.03	.03
Happy man	-.10	-.06	.18	-.05	.10	-.05	.10
Malnourished infant	.04	.05	-.04	-.02	-.04	-.08	.04
Hospitalized Infant	.14	-.02	.05	-.11	.03	-.14	.03
Man with a gun	-.13	-.10	-.17	-.06	-.21	.03	-.13
Glass	.19	-.13	-.10	.00	-.05	.00	-.01
Chair	-.02	.09	-.06	.08	.13	.00	.05

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$

Table A9 *Correlations Between the TriPM, the IRI and Total Fixation Duration of Affective Pictures for Women.*

Total fixation duration	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit Bull	-.01	-.07	-.06	-.07	-.06	-.02	-.09
Happy man	.05	.11	-.08	-.08	.04	.04	.08
Malnourished infant	.12	.20	.04	.01	.08	-.03	.15
Hospitalized infant	.06	.12	-.12	.09	.05	.15	.27*
Man with a gun	.00†	.16	.03	-.01	.11	-.08	.01
Glass	.09	.01	-.03	.00	-.07	.13	-.05
Chair	-.19	.00	.05	.02	.20	.01	.03

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$. † indicates $p \cong 1$.

Table A10 *Correlations Between the TriPM, the IRI and Fixation Count of Affective Pictures for Women.*

Fixation count	Boldness	Meanness	Disinhibition	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
Pit Bull	-.08	-.05	.07	-.08	-.00	-.01	-.02
Happy man	.16	-.15	-.30*	.01	-.11	.13	-.16
Malnourished infant	.00	-.11	-.07	-.09	.00	.12	-.17
Hospitalized infant	-.14	-.10	-.19	.09	.08	.22	.09
Man with a gun	-.22	.08	.03	-.02	.07	-.15	-.01
Glass	-.02	.01	-.00	-.33**	-.22	-.04	-.05
Chair	.00	-.15	-.36**	-.04	-.07	.04	-.08

Note: ** indicates significance at $p < .01$ and * indicates significance at $p < .05$