DEFICIENT AVOIDANCE AND AGGRESSION IN MEN WITH PSYCHOPATHIC TRAITS

by

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(Under the Direction of Amos Zeichner)

ABSTRACT

Cleckley (1941) posited that psychopathic individuals suffer from a "semantic dementia" in which they fail to process the emotional meaning of language. The current study sought to examine the role of "semantic dementia" in across factors of psychopathy (i.e., factor 1 [emotional detachment] and factor 2 [antisocial behavioral style]) by investigating cognitive processing of affective words, behavioral predispositions, and aggression. One-hundred and forty-four men were recruited to participate in both a noncompetitive and competitive reaction time task. During the noncompetitive reaction time task, participants responded to emotionally-valenced word stimuli through push and pull movements using a joystick. Previous work conducted by Chen and Bargh (1999) found that individuals respond quicker to appetitive (positively-valenced) stimuli when performing a pull movement and quicker to aversive (negatively-valenced) stimuli when performaing a push movement. Prior to the competitive reaction time task, which provided participants the opportunity to shock or refrain from shocking an ostensible opponent, participants were randomly assigned to either the reactive or instrumental condition. Those assigned to the reactive condition received provocation via shocks and performance feedback. Individuals in the instrumental condition were informed of a potential $20 prize conditional on accumulating more "wins" (i.e., faster reaction times than their opponent). Participants in this condition were informed that shocks negatively influence reaction time speed. This manipulation was intended to motivate participants to use aggression as a means to acquire a secondary gain. No feedback regarding performance was provided until the conclusion of the experiment to remove any potential provocation. Analyses revealed that the relationship between high levels of factor 1 (emotional detachment) psychopathy traits and aggression was moderated by level of behavioral activation and ability to correctly classify positively- and negatively-valenced words. No significant relationships were noted for reaction time, factor 1, and aggression. Significant results provide support to the role of "semantic dementia" and suggest possible subtypes of factor 1 psychopathy based upon levels of behavioral activation.

INDEX WORDS: Psychopathy, Aggression, Violence

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CHAPTER 1

INTRODUCTION

Aggression

Aggression directly or indirectly affects our daily lives. News reports provide countless examples of aggressive acts committed locally, nationally, and abroad. The Federal Bureau of Investigation's Uniform Crime Reports documented that 1,367,009 violent crimes were committed in the United States during 2004 (Federal Bureau of Investigation – Uniform Crime Reports, 2004). Violent crimes, as defined by the Uniform Crime Reports, are reported cases of murder, non-negligent manslaughter, forcible rape, robbery, and aggravated assault. Analysis of violent crime over the last 13 years has documented a small but consistent decrease in the rate perpetrated. Nevertheless, the seriousness of violent crime remains a societal concern with murder occurring every 32.6 minutes, forcible rape every 5.6 minutes, robbery every 1.3 minutes, and aggravated assault every 36.9 seconds in the United States. Consequently, continuing to strive toward attaining a better understanding of the factors that predispose individuals to be at risk to perpetrate aggression and violence is of utmost importance.

Baron (1977) conceptualized aggression as, "any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment." Berkowitz (1993) elaborated upon this conceptualization by referring to aggression as a deliberate behavior intended to achieve a particular goal – injuring another person. Common to these approaches is the assertion that aggression often serves as a mechanism of causing harm to another in order to achieve a particular goal.

The manner in which an individual perpetrates aggression to attain a particular goal can take multiple forms. Examples include physical, verbal, direct, and indirect forms of aggression. Conceptually, it has most widely been asserted that aggression be categorized according to instrumental (also referred to as proactive) and reactive (also referred to as impulsive, affective, hostile, angry, or emotional) forms (Bushman & Anderson, 2001). Instrumental aggression is posited to encompass behaviors in which an attack is primarily intended to attain a goal rather than being primarily motivated by the desire to cause harm to someone. In this form, aggression is carried out for an extrinsic purpose, or secondary gain, rather than for the pleasure of doing harm. Reactive aggression, however, refers to behaviors motivated primarily by the desire to hurt or harm another.

Anderson and Bushman (2002) combined several definitions (e.g., Baron & Richardson, 1994; Berkowitz, 1993; Bushman & Anderson, 2001; Geen, 2001) to construct a succinct and exhaustive definition of aggression that conceptualizes the relationship between instrumental and reactive aggression. They defined human aggression as "any behavior directed toward another individual that is carried out with the proximate intent to cause harm, and during which, the perpetrator must believe that the behavior will harm the target, and the target is motivated to avoid the behavior (p.28)." This definition dismisses circumstance of accidental harm due to lack of intent. Additionally, Anderson and Bushman (2002) distinguish *violence* as a form of aggression in which extreme harm is the goal (e.g., physical injury or death). Notably, while all violence is aggression, aggression may occur in the absence of violence (e.g., verbal aggression). With regard to the current study, *aggression* and *violence* will be used interchangeably in reference to only violent acts of aggression as the current study involves aggressive acts intended to be harmful to another individual through the administration of shocks.

The distinction between instrumental and reactive forms of aggression has been utilized to differentiate between planned and impulsive aggressive behaviors. Nevertheless, critics suggest that the dichotomization of aggression into these categories is limiting. Bushman and Anderson (2001) argued that such a distinction impedes advances in examination and management of human aggression. They propose that the distinction between the two forms may be improved upon by identifying the primary goal, presence of anger, and level of planning involved. For instance, since reactive aggression is primarily motivated by the goal to cause harm to another, it is typically committed with high concomitant arousal, and is marked by a lack of planning or forethought. Instrumental aggression, however, usually occurs in the absence of emotional arousal and is committed in order to attain secondary gain (e.g., money; Berkowitz, 1993). Due to the role of secondary gain, instumental aggression often involves more planning relative to reactive aggression. Conceptualizing forms of aggression as a dichotomy may be inaccurate as aggressive acts rarely exist in pure form (i.e., either reactive or instrumental). For example, a husband may physically abuse his wife in order to either assert dominant status or in reaction to increased levels of emtional arousal. In this situation, aggression may be conceptualized as a means to attain secondary gain (i.e., dominance) or as a reaction to affective arousal.

Despite a movement toward consideration of mixed motives of aggression (i.e., aspects of both reactive and instrumental), there continues to be a need for categorizing aggressive behaviors. To accommodate this need, it may be beneficial to examine initial motivating factors. In an example drawn from actual events, it may be helpful to reflect upon the shootings committed by Eric Harris and Dylan Klebold, at Columbine high school in Littleton, Colorado in April of 1999. In the incident, in which 13 classmates were murdered and more than 30 were wounded, there appeared to be careful, premiditated planning. Further information gleaned about the two shooters during the investigation indicated that they had experienced years of provocation by peers. Problems with the classic dichotomy of aggression arise as it appears that Mr. Harris and Mr. Klebold's behaviors may be conceptualized as both instrumental, due to the careful planning involved, and reactive, due to their desire to harm those who had caused them to experience negative affect over years through insults, ridicule, and social ostracism. Hence, purely basing categorization upon unpleasant arousal and planning as distinction criterion in this example may be misleading and potentially inaccurate. In order to increase accuracy it may be more appropriate to classify Mr. Harris and Mr. Klebold's actions based upon the initial motivating factor, their emotional reaction to peers' provocations. One could pose the argument that premeditation (e.g., obtaining firearms, creating a list of students to murder) coupled with the possibility that Mr. Harris and Mr. Klebold used aggression as a means to assert dominance on their victims may be proof of secondary gain and instrumental aggression. However, the secondary gain appears to be a consequence of the initial emotional reaction in response to provocation. Therefore, the distinction between forms of aggression in this example provides a model for examining initial motivating factors (i.e., reaction to unpleasant arousal versus secondary gain) as a more accurately means of conceptualizing aggressive behaviors.

Psychopathy

Baron (1977) proposed that an individual's actions in a given context derive from situational variables (e.g., stress, intoxication) as well as an individual's traits (e.g., narcissism). As such, personality plays a pivotal role in determining the likelihood that a given person will become aggressive toward others (Baron, 1977). One personality trait that has consistently been shown to relate to an increased likelihood of aggressive behavior is psychopathy (Hart & Hare, 1997). Overall, psychopathic offenders have shown to consistently commit more violent and nonviolent crimes relative to their non-psychopathic counterparts from adolescence to their late 40s (Harpur & Hare, 1994). Serin and Amos (1995) found that psychopathic individuals were approximately five times more likely to engage in violent recidivism within 5 years of release from incarceration compared to non-psychopaths. Psychopaths have also demonstrated an increased likelihood to be involved in a spectrum of violent behavior including severe forms of sexual violence (Brown & Forth, 1997; Hare, Cooke, & Hart, 1999), targeting multiple victim types (Porter et al., 2000), and antigay violence (Parrott & Zeichner, 2006). Psychopaths have also been found to commit significantly more instrumental homicides than their non-psychopathic counterparts (Cornell et al., 1996; Woodworth & Porter, 2002). Collectively, these findings bolster the conceptualization proposed by Cleckley (1941) who described psychopaths as individuals demonstrating significant emotional deficiencies and antisocial behaviors.

McCord and McCord (1964) described the psychopath as, "an asocial, aggressive, highly impulsive person, who feels little or no guilt and is unable to form lasting bonds of affection with other people and represents a major danger to society" (p. 3). Psychopathy is believed most commonly to be composed of two distinct factors (Hare, 2003; Harpur, Hakstian, & Hare, 1988; Harpur, Hare, & Hakstian, 1989). The first factor (factor 1), *emotional detachment*, comprises emotional and interpersonal aspects that include affective shallowness, lack of shame, superficial charm, manipulativeness, grandiosity, absence of empathy, lack of remorse, and lying. The second factor (factor 2), *antisocial behavioral style*, is characterized by impulsivity, low socialization, proneness to boredom, lack of concern or plans for the future, irresponsibility, aggression, early-life behavioral problems and delinquency, substance abuse, high sensation seeking, and low motivation (Cleckley, 1976; Harpur, Hare, & Hatskian, 1989; Kiehl et al., 2001; Patrick, Cuthbert, & Lang, 1994; Pitchford, 2001; Smith & Newman, 1990; Woodworth & Porter, 2002). Empirical evidence has also demonstrated a strong relationship between forms of instrumental aggression and emotional detachment features of psychopathy, whereas reactive aggression has been more closely associated with antisocial behavioral features (Cornell et al., 1996; Patrick & Zempolich, 1998).

Current estimates report that clinical forms of psychopathy exist in approximately 1% of the general population and in approximately 15% to 25% of the incarcerated population (Keihl et al., 2001). Notably, psychopathic offenders are believed to account for a disproportionate percentage of violent crimes with approximately 50% of serious crimes being committed by this population (Hare, 1993; Hare & McPherson, 1984). The explanations for the disproportionate number of crimes committed by psychopaths continue to be debated by the scientific community. In general, researchers in the field appear to concur that actions of psychopathic individuals are related to an interaction between biological deficits and deficient socialization process (Blair, 1995, 2001; Gorenstein & Newman, 1980).

Exploration in the area of the biological foundation of psychopathy has yielded multiple leads. By examining prefrontal glucose in murderers from high SES backgrounds and intact homes, Raine, Stoddard, Bihrle, and Buchsbaum (1998) discovered significant deficits in prefrontal glucose metabolism. Laakso et al. (2001) demonstrated a negative correlation between scores on the Psychopathy Checklist-Revised (PCL-R; Hart, Hare, & Forth, 1994), the most widely used psychopathy assessment instrument for clinical and forensic samples, and regional volumes of anteroposterior axis of the hippocampus. Other studies have discovered relationships between criminal behaviors (e.g., murder, assault) of psychopathic individuals and structural abnormalities in the orbital frontal cortex (Damasio, Tranel, & Damasio, 1990), prefrontal cortex (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999; Bechara, Damasio, Damasio, & Anderson, 1994; Raine, Lencz, Bihrle, LaCasse, & Colletti, 2000), limbic structures such as the amygdala (Patrick, Bradley, & Lang, 1993; Patrick, Cuthbert, & Lang, 1994), the cingulate (Tranel & Damasio, 1994) and other cortical areas.

Perhaps one of the most comprehensive attempts to elucidate the interaction between biological deficiencies and the behaviors of psychopathic individuals is provided by Damasio's *Somatic-Marker* hypothesis (Damasio, 1994; Damasio, Tranel, & Damasio, 1991). This neuropsychological model of behavior attempts to integrate motivational, affective, and information-processing factors. Damasio (1994) proposes that selecting the most adaptive behavior is informed when affective states "mark" cognitions. In absence of an affective "mark," individuals become unable to differentiate between appetitive and aversive stimuli in their environment, which negatively affects their ability to determine the ultimate consequence of their actions. Evidence provided by ventromedial frontal (VMF) lesions in humans demonstrates how VMF patients, who typically lack affective markers to anticipate the consequences of their actions, have been shown to experience problems in living such as inappropriate social behavior, failure to plan ahead, irresponsibility, and indecisiveness (Damasio, 1994; Saver & Damasio, 1991). The composite of these features led Demasio (1990; 1994) to diagnose VMF patients with "acquired sociopathy."

A model proposed by Blair (1995) referred to as the *violence inhibition mechanism model (VIM)*, posits that an innate biological system exists to respond to cues of sadness and fear. This system is considered crucial to the moral socialization process responsible for allowing an individual to learn to inhibit behaviors that produce sad or fearful responses in another. Specifically, "moral socialization" occurs through pairing cues of sadness and/or fear shown in a victim with activation of an innate biological system. As these associations are strengthened, an individual also forms representations of the act that precipitated the specific distress cues in another individual (e.g., fear is associated with a person threatened by another; Blair, 1995). As most humans are believed to innately find distress in another individual aversive, the mechanism is believed to reduce the likelihood of committing actions that will cause distress in others (Blair, 1995; Blair, Jones, Clark, & Smith 1997). Blair argues that a psychopath's deficiency regarding appropriate social development is directly associated with the deficient functioning of this mechanism (Blair et al., 2002). Support for the model was provided by research demonstrating how psychopathic individuals show deficient autonomic responses to the distress in another individual (Aniskiewicz, 1979; Blair, 1999; Blair et al., 1997; House & Milligan, 1976). Furthermore, individuals with high levels of psychopathic traits in childhood and adulthood demonstrate impaired identification of sad and fearful facial and vocal affect relative to those with lower levels of psychopathic traits. This finding is believed to bolster the position that dysfunction of innate mechanisms leads to deficiencies in recognizing and reacting to cues of sadness and fear (Blair, Colledge, Murray, & Mitchell, 2001; Stevens, Charman, & Blair, 2001).

In work conducted by Patrick (1994), the deficient socialization of psychopathic individuals was conceptualized in terms of the *low-fear model*. This model posits that a core feature of psychopathy, emotional detachment, may account for deficiency in fear response, which is the failure of aversive cues to prime normal defensive actions. This emotional deficit may to lead to inappropriate socialization and represent a severe variant of normal temperament (Patrick, 1994). Vrana, Spence, and Lang (1988) found that non-psychopathic individuals exposed to aversive slides (e.g., mutilations, snakes) demonstrate heightened startle responses (i.e., eye blink) compared to neutral slides. These results have since been replicated (e.g., Bradley, Cuthbert, & Lang, 1990, 1991; Bradley, Lang, & Cuthbert, 1990; Hamm, Stark, & Vaitl, 1990; Levenston, Patrick, Bradley, & Lang, 2000; Patrick, 1994; Patrick, Bradley, & Lang, 1993). Explanation of this effect is based upon work conducted in the area of emotion as action tendencies (Fridja, 1986). Specifically, emotionally-valenced stimuli (i.e., pleasant or unpleasant) act as a prime in a motivational system inherent within each organism that activates either approach or avoidance behavior (Gray, 1972, 1981). Psychopaths, however, demonstrate a deviation from the explanation relative to their non-psychopathic counterparts. For instance, psychopathic samples have consistently demonstrated an impaired startle reflex potentiation response to aversive stimuli, providing evidence of a reduced fear response (Levenston, Patrick, Bradley, & Lang, 2000; Patrick, 1994; Patrick, Bradley, & Lang, 1993). Together, these and similar findings support the argument that the psychopath's violent and antisocial behavior may be due to an inability to experience negative emotion and to recognize it in others (Blair, 2001; Kosson, Suchy, Mayer, & Libby, 2002; Patrick, Cuthbert, & Lang, 1994).

When considered collectively, the *somatic marker* hypothesis, *violence inhibition model*, and the *low-fear model*, all propose that psychopathy derives from an initial underlying biological deficiency leading to subsequent deficits in the domains of emotion, cognition, and behavior. Over time, these deficits cause many of the maladaptive outcomes associated with the psychopathic personality.

Patrick (1994) found that psychopathic and non-psychopathic individuals did not differ on their ratings of aversive slides. However, psychopathic individuals' demonstrated reduced startle potentiation, a reflexive measure of fear, in response to aversive slides compared to non-psychopathic individuals. These findings are congruent with Cleckley's theory that psychopathy is marked by a severe affective deficit that is masked by a superficial grasp of "emotional language." Cleckley (1941) hypothesized that the pathological characteristics that define the psychopathic individual may all be attributed to a core deficit, "semantic dementia," comprised of a failure to process emotional meaning of language. Support for this view has been established through evidence of disparate affective reactions between psychopathic individuals and their non-psychopathic counterparts regarding linguistic cues (Williamson, Harpur, & Hare, 1991). Specifically, this study found that linguistic cues developed through prior associations provoked stronger affective reactions in non-psychopathic subjects and elicited reduced emotional response in psychopaths. This evidence is consistent with a statement made by Johns and Quay (1962) in which they suggested psychopaths know the "words" of emotion but not its "music."

Attitude Activation and Behavioral Predispositions

Affective language, which has been used in previous studies examining psychopaths' deficient somatic responses to emotional words (e.g., Williamson, Harpur, & Hare, 1991), is believed to develop through associations of environmental cues with emotional experiences over time (Bargh, Chaiken, Govender, & Pratto, 1992). In a reaction time study conducted by Bargh et al. (1992), activation of attitudes (i.e., good, bad) toward cues in the environment was found to be an automatic process described as "pervasive and unconditioned." In addition, the study discovered that the majority of evaluations (i.e., good, bad) stored in memory, including both social and nonsocial cues, are activated automatically in the presence or mention of the cue. Chen and Bargh (1999) demonstrated that the automatic activation of attitudes interacts with behavioral predispositions toward a stimulus, such that positive evaluations produce immediate approach tendencies and negative evaluations produce immediate avoidance tendencies. Specifically, this study found that participants react more quickly to negatively-valenced stimuli when pushing a lever away from themselves (avoidance behavior) than when pulling it toward them (approach behavior). Participants also reacted more quickly to positive-valenced stimuli when pulling a lever toward themselves (approach behavior) than when pushing it away from themselves (avoidance behavior). Other studies have provided support for the interaction between automatic attitude activation and behaviors. For example, Cacioppo, Priester, and Berntson (1993) found that ideographs presented during an arm flexion were evaluated subsequently to be more positive than ideographs presented during arm extension. The authors cite the *motor processes hypothesis* to explain how the relationship between behaviors and attitude activation develops. This hypothesis proposes that the reflexive/automatic activation of attitudes and behavioral predispositions occurs over the course of numerous pairings of somatic responses and behaviors during an individual's lifetime. In the aforementioned study, somatic and automatic attitude activation is coupled with arm flexion-approach and arm extension-avoidance associations repeatedly during an individual's life in response to aversive and appetitive stimuli. These associations are adopted into nondeclarative memory and influence future attitudinal effects of arm flexion versus extension. The *motor processes hypothesis* does not suggest that people do not grasp and consume unpleasant stimuli (e.g., unpleasant foods) or avoid a pleasurable stimulus (e.g., pleasant foods while dieting). Rather, such actions are considered to be in contrast with the avoidance behaviors and acquisition behaviors prompted by appetitive and aversive stimuli, respectively, which have been engrained over time in individuals' repertoire. Therefore, deviations from these engrained associations are believed to require more thought about the stimulus, produce more conflict, and entail more self-control. Further support for these results is found in the theory and research dedicated to classical conditioning of human attitudes (Zanna, Kiesler, & Pilkonis, 1970). This research discovered that, when in contact with a nociceptive stimulus, an arm extension is coupled temporally with the onset of an unconditioned aversive stimulus. In retrieving a desirable object, arm flexion is coupled closely, temporally, to the acquisition or consumption of the desired object.

Behavioral Approach and Inhibition Systems

Research conducted by Izard (1993) and Lang (1979) found support for conceptualizing emotions in terms of two opponent motive systems. These systems, an appetitive system that controls approach behavior and engagement with the environment, and a defensive system that elicits avoidance and protection against danger (Lang, 1995). Lang, Bradley, and Cuthbert (1997) propose that appropriate functioning of this system is essential to survival in natural settings.

Similarly, Gray (1972, 1981) proposed a theory in which he postulated two dimensions of personality, anxiety and impulsivity. Incorporated within this theory is the position that an individual's physiology is governed two mechanisms. The first acts to regulate aversive motivation (behavioral inhibition system [BIS]) whereas the other regulates appetitive motivation (behavioral approach/activation system [BAS]). According to Gray, the BIS is hyperresponsive to punishment signals, novelty, and nonreward. It is also generally considered to be associated with weak inhibition of impulses and anxiety in response to impending punishment (Fowles, 1980; Gray, 1985). The BAS, in contrast, is believed to be responsive to reward signals, escape from punishment, and nonpunishment. Gray (1977, 1981, 1990) has also suggested a causal link between the BAS and the experience of positive feelings such as hope, elation, and happiness. Together, these tendencies are believed to cause increased movement toward goals and likelihood, engagement in goal-directed efforts, and experience of positive feelings during exposure to cues of possible reward. Other theorists have concurred with these associations (Cloninger, 1987; Depue & Iacono, 1989; Depue, Krauss, & Spoont, 1987).

While Gray's work has primarily focused on animal behavior and drug effects, rather than on studies of human behavior and affect, it is believed to provide insights into human personality. Based upon an individual's responsiveness along the two systems (i.e., BIS/BAS) to two classes of stimuli (i.e., aversive and appetitive), it may account for various kinds of behavioral problems (Fowles, 1987, 1988, 1993; Quay, 1988, 1993). For instance, Fowles (1980) and Gray (1985) suggest that at a heightened BAS may underlie the sociopathic personality. A study conducted by Harmon-Jones (2003), concluded that BAS is related to anger in addition to its typical association with positive affect. The study also discovered that physical aggression was positively related to BAS and negatively related to BIS. Additionally, Depue and Iacono (1989) have indicated the role of heightened BAS as one of the underpinning factors of bipolar disorder. Quay (1988, 1993) also argued that an overactive BAS and BIS may be associated with the development of childhood conduct disorder and anxiety disorders, respectively. Lykken (1995) hypothesized that primary psychopathy (factor 1) would be associated with a weak BIS and a normal BAS, whereas secondary psychopathy (factor 2) was predicted to be associated with a strong BAS and normal BIS. Newman, MacCoon, Vaugh, and Sadeh (2005) provided support for Lykken's prediction regarding BIS/BAS and factor 1. However, the authors found that factor 2 was associated with a strong BAS but provided mixed support for the relationship with BIS. The relationships noted between the BIS and BAS systems and human psychopathology illustrate how appetitive and aversive motivational systems are likely to inform conceptualizations of psychopathology. However, Fowles (1988, 1993) warns that these illustrations do not exhaust the ways in which relationships exist, prompting further empirical evaluation and examination of inconsistencies.

Statement of Purpose

The current study sought to elucidate the relationship between cognitive processing of aversive and appetitive stimuli, behavioral predispositions, aggression, and psychopathy. To add credence to previous theories that have linked psychopathy with Gray's theory of brain function and behavior (Gray 1972), the role of BIS/BAS were examined across factors of psychopathy. Predictions regarding the relationship between BIS/BAS and factors of psychopathy were based upon Gray's original conceptualization, and diverge from those posited by Lykken (1995) and Newman, MacCoon, Vaughn, and Sadeh (2005). Specifically, BIS was predicted to be positively related to factor 2 of psychopathy and moderate levels of aggression in the reactive condition. This link was based upon the positive relationship between anxiety and antisocial behavior captured within the BIS construct (Pine et al., 2000; Robbins, Tipp, & Pryzbeck, 1991; Russo & Beidel, 1993; Zoccolillo, 1992). BAS was predicted to be positively related to factor 1 of psychopathy and moderate levels of aggression in the reactive and instrumental conditions. This prediction was based upon theories suggesting that the BAS is associated with "sociopathic personality" (Fowles, 1980; Gray, 1985), conduct disorder (Quay, 1988, 1993), and self-reported aggression (Harmon-Jones, 2003). Additionally, BIS was predicted to be negatively related to factor 1. This expectation was based upon research that has found factor 1 to be negatively related to levels of anxiety (Frick et al., 1999; Patrick, 1994; Verona et al., 2001).

Williamson et al. (1991) demonstrated slowed reaction times to negatively-valenced word stimuli in a psychopathic group compared to a non-psychopathic group. This finding and others previously cited support the presence of a "semantic dementia" that may influence behavioral responses in psychopathic individuals. Therefore, it was predicted that individuals with high factor 1 would show significant deficits in approach and avoidance behavior (slower reaction times) in response to negatively- and positively-valenced stimuli relative to participants with low factor 1 scores. This expectation was based upon a diminished capacity for empathy and emotional responsiveness in those with elevated factor 1 scores. Individuals with elevated factor 1 scores were also predicted to demonstrate significantly more errors while identifying negative and positive words on the joystick reaction task. Overall, it was hypothesized that word errors and average reaction times would moderate the level of aggression, with increased errors and reaction times to positive and negative words moderating the relationship between heightened factor 1 scores and aggression in both conditions. In general, it was predicted that approach tendencies (pull) associated with positive words would be significantly faster than avoidance tendencies (push) associated with negative words. This finding was expected to provide support to similar findings cited by Chen & Bargh (1999).

Identifying different elevations across factors of psychopathy may assist in elucidating the disparate behavioral manifestations that range from the most violent individuals to those who are contributing members of society and unknown to the legal system (Cleckley, 1976; Hare, 1993; Simourd & Hodge, 2000). A limited number of studies have examined differences between elevations in factors of psychopathy and their distinctive relation to reactive aggression and instrumental aggression (Cornell et al., 1996; Serin 1991; Woodworth & Porter, 2002). The present investigation sought to examine different elevations in factor 1 and factor 2 psychopathy scores and aggression in reactive and instrumental conditions. In particular, elevations of factor 1 were hypothesized to be significantly associated with aggression in the reactive and instrumental conditions relative to those lower on factor 1. Individuals with high levels of factor 2 psychopathy scores were predicted to express greater levels of reactive aggression relative to those lower on factor 2 (Patrick & Zempolich, 1998).

CHAPTER 2

METHOD

Participants and Experimental Design

One-hundred and forty-four men were recruited from the University of Georgia Research Participant pool and participated in the current experimental study as volunteers. Participants were informed that the purpose of the study was to examine reaction time in non-competitive and competitive situations. All participants received research credit for their participation in the study. The exclusion of females and recruitment of males between the ages of 17 and 34 is based upon the Uniform Crime Reports (2004) documenting high prevalence of violent crime in this demographic.

This study had six independet variables: Factor 1 (a continuous variable), Factor 2 (a continuous variable), BIS (a continuous variable), BAS (a continuous variable), and aggression condition (instrumental and reactive). Participants were randomly assigned to either the instrumental aggression condition (n = 72) or the reactive aggression condition (n = 66). Those in the instrumental condition received no shocks or feedback (i.e., “win” or “loss”) following each trial to avoid reactive forms of aggression (i.e., avoid any aggressive responses in reaction to being shocked or receiving feedback). In the reactive condition, shocks were generated using a Precision Regulated Animal Shocker (Coulbourn Instruments, Allentown, PA) and administered in a pre-determined configuration. In this condition, participants received electric shocks on 50% of the trials. Levels of psychopathic traits were indicated by participants's responses on the

Levenson Self-Report Psychopathy Scales (LSRP; Levenson et al., 1995) and Psychopathy Personality Inventory - short form (PPI; Lilienfeld, 1990).

Instruments

Ninety-Two Attitude-Object Stimuli (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio et al., 1986). The current study utilized the 15 highest (most *positive*) and 15 lowest (most *negative*) from the 92 attitude-object words originally compiled by Fazio et al. (1986). The 92 attitude-object words have been used in previous automatic attitude research and allow for examination of automatic behavioral dispositions (i.e., approach and avoidance behaviors). The selection of the words for the current study was based upon research conducted by Bargh, Chaiken, Govender, and Pratto (1992). By selecting the 15 highest and 15 lowest rated words from the 92 attitude-object words in this study it was hoped to obtain words with the most salient emotional valence.

Levenson Self-Report Psychopathy Scale (LSRP; Levenson, et al., 1995). The LSRP was designed for use in nonforensic settings to assess affective and behavioral features of individuals not identified as criminals (Epstein, Poythress, & Brandon, 2006). The LSRP is a 26-item Likert-type scale comprising two subscales that assess two domains of the psychopathic personality. The Factor 1 scale (Cronbach α = .82), reflects a callous, manipulative, and selfish use of others (e.g., “For me, what’s right is whatever I can get away with”). Factor 2 scale (Cronbach α = .63), assesses impulsivity and poor behavioral control (e.g., “When I get frustrated, I often let off steam by blowing my top”). The Total scale is a measure that represents a composite of both the Factor 1 and Factor 2 scales. Respondents rate each item on a scale from “1” (*disagree strongly*) to “4” (*agree strongly*), with higher scores indicative of higher levels of psychopathy. In the current sample, Cronbach's alphas were α =.85 (*M* = 31.8, *SD* = ±7.6*)*, α = .66 (*M* = 20.1, *SD* = ±4.1*)*, and α =.86 (*M* = 51.9, *SD* = ±10.4*)* for Factor 1, Factor 2, and Total, respectively. Standardized scores (z-scores) were computed and utilized during analyses to ensure use of the same unit of measurement. This procedure reduces potential error that may be introduced by using different metrics.

The BIS/BAS Scales (Carver & White, 1994). The BIS/BAS Scales is a 20-item questionnaire with four scales: BIS (7 items), BAS – Reward Responsiveness (5 items), BAS – Drive (4 items), and BAS – Fun Seeking (4 items). Each item is rated on a scale from 1 (*strongly agree*) to 4 (*strongly disagree*). The BIS subscale assesses sensitivity to aversive stimuli (e.g., anxiety related to making a mistake), whereas the BAS subscales measure sensitivity to anticipate/acquired rewards, willingness to approach new appetitive stimuli, and motivation to achieve desired goals. Since all three BAS subscales strongly loaded on a second-order BAS factor in the current and previous studies (e.g., Harmon-Jones, 2003; Newman et al., 2005), a BAS composite score was used. In the current sample, Cronbach's alphas were α =.74 (*M* = 19.4, *SD* = ±3.3*)* and α = .76 (*M* = 13.4, *SD* = ±1.5*)* for BIS and BAS, respectively. Total BAS and BIS scores were transformed into z-scores for analyses.

Approach-Avoidance Joystick Task. The present study utilized *DirectRT v2004: Research Software* (Jarvis, 2004 [Empirisoft]) in order to coordinate joystick movements (push ["positive"] and pull ["negative"]) with the 30 words selected from the 92 attitude-object words presented on a computer screen. This task was introduced during the first part of the experiment, which investigated how quickly participants can classify words on the computer screen as "positive" or "negative." All participants are instructed to push the joystick away from them if the word has a negative meaning and to pull the joystick toward them if the word has a positive meaning. In the current study, the mean reaction times were 771ms and 829ms for positive and negative words, respectively. The average number of correctly identified positive words was 14.1 out of 15 and 13.8 out of 15 for negative words. Number of words correctly identified, labeled Positive Count and Negative Count, and reaction times for each participant, labeled Positive Average and Negative Average, were transformed into z-scores for analyses.

Psychopathic Personality Inventory (PPI; Lilienfeld, 1990) – *Short Form*. The original PPI was developed originally to assess the core features of psychopathy in nonclinical samples, although it has also been used to assess psychopathy in incarcerated samples (e.g., Poythress, Edens, & Lilienfeld, 1998). In addition to a total score, the PPI contains eight factor-analytically developed subscales (Social Potency, Coldheartedness, Fearlessness, Impulsive Nonconformity, Stress Immunity, Machiavellian Egocentricity, Blame Externalization, and Carefree Nonplanfulness). For the current study, the 56-item short form of the PPI was used, which has been found to correlate $r = .90$ or above with the full PPI in several samples (Lilienfeld & Andrews, 1996). Using principal components analyses conducted by Wilson, Frick, and Clements (1999) and Lilienfeld and Hess (2001) items from the PPI – short form subscales have been designed to assess a two-factor structure of psychopathy. Social Potency, Coldheartedness, Fearlessness, Impulsive Nonconformity, and Stress Immunity items assess Factor 1, whereas Machiavellian Egocentricity, Blame Externalization, and Carefree Nonplanfulness items assess Factor 2. Cronbach's alphas for the PPI – short form total scores ranged from .85 to .94 (Edens, Poythress, & Lilienfeld, 1999; Lilienfeld & Andrews, 1996; Lilienfeld &

Hess, 2001). With regard to the current study, Cronbach's alphas were $\alpha = .35$ ($M = 88.3$, $SD = \pm 10.7$), $\alpha = .37$ ($M = 40.0$, $SD = \pm 6.8$), and $\alpha = .21$ ($M = 128.4$, $SD = \pm 12.0$) for Factor 1, Factor 2, and Total, respectively.

Response-Choice Aggression Paradigm (RCAP; Zeichner, Frey, Parrott, & Butryn, 1999; Zeichner, Parrott, & Frey, 2003). Under the guise of a 30-trial reaction time competition, participants used a white, metal console (i.e., reaction time/aggression console) fitted with a reaction time switch, as well as 10 electrical switches and corresponding light-emitting diodes. The 10 switches, numbered consecutively "1" through "10" are used by the participants, as they wish, to ostensibly deliver electrical shocks to an opponent as a means of "punishment."

This paradigm comprises a modification to the original TAP (Taylor, 1967) in which over the course of the reaction time competition, participants are free to deliver fictitious shocks to the confederate following both "win" and "loss" trials rather than only following a "loss" trial. In addition, participants are informed that they may choose not to deliver any shocks throughout the reaction time competition in contrast to the original construction, which instructed participants to administer shocks after each "loss" trial. This variation of the original TAP was developed to provide participants with the option to not respond aggressively in hopes of making the task more generalizable to real-world situations.

Seven measures of physical aggression are derived from the RCAP. *Mean shock intensity* (SI), which is calculated as the mean of the shock intensities selected across trials on which a shock is delivered by participants to ostensibly shock their opponent. This measure is conceptualized as a measure of direct physical aggression and is based upon the selected shock intensities ostensibly delivered to the other participant (confederate). *Mean shock duration* (SD) is based on the average duration participants depress and hold the shock keys across trials. This measure is representative of an expression of physical aggression than has a less discrete form than that of SI. *Proportion 10* (P10) is computed as the proportion of trials on which the highest available level of shock is selected, relative to the number of trials during which a shock is delivered. This represents the degree to which participants display extreme levels of aggression when they choose to respond in an aggressive manner. All of the measures stated to this point are considered indices of magnitude of aggressive behavior.

The remaining aggression indices of the RCAP relate to the ability of participants to refrain from aggressive responses in addition to the moment at which participants decide to aggress. *Shock Frequency* (SF) is based on the number of trials during which shocks are selected. *Flashpoint-Latency* (FP) pertains to the interval provided by the number of elapsed trials during which no shock is selected. *Flashpoint-Intensity* (FPI) is a measure of the intensity of the first shock selected and *Flashpoint-Duration* (FPD) is the duration of the first shock selected.

Several of the aggression indices captured by the RCAP were combined to form three distinct measures. Prior research has suggested that shock intensity, duration, and frequency reflect a similar underlying phenomenon (i.e., general aggression [GA]; Carlson, Marcus-Newhall, & Miller, 1989). Therefore, a GA index was created by summing the standardized values of these measures. A second composite index, Initial Aggression (IA), was created by summing the standardized values of first shock intensity and duration to indicate the level at which participants initiated aggression. Third, P10 was analyzed individually and composes the Extreme Aggression (EA) index. Similar indices were constructed and utilized in a study conducted by Reidy et al. (2008).

Procedure

Research volunteers responded to an advertisement for a study entitled, "Examination of reaction time in non-competitive and competitive situations." Gender and age were used as inclusion criteria (i.e., male, age 18-35 years). Upon arrival for a scheduled appointment, participants were greeted by the experimenter and brought to the experimental chamber. Participants were allowed to view an adjacent chamber, the door of which was left ajar to facilitate participants' belief that it was housing another participant. Participants were seated facing the reaction time/aggression console. After administering the informed consent form for the experimental procedure, participants were provided with general information regarding the study. They were told:

> "Prior studies have suggested that reaction time is influenced by elements of competition and emotionally-valenced object words. Unfortunately, there have been only a few studies that have examined this relationship directly. Today, we will be attempting to examine the relationship between these elements and how they associate with certain personality types."

Next, participants were informed of the different components of the experiment, which included: (1) completion of questionnaires, (2) participation in a non-competitive reaction time task dedicated to the rating of emotionally-valenced words, (3) assessment of participants' subjective pain threshold, and (4) a competitive reaction time task.

Following the brief introduction, participants were asked to complete a packet of questionnaires (Demographic form, LSRP, PPI - short form, BIS/BAS Scales). Participants were told that these questionnaires would allow for the evaluation of personality influences that may relate to their reaction time results. Participants were assured of the confidentiality of their data.

Following completion of questionnaires, participants were seated in front of a computer screen with a joystick placed next to their dominant hand. A label marked "+" was affixed to the base of the joystick closest to participants while another label marked "-" was affixed to the base of the joystick farthest from participants. Participants were asked to pay close attention to words presented on the center of the computer screen and to evaluate each word as quickly and accurately as possible according to whether it is "positive (+)" or "negative (-)." The experimenter first demonstrated how to properly use the joystick by responding randomly to letters of the alphabet appearing in the center of the computer screen. Next, participants performed 10 practice trials during which they responded to the words "Push" and "Pull," presented in the center of the computer screen. These practice trials were included to provide a baseline for reaction time to neutral stimuli and allow each participant to familiarize themselves with movements of the joystick in a given direction. Following these trials, participants were presented with 10 additional practice trials. Items included in these trials incorporated randomly selected negatively- and positively-valenced words intended to allow participants to practice responding to emotionally-valenced word stimuli. All remaining questions about the task were answered before the experimenter initiated the experimental trials and left the chamber.

Each attitude object stimulus appeared in the center of the computer screen until participants move the joystick sufficiently to register as a push ("negative") or pull ("positive") response. The computer automatically recorded time elapsed between when the word first appeared on the screen and when participants made a greater than 10 degree movement with the joystick toward the "positive" or "negative" direction for each trial. The joystick program partitioned joystick movements into eight equal segments. Together these eight segments composed a circular response region. The program was designed to regard the bottom and top three segments as "positive" and "negative" responses, respectively. This designation left two of eight segments, one to the left and one to the right of the circular response region, not included. Any responses in these segments by a participant would be considered an invalid response. In addition to recording time elapsed from word presentation and response, the computer recorded whether participants pushed or pulled the joystick on each trial. Following participants' responses, the next word was presented in the middle of the computer screen. Once all word stimuli had been evaluated, the experimenter returned to the chamber and provided information regarding the experiment's second phase (i.e., competitive reaction time task).

Participants were provided a complete description of the competitive reaction time task. Specifically, participants were told that a red LED labeled "get ready" light would illuminate on the console, followed by a yellow "press" LED - at which point they were be instructed to depress the reaction time button. Once the green "release" LED was illuminated, it signaled for the release of the reaction time (RT) switch. Participants were informed that their reaction times would be determined by the latency between the illumination of the green "release" LED and release of the reaction time button. Feedback regarding the outcome of each trial was displayed through the illumination of either a red LED (signifying "loss") or a green LED (signifying a "win") in the *reactive* condition only. Participants randomly assigned to the *instrumental* condition did not receive feedback (i.e., "win" or "loss") during the reaction time trials. Instead, these participants were informed that their win-loss results would be computed and revealed to them at the conclusion of the experiment. This procedure was intended to remove any aggressive reactions to feedback rather than those motivated by instrumental factors (i.e., accumulating more "won" trials than their opponent to earn money).

Participants were then told that they may use switches "1" through "10" to deliver varied shock intensities to the "other participant" following each reaction time trial, regardless of its win/loss outcome. Participants were informed that the range of shocks they and the "other participant" would receive are determined by a subjective pain assessment procedure, which was completed prior to beginning the reaction time task. Questions and concerns were addressed at this time.

Participants randomly assigned to the *instrumental* condition were informed that the competitive reaction time task phase of the experiment would provide them with an opportunity to earn money dependent upon their performance. Participants were told that they had an opportunity to win $20 if they accumulated more "wins" than their opponent during the competitive reaction time task. Participants were informed that the winner, who had accumulated more "wins," would be announced to them at the conclusion of the experiment. Participants were informed that electrical shocks have been found to negatively affect reaction time. The inclusion of this information and opportunity to win money in the *instrumental* condition was intended to provide participants an opportunity for utilizing shocks in order to obtain secondary gain.

Upon completion of instructions, the experimenter attached two shock electrodes, one to the middle and one to the index fingers of the non-dominant hand of participants. Participants were informed that the pain tolerance of the "other participant" would be assessed prior to determining their tolerance. Additionally, participants were able to hear the responses of the "other participants" over the intercom and informed that the "other participant" would be able to hear their responses as well. This procedure was intended to reinforce participants' belief that they were competing against another individual. In reality, the confederate's responses for the pain tolerance assessment were pre-recorded on a digital audio file. Next, each of the participants' pain tolerance was assessed to determine the intensities of shocks they would receive during the competitive reaction time task. Administration was done using short-duration shocks (500 msec) in an incremental fashion from lowest available shock setting, which is imperceptible, until shocks reach a reported "painful" level. The participants' determination of their subjective pain tolerance was aided by a visual analogue scale labeled "1-10" affixed to the wall of the chamber (1 = *mild*, 5 = *moderate*, 10 = *painful*).

The entire competition consisted of one block of 30 consecutive trials. Trials were spaced by 5-sec intervals. In the each condition (i.e., reactive and instrumental), participants were assigned to "win" 15 trials and "lose" 15 trials. The win/lose sequence and shocks were presented in a randomized fashion across both "wins" and "loses" in the *reactive* condition and were predetermined. As mentioned previously, no "win/loss" feedback was included in the *instrumental* condition. Instead, participants were instructed that their "win/loss" outcome would be revealed to them at the conclusion of the experiment. All participants in the *reactive* condition received the same predetermined sequence of shocks from the "other participant." The sequence was incorporated into a computer program that executed the reaction time task, administered shocks to participants, and recorded shock selections made by participants (e.g., mean shock intensity, mean shock duration, etc.).

Following the reaction time task trials, electrodes were detached from the participants' fingers and their belief in the deception was assessed. Participants were asked four questions designed to determine their belief that they were actually competing against another individual and that reaction time was actually being measured. If participants express any doubt related to the construction of the study on any of these areas their data was not used. Following the manipulation check, participants were debriefed regarding the purpose of the study. Specifically, participants were informed that their data would be used in order to further examine the relationship between particular personality variables and reaction times in non-competitive and competitive tasks. Participants' were asked to provide either their e-mail or telephone number to receive a complete debriefing after the study's completion. This procedure was followed to avoid sharing of information between participants and prospective participants regarding the study's true aims and, thereby, jeopardizing the necessary level of deception to gather accurate data. Following completion of the study, those in the *instrumental* condition were informed that they did not accumulate more "wins" than their opponent did and, therefore, did not win $20. After the abridged debriefing statement, each of the participants were provided with research credit, thanked, and released.

The final debriefing was transmitted to all participants who provided legible e-mail or telephone contacts. This debriefing informed participants that they participated in a study examining the relationship between reaction time, evaluation of emotionally-valenced words, particular personality traits (e.g., impulsivity), and aggression. They were informed that they were not competing against another participant. Those in the *instrumental* condition were informed that the opportunity to win money was necessary to examine the utilization of aggression to obtain a secondary goal (e.g., money).

Risk and Protection of Participants

Some discomfort may have been experienced when receiving electric shocks. Each of the participants' subjective sensitivity to the shocks encountered was assessed and no shocks higher than the participants' reported pain threshold were administered. No long-term adverse consequences have been reported with this procedure in previous studies utilizing a similar procedure. Additionally, participants were allowed to terminate participation without prejudice or punitive action at any time. In previous studies using competition tasks such as this one, neither immediate nor subsequent problems were encountered. If any participants reported emotional distress from their participation in this study, they were referred to mental health providers.

CHAPTER 3

RESULTS

RCAP Manipulation Check

The validity of data was determined with respect to the efficacy of deception. Participants who did not believe they were competing against another person during the competitive reaction time task were excluded from analyses. These individuals were identified through administration of a brief interview, which preceded the debriefing. Each participant was asked: 1) to report his impression of the "other participant," 2) whether he believed the "other participant" acted fairly towards him during the competitive reaction time task, and 3) whether he believed the experimental task was a valid measure of reaction time. Additionally, participants' behavior was observed during the course of the experiment via a video camera to note indications of belief in the deception (e.g., cursing at the other participant). Of the 144 participants that completed the experiment, six indicated some degree of disbelief that they were competing against another participant. Consequently, these participants were excluded from data analyses.

Preliminary Analyses

Excluded participants. Six participants were excluded from data analyses resulting from their failure or questionable belief in the experimental deception (i.e., competing against another participant). Comparisons of excluded participants to those retained was not undertaken due to limited power to detect differences. One hundred and thirty-eight participants were included in the final analyses.

Instrument data. Joystick trials reflecting incorrect responses as determined by results collected by Bargh, Chaiken, Govender, and Pratto (1992) were deleted from the computation of average reaction times. Additionally, any response latency 2.5 standard deviations above or below each individual's mean response latency was removed (i.e., reaction time outliers).

Preliminary zero-order correlational analyses of psychopathy measures and BIS and BAS were conducted. Factor 1 and 2 of the LSRP were found to be significantly correlated (.536, $p < .01$) while BIS and BAS were not significantly correlated (.071, $p > .05$). Notably, Factor 1 of the LSRP was not significantly related to factor 1 of the PPI - short form (-.073, $p > .05$). While nonsignificant, Factor 1 and 2 of the PPI were noted to be negatively correlated (-.118, $p > .05$). Based upon the lack of significant correlations between factors of the two psychopathy measures and low Cronbach's alphas for the PPI – short form, Factor 1 and Factor 2 will refer solely to those measured by the LSRP. In support of this determination, findings cited by Miller, Gaughan, and Pryor (2008) suggest that Factor 1 of the LSRP is a superior measure relative to the PPI-R in its ability to correspond more closely to the traditional construct of psychopathy (Miller et al., 2008). Refer to Appendix A, Tables 1 and 2 for correlation matrices.

Zero-order correlational analysis was conducted for Positive Count, Negative Count, BIS, and BAS. No significant relationships were noted (all $p > .05$). Partial correlational analyses were conducted for Positive Average, Negative Average, BIS, and BAS while controlling for average push and pull reaction times to neutral words during practice trials. Controlling for average push and pull reaction times removed individual motor speed differences from analyses. The first analysis examined for a relationship between Positive Average and BAS while controlling for average pull movements in response to neutral words during practice trials. No significant relationship was found (.071, $p > .05$). The second analysis examined for a relationship between Negative Average and BIS while controlling for average push movements in response to neutral words during practice trials. No significant relationship was found (.005, $p > .05$).

Demographic and group characteristics. Analyses revealed the following: Ethnicity was representative of the Research Participant pool with 7.2% Asian, 5.1% Black, .7% Hispanic or Latino, 83.3% White, non-Hispanic, and 3.6% Other. The average income of participants was between $50,000 and $60,000. All participants were single. The average age and education among participants was 19 years and 14 years, respectively.

To identify and examine the influence of demographic variables between participants randomly assigned to either the reactive or instrumental conditions of the competitive reaction time task, an independent *t*-test was performed. Pertinent demographic and personality variables were entered as test variables with the reactive and instrumental conditions used as grouping variables. No significant differences for age $t(136) = .128$, *ns*; education $t(136) = .015$, *ns*; or income $t(136) = -.733$, *ns* were noted. Participants also did not demonstrate significant differences across conditions for Factor 1 $t(136) = .611$, *ns*; Factor 2 $t(136) = .369$, *ns*; BIS $t(136) = .423$, *ns*; or BAS $t(136) = .283$, *ns*. Levene's test is similar to a *t*-test in that it examines the hypothesis that variances in two groups are equal (Field, 2005). If Levene's test is significant, then it may be concluded that variances are significantly different and, therefore, the test statistics for the *t*-test labeled "*Equal variances not assumed*" should be used. The

Levene's test for the demographic variable of ethnicity was significant. As a result, equal variances was not assumed across the two experimental conditions; the test statistic was $t(119) = -1.7$, *ns* for ethnicity. Results are displayed in Table 3 of Appendix A.

A series of one-way ANOVAs was performed to test for the presence of experimenter effects across dependent variables. The first ANOVA explored differences on the joystick measures. No significant differences were revealed for Positive Count $F(4, 133) = .305$; Negative Count $F(4, 133) = .612$; and Positive Average $F(4, 133) = 1.66$, all $p > .05$. However, significant differences were found for Negative Average $F(4, 133) = 2.88$, $p < .05$. ANOVAs separated examined by condition revealed significant differences for GA = $F(4, 61) = 4.615$ and IA = $F(4, 133) = 3.767$ in the reactive condition. No significant differences in aggression indices were noted in the instrumental condition (all $p > .05$). These results are provided in Table 4, 5, and 6 of Appendix A.

Regression Analyses

Non-aggression related effects. Factors of psychopathy were expected to relate to particular elevations of BIS and BAS. In particular, Factor 1 was predicted to be positively related to BAS and negatively related to BIS , while Factor 2 was expected to be positively related to BIS. Two separate regression analyses were performed to examine these hypotheses. The first regression analysis included both Factor 1 and Factor 2 as predictors. Due to the correlation between Factor 1 and Factor 2, both were entered as predictors to account for suppressor effects, which occur when a predictor has a significant effect but only when another variable is held constant (Field, 2005). BAS was included as the outcome variable. Results partially supported the hypothesis, demonstrating a significant positive relationship between Factor 1 and BAS $t(135) =$

2.21, ($b = .17, p < .05$). The second regression analysis included Factor 1 and Factor 2 as predictors with BIS as the outcome variable. A significant positive relationship was found between Factor 2 and BIS $t(135) = 2.21$, ($b = .23, p < .05$). No significant negative relationship was noted between Factor 1 and BIS $t(135) = -.033$, ($b = -.003, p > .05$). The significant relationships are displayed graphically in Figures 1 and 2, respectively, in Appendix B.

With regard to evaluation and reactions associated with negatively- and positively-valenced words, individuals with elevated levels of Factor 1 were predicted to demonstrate significantly more errors to negative and positive words, and to demonstrate significantly slower reaction times. To test these hypotheses, correlation analysis was conducted among Factor 1, Positive Count, Negative Count, Positive Average, and Negative Average. These hypotheses were not supported (all $p > .05$).

A dependent *t*-test was performed to examine whether participants' reactions to negative words were significantly different from responses to positive words. Results supported the hypothesis $t(138) = 11.02, p < .01$, suggesting that individuals responded more quickly to positive relative to negative words on the joystick task.

Aggression related effects. An independent *t*-test was conducted to examine whether aggression indices were influenced by condition. Aggression indices were entered as test variables and condition was entered as the grouping variable. Significant differences were found for GA $t(136) = 3.38, p < .01$ and IA $t(136) = 3.00, p < .01$. The Levene's test for EA was significant. As a result, equal variances was not assumed across the two experimental conditions; the test statistic was $t(123) = 4.21, p < .001$ for EA. These results suggest that individuals assigned to the reactive condition were significantly more aggressive than individuals assigned to the instrumental condition. Refer to Table 7 in Appendix A for results.

Pearson product-moment correlations were computed for BIS/BAS and aggression indices in both reactive and instrumental conditions. This procedure was done in order to determine whether BAS was significantly related to aggression in both experimental conditions. Significant correlations were found for BAS and GA in the reactive condition (.264, $p < .05$) and BAS and EA in the instrumental condition (.261, $p < .05$). These relationships indicate that BAS is positively related to aggression in both experimental conditions. Refer to Appendix A, Table 8 and 9 for correlation matrix.

Individuals with higher levels of Factor 1 scores were predicted to demonstrate increased levels of aggression in both conditions relative to those with lower levels of Factor 1. Additionally, individuals with higher levels of Factor 2 were hypothesized to be more aggressive in the reactive condition relative to those with lower Factor 2. To test these hypotheses, regression analyses were conducted in which Factor 1 and Factor 2 were entered as predictors to control for suppressor effects with aggression as the outcome variable. Each aggression index was entered as an outcome variable separately for both conditions. Predictions were not supported. Factor 1 was not found to be related to GA, IA, or EA in the reactive or instrumental conditions and Factor 2 was not significantly related to GA, IA, or EA in the reactive condition (all $p > .05$).

Regression analysis was utilized to examine whether BAS would moderate the relationship between Factor 1 and aggression in reactive and instrumental conditions. This relationship was based upon previous findings that cite a relationship between BAS and physical aggression (Harmon-Jones, 2003). Separate equations were calculated such that each of the aggression indices was separately regressed onto Factor 1, using BAS as the moderator variable. Conditions were examined separately. Recommendations of Aiken and West (1991) were followed to test for moderation using multiple regression equations. Following this approach, it is necessary to compute a product term between the independent and moderator variables of interest. This operation requires that scores be standardized by transformation in to z-scores to reduce multicolinearity, account for scale invariance, and enable interpretation within the same metric (Aiken & West, 1991; Cohen & Cohen, 1983). Scores of Factor 1 and BAS were converted to z-scores and interaction terms were created by obtaining their cross-products. Unstandardized regression coefficients were utilized because the interpretation of standardized coefficients using the aforementioned procedure would likely provide incorrect effects (Aiken & West, 1991). As a result, parameter estimate for regression equations are provided as unstandardized *b*'s. The significance value of the interaction term was examined to determine whether moderation significantly improved the equation. For equations with significant interaction terms, regression coefficients for simple effects (one *SD* above and one *SD* below the mean of Factor 1) were tested to determine whether they were significantly different from zero. Using BAS as the moderator and Factor 1 as the independent variable, separate regression equations were computed for each of the aggression indices in each condition. A significant relationship between Factor 1 and EA was found in the instrumental condition $t(68) = 2.77$, ($b = .28$, $p < .01$). This finding indicates that the significant relationship between Factor 1 and EA was influenced by BAS. Specifically, those with concurrent elevated BAS and Factor 1 demonstrated significantly higher levels of EA relative to those low on BAS and high on Factor 1. Results are displayed in Figure 3 of Appendix B.

The moderation effect of BIS on the relationship between Factor 2 and aggression was also examined. Factor 2, BIS, and their interaction term were entered as predictors and examined for the reactive condition. Aggression indices were entered separately as outcome variables. No significant relationships were noted ($p > .05$).

Next, the moderating effects of positive and negative words identified correctly on Factor 1 and aggression indices were examined for each condition. First, standardized scores for Factor 1, negative words identified correctly (Negative Count), and their interaction term were entered as predictors to test whether more errors in negative words would be made by those high on Factor 1 and correspond to higher the levels of aggression. Significant moderation effects were found in the reactive condition demonstrating partial support of the hypothesis. Specifically, those with fewer negative words correctly identified and higher levels of Factor 1 displayed more EA than those with lower levels of Factor 1, $t(62) = -2.33$, $b = -.30$, $p < .05$. Notably, individuals with more negative words correctly identified evinced higher levels of EA across levels of Factor 1. Refer to Figure 4 in Appendix B for graphical depiction of results.

The second analysis consisted of entering standardized scores of Factor 1, positive words identified correctly (Positive Count), and their interaction term as predictors and aggression indices as outcome variables. Each condition was examined separately. This was done to test the hypothesis that a high number of positive word errors would moderate the relationship between Factor 1 and aggression. Effects were noted in the reactive condition $t(62) = -2.13$, $b = -.33$, $p < .05$, partially supporting the hypothesis.

Specifically, individuals with fewer positive words correctly identified and high levels of Factor 1 were found to have elevated levels of EA relative to those lower on Factor 1. Those with more positive words correctly identified, however, demonstrated higher levels of EA across levels of Factor 1. Result is displayed graphically in Figure 5 of Appendix B.

Last, moderation effects of positive reaction time on the Factor 1-aggression relationship were examined in each condition. Individual motor speed was covaried out by entering reaction time to neutral practice words as a predictor in step one of a hierarchical regression. Factor 1, reaction time to positive words (Positive Average), and their interaction term were entered as predictors in the second step. Each of the aggression indices were entered separately as outcome variables. The hypothesis being tested predicted that those with longer reaction times to positive words and higher levels of Factor 1 would demonstrate higher levels of aggression. No significant results were demonstrated (all $p > .05$).

A second set of analyses was performed to test moderation effects of negative reaction time on the Factor 1-aggression relationship. This was examined in both conditions. Individual motor speed was covaried out by entering reaction time to neutral practice words as a predictor in step one of a hierarchical regression. Factor 1, reaction time to negative words (Negative Average), and their interaction term were entered as predictors in step two. Each of the aggression indices were entered separately as outcome variables. No significant relationships were demonstrated (all $p > .05$).

CHAPTER 4

DISCUSSION

The present study sought to explore psychopathy and its relationship to cognitive processing and behavioral predispositions with regard to aversive and appetitive stimuli. Additionally, the study examined the effects these factors have on aggression in reactive and instrumental conditions. A number of hypotheses were supported and add information regarding the relationship of psychopathy with aggression.

Partially supporting the hypotheses that BAS and BIS are related to factors of psychopathy, Factor 1 demonstrated a positive relationship with BAS, while Factor 2 was shown to relate positively to BIS. No significant negative relationship between Factor 1 and BIS was noted. Results from the current study partially support the original model of BIS and BAS. This model posits that BIS and BAS represent separate structures in the nervous system, which are presumed to be orthogonal (Gray 1987; Quay, 1993). Each system reacts to distinct environmental stimuli. Therefore, concurrent levels of elevated BIS and BAS are not expected. Previous studies have cited a relationship between heightened levels of anxiety and BIS (Carver & White, 1994). Additionally, elevations in anxiety have been shown to augment antisocial behavior in both children and adults (Pine et al., 2000; Russo & Beidel, 1993; Zoccolillo, 1992; Robins et al., 1991). Considering the antisocial behavioral style that comprises factor 2, the relationship between BIS and Factor 2 appears consistent with previous findings.

Gray (1972, 1981) proposed that BAS is responsive to reward signals. Considering the increased prevalence of instrumental aggression (i.e., aggression driven by an external reward) in those with elevated factor 1 (Cornell et al., 1996), it appears that current the relationship demonstrated between BAS and Factor 1 is consistent with Gray's original conceptualization. No significant negative relationship was found between Factor 1 and BIS. This result may be the consequence of using a non-forensic sample. Specifically, individuals in the current sample have diminished levels of factor 1 relative to a pathological level, which may result in diminished levels of association with BIS.

As previously mentioned, Lykken (1995) hypothesized that factor 1 would be characterized by a hyporeactive BIS and average BAS, whereas factor 2 would be associated with a hyperreactive BAS and average BIS. Newman, MacCoon, Vaugh, and Sadeh (2005) provided partial support for these predictions. Specifically, the authors provided support for Lykken's predictions regarding factor 1, but found factor 2 to be positively associated with BAS. Mixed support was found for the relationship between factor 2 and BIS. The differences between current findings and those cited by Lykken and Newman, MacCoon, Vaugh, and Sadeh may be attributed to the use of a sub-clinical sample.

Complimenting the relationship between elevated levels of BAS and Factor 1, BAS was found to moderate the relationship between Factor 1 and EA in the instrumental condition. Results indicate that BAS, which is sensitive to reward cues, moderated the relationship between Factor 1 and EA due to impending reward (i.e., opportunity to win $20 in the instrumental condition). The relationship between heightened levels of factor 1 and instrumental aggression has previous support (Cornell et al., 1996). These results may reflect subtypes of individuals high on factor 1 identified by their level of BAS. While factor 1 of psychopathy may be generally related to heightened BAS, there may be a subtype of individuals low on BAS not motivated to utilize aggression to obtain secondary gain. Such a finding may bolster the argument that there are “successful psychopaths,” individuals with psychopathic personality trait configurations without a typical history of arrest and incarceration (Lynam, Whiteside, & Jones, 1999). Perhaps these “successful psychopaths,” a subtype of individuals with elevated factor 1 and diminished BAS sensitivity, are not highly motivated by reward cues, thereby decreasing their aggressive behaviors and avoiding arrest.

Significant results for EA, but not GA or IA, may indicate that individuals high on Factor 1 and BAS in the instrumental condition utilized a high proportion of EA as a means to ensure they “won” more trials than they “lost.” This is likely due to participants being informed that shocks are negatively related to their opponents’ reaction times. In addition to the utilization of EA to ensure more “wins,” EA may have been the aggression index of choice due to a learned pattern of aggressive behavior. Geen and Donnerstein (1998) described how individuals may select from multiple ways of aggressing against another and may select to use only one. Specifically, they posit that individuals may select a single method as most effective and, as a result, only use that one. They also suggest that participants may “forget” alternative methods to aggress against their target. Therefore, the decision to respond with EA may be considered the “best” method of aggression under instrumental conditions for those high on Factor 1 and BAS. The development of this preference may be the result of particular learned responses. Huesmann (1988) and Huesmann and Eron (1989) demonstrated how children develop particular "scripts" through social learning. The authors state that cognitive scripts stored in a person's memory act as guides for behavior and social problem solving. Scripts assist in determining what events are to happen in the environment, how to behave in response to these events, and what the outcome of particular behaviors are likely to be. Therefore, it is likely that individuals with elevated factor 1 with concurrent high levels of BAS have learned a particular aggression script for instrumental conditions. These individuals, in response to instrumental conditions, may rely solely upon EA rather than GA or IA as a means to obtain secondary gain because it has been the most effective method of aggression in the past.

The BIS was not found to moderate the relationship between Factor 2 and aggression in the reactive condition as predicted. Despite the relationship between Factor 2 and BIS, the suppression of aggression across indices may be explained by anxiety related to punishment cues indicative of BIS. Previous studies have demonstrated that anxiety is negatively related to aggression in many psychiatric disorders marked by diminished fear, including psychopathy, conduct disorder, and antisocial personality disorder (Eaves, Darch, & Williams, 2004; Lorber, 2004; Raine, Reynolds, Venables, Mednick, Farrington, 1998). However, disorders characterized by aggression, such as borderline personality disorder, intermittent explosive disorder, and posttraumatic stress disorder, have been associated with elevated levels of anxiety (Coccaro, Kavoussi, Berman, & Lish, 1998; Orsillo, Heimberg, Juster, & Garrett, 1996). Furthermore, a number of other studies have found that anxiety is positively related to the antisocial behavioral style that comprises factor 1 (Frick et al., 1999; Patrick, 1994; Verona et al., 2001). In contrast, Broman-Falks, McCloskey, & Berman (2006) found an inverse relationship between anxiety sensitivity and extreme aggression in which individuals with higher anxiety sensitivity demonstrated less aggression in response to severe provocation. Overall, the evidence regarding whether anxiety functions to inhibit or promote aggression remains unclear. In the current study, individuals with high Factor 2 and concurrent high BIS may have experienced increased levels of anxiety due to their participation in the joystick task and did not respond aggressively to provocation in the reactive condition. Alterman (1998) propose that variablility in research regarding anxiety and psychopathy may be accounted for by subtypes of psychopathy. For example, if a psychopath has elements of another disorder such as Borderline Personality Disorder, the individual may experience anxiety secondary to fear of abandonment or an inability to tolerate ambiguity. Concurrent relationships between psychopathy, anxiety, or other psychological disorders may influence whether an individual will be provoked or perform aggressive behaviors. In the current study, individuals with elevated Factor 2 may have been related to either high levels of anxiety or a concurrent disorder, also associated with elevated anxiety, that inhibited aggression.

The relationship between Factor 1 and aggression was anticipated to be moderated by the number of words correctly categorized as “negative” or “positive” during the joystick reaction task. This prediction was partially supported. Correctly identified negative words moderated the relationship between Factor 1 and EA in the reactive condition. Specifically, in the reactive condition, elevated levels of Factor 1 were related to higher levels of EA as the number negative word errors increased. This finding suggests that “semantic dementia” may play an integral role in eliciting aggression in individuals high on factor 1. In particular, individuals with elevated levels of factor 1 and "semantic dementia," which diminishes their ability to recognize the emotional aspects of cues in the environment, appear more likely to engage in risky behaviors. Such a relationship may result from a diminished ability to identify the emotional consequences of their aggressive behaviors on others. As these relationships were primarily noted to occur in the reactive condition in which provocation was present, the ability to identify emotional consequences of actions may be more disrupted in response to perceived or actual threat.

Notably, those with a greater number of correctly identified negative and positive words were significantly more aggressive. No differences were noted across levels of Factor 1, which may have resulted from the use of concrete word stimuli (i.e., attitude-object stimuli words). Specifically, Kiehl et al. (1999) found that there were no group differences between psychopathic individuals and their counterparts when asked to identify concrete words. Perhaps the concrete word stimuli utilized in the present study identified only individuals high on factor 1 that are affected by "semantic dementia." As a result, these individuals may experience difficulties identifying the emotional consequences of their actions on others, leading to increased aggression.

Further examination of the role of "semantic dementia" and its effects on psychoapthy and aggression was conducted. The hypotheses predicted that individuals with elevated factor 1 would demonstrate deficient approach and avoidance behaviors as measured by average reaction times in response to positively- and negatively-valenced words. These hypotheses were not supported. As previously cited, the lack of significant findings may be related to the use of concrete word stimuli. Specifically, individuals high on factor 1 in the present study may have experienced little difficulty identifying the appropriate response (i.e., positive or negative rating) due to the use of concrete words. This effect is supported by Johns and Quay (1962) who suggest psychopaths are individuals who know “the words but not the music,” stating that the meaning of words and phrases may be intact while the emotional content is lost. Together, the findings of Kiehl et al. (1999) and Johns and Quay (1962) may explain why the relationship between Factor 1 and aggression was not moderated by reaction time.

General reaction time responses were shown to be quicker for approach tendency (joy stick pull) in response to positive words than avoidance tendencies (joy stick push) associated with negative words. This finding is consistent with those found by Chen and Bargh (1999) and represent the tendency for individuals to be more responsive to appetitive than aversive stimuli. In both the cited and current study, shorter reaction times were demonstrated in response to appetitive relative to aversive stimuli.

Generally, it appears that individuals with elevated Factor 1 scores are more likely to engage in aggressive behavior in the reactive and instrumental conditions. These findings provide support to those findings noted by Reidy et al. (2007), in which factor 1 of psychopathy was noted to predict aggression in both reactive and instrumental conditions. Overall, participants were noted to respond with significantly more aggression in the reactive relative to instrumental condition and is likely due to the influence of provocation. The lack of findings regarding Factor 2 and aggression in the reactive condition may have resulted from priming effects associated with the joystick reaction time task. In particular, the joystick task and word stimuli may have primed anxiety in participants high on Factor 2, leading to heightened anxiety indicated by elevated BIS scores. The anxiety experienced by these participants may have inhibited their aggressive responses, despite the presence of provocation.

While several findings in the current study have provided support and novel insights into the relationship between psychopathy and aggression, there are a number of limitations that may be improved upon in future research. First, it may be beneficial to replicate the current study utilizing a forensic participant sample rather than undergraduate students. Examining a forensic sample with diagnosed psychopaths may provide more accurate and generalizable findings with regard to evaluation of emotionally-valenced words and aggression. Second, the current study may be improved by including all of the 92 attitude-object word stimuli rather than the 15 most negatively rated and 15 most positively rated words. By including more neutral words, as in the original 92, participants may react differently to negative or positive words based upon relative differences. On the other hand, utilizing the joystick task and incorporating more abstract words (e.g., happiness versus puppy; sadness versus cancer) may lend to improved ability to detect the influence of "semantic dementia" upon factors of psychopathy and aggression. Third, it may be helpful to include measures to examine whether particular anxiety responses associated with elevations of the BIS may inhibit aggressive behaviors. In addition to anxiety, measures dedicated to detecting concurrent psychiatric disorders may facilitate the identification of subtypes of psychopathy or provide insight into the relationship between anxiety, psychopathy, and aggression. Identification of subtypes of psychopathy may also lend to identifying more specific triggers for aggressive behavior. Fourth, Shadish, Cook, and Campbell (2002) recommended avoiding mono-operation bias (i.e., only using one measure of a construct) in psychopathology research. Additionally, Cale and Lilienfeld (2006) suggest that mono-operation bias is especially problematic in research focusing on psychopathic personality. In the current study, the PPI – short form was disregarded as a measure, leaving the LSRP as the sole measure of psychopathy. The decision to disregard the PPI – short form was based upon low Cronbach's alphas and nonsignificant relationship between Factor 1 of the LSRP and factor 1 of the PPI. As previously noted, the PPI has been questioned regarding factor validity and its adherence to the original conceptualization of psychopathy (Miller et al., 2008). If replicated, the current study may be improved by incorporating additional measures of psychopathy. Fifth, the demonstration of experimenter effects for Negative Average, GA, and IA may be indicative of variance introduced through use of several experimenters. Therefore, future studies may improve upon the current study by limiting the number of experimenters. Sixth, the lack of significant relationship between BIS/BAS, Positive Count, Negative Count, Positive Average, and Negative Average may indicate a weakness in the ability of the joystick task to measure approach and avoidance behaviors to appetitive and aversive stimuli. However, the lack of significant relationship between BIS/BAS and the joystick measures may be attributed to lack of significant reward and punishment cues. Replication of the joystick task with more effective affective stimuli and the inclusion of reward and punishment cues may clarify whether the joystick task is related to BIS/BAS. Last, it may be helpful to conduct the joystick task and competitive reaction time task during different sessions and counterbalanced in order to control for any priming effects.

Overall, the current study's findings suggest that "semantic dementia" may play an important role in moderating the relationship between Factor 1 and aggression under reactive conditions. Furthermore, high levels of BAS appear to have a significant influence upon whether individuals with an elevated level of factor 1 will aggress. Collectively, these results may assist future studies identify risk factors that increase the likelihood of individuals high on factor 1 to become aggressive. Future research may benefit from a longitudinal examination of the formation of aggression scripts in children at risk for developing psychopathy. By identifying the elements that shape particular aggression scripts, it may be possible to intervene and assist those at risk to learn more adaptive scripts for problem solving.

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APPENDIX A

TABLES

Table 1

Inter-correlations of independent and dependent variables across conditions

	1	2	3	4	5	6	7	8	9	10	11
1. F1	--	.536**	.114	.155	-.102	-.035	-.098	.099	.090	.091	.159
2. F2		--	.218*	-.006	-.092	.022	-.021	.035	.017	-.016	-.020
3. BIS			--	.071	-.080	.092	-.002	.079	.057	.051	.141
4. BAS				--	.106	.016	.005	-.017	.137	.082	.167
5. PC					--	.058	.365**	-.275**	-.005	.040	.002
6. NC						--	.090	.179*	-.159	-.105	-.120
7. PA							--	-.767**	.059	.042	-.009
8. NA								--	-.102	-.095	-.062
9. GA									--	.763**	.575**
10. IA										--	.491**
11. EA											--

Note. F1 = LSRP Factor 1; F2 = LSRP Factor 2; BIS = Behavioral Inhibition System; BAS = Behavioral Activation System; PC = Positive Count; NC = Negative Count; PA = Positive Average; NA = Negative Average; GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.

* $p < .05$.

** $p < .01$.

Table 2

Inter-correlations for factors of LSRP and PPI – short form

	1	2	3	4
1. LSRP1	--	.536**	-.073	.511**
2. LSRP2		--	-.212*	.570**
3. PPI1			--	-.118
4. PPI2				--

Note. LSRP1 = LSRP Factor 1; LSRP2 = LSRP Factor 2; PPI1 = PPI Factor 1; PPI2 = PPI Factor 2.
* $p < .05$.
** $p < .01$.

Table 3

Summary of independent t-test results testing for differences in demographic and independent variables across conditions

	t	*p*
Subject Age	.128	*ns*
Years of Education	.015	*ns*
Yearly Income	-.733	*ns*
Ethnicity	-1.7	*ns*
Factor 1	.611	*ns*
Factor 2	.369	*ns*
Total	.59	*ns*
BIS	.423	*ns*
BAS	.283	*ns*

Note. Marital status was not included in the analysis due to a homogeneous composition of single participants.
ns > .05.

Table 4

Summary of ANOVA results testing for experimenter effects on dependent variables

	F	*p*
PC	.305	*ns*
NC	.612	*ns*
PA	1.66	*ns*
NA	2.88	.025*

Note. PC = Positive Count; NC = Negative Count; PA = Positive Average; NA = Negative Average.
ns > .05.

Table 5

Summary of ANOVA results testing for experimenter effects on aggression indices in the reactive condition

	F	*p*
GA	4.62	.046*
IA	3.77	.008**
EA	1.98	*ns*

Note. GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.
ns > .05.

Table 6

Summary of ANOVA results testing for experimenter effects on aggression indices in the instrumental condition

	F	*p*
GA	.867	*ns*
IA	1.51	*ns*
EA	.547	*ns*

Note. GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.
ns > .05

Table 7

Summary of independent t-test results testing for differences across conditions for aggression indices

	t	*p*
GA	3.38	.001**
IA	3.00	.003**
EA	4.21	.000***

Note. GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.

Table 8

Inter-correlations of independent and dependent variables in the reactive condition

	1	2	3	4	5	6	7	8	9	10	11
1. F1	--	.564**	.128	.253*	-.134	-.042	.043	.001	.181	.088	.117
2. F2		--	.164	.069	-.065	.100	.033	-.007	.019	-.065	-.076
3. BIS			--	-.054	-.118	.198	.037	-.068	.080	.048	.179
4. BAS				--	-.092	.036	-.007	-.127	.264*	.092	.181
5. PC					--	.138	.348**	-.274*	.027	.094	-.046
6. NC						--	.178	.074	-.137	-.113	-.047
7. PA							--	-.738**	.092	-.011	-.016
8. NA								--	-.293*	-.174	-.137
9. GA									--	.661**	.543**
10. IA										--	.388**
11. EA											--

Note. F1 = LSRP Factor 1; F2 = LSRP Factor 2; BIS = Behavioral Inhibition System; BAS = Behavioral Activation System; PC = Positive Count; NC = Negative Count; PA = Positive Average; NA = Negative Average; GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.

* $p < .05$.

** $p < .01$.

Table 9

Inter-correlations of independent and dependent variables in the instrumental condition

	1	2	3	4	5	6	7	8	9	10	11
1. F1	--	.506**	.088	.098	-.035	.027	-.203	.169	-.045	.029	.127
2. F2		--	.271*	-.076	-.118	-.056	-.069	.073	-.013	.016	.011
3. BIS			--	.189	-.026	.015	-.024	.174	.012	.024	.073
4. BAS				--	.312**	-.048	.001	.059	.105	.135	.261*
5. PC					--	-.104	.378**	-.297*	.032	.040	.183
6. NC						--	-.030	.282*	-.090	.011	-.073
7. PA							--	-.030	.082	.147	.063
8. NA								--	.003	-.041	-.011
9. GA									--	.849**	.542**
10. IA										--	.528**
11. EA											--

Note. F1 = LSRP Factor 1; F2 = LSRP Factor 2; BIS = Behavioral Inhibition System; BAS = Behavioral Activation System; PC = Positive Count; NC = Negative Count; PA = Positive Average; NA = Negative Average; GA = General Aggression; IA = Initial Aggression; EA = Extreme Aggression.

APPENDIX B

FIGURES

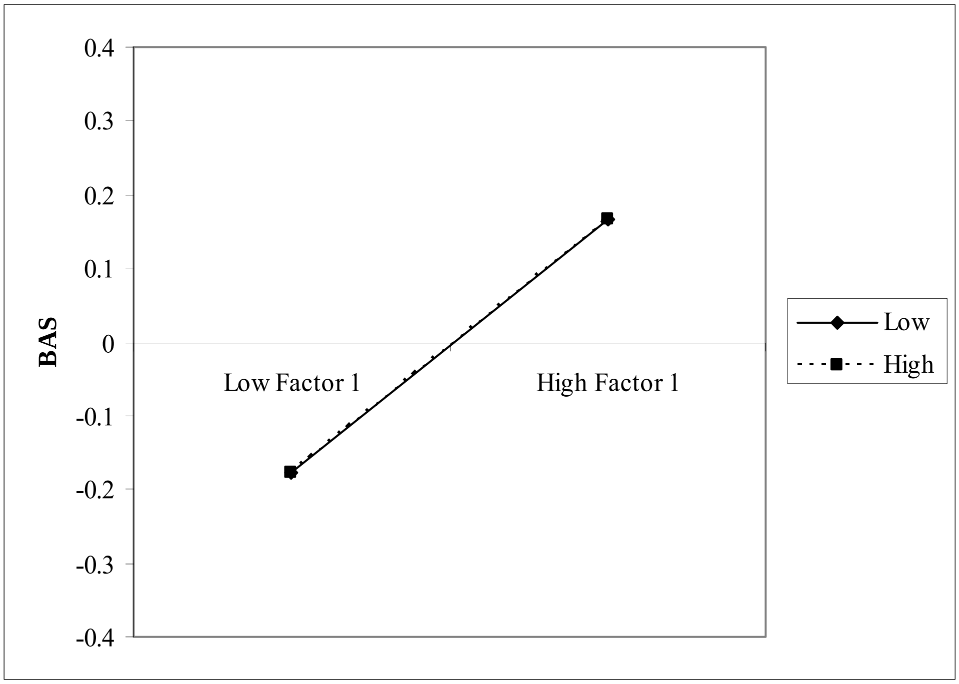

Figure 1: Relationship between Factor 1 and BAS

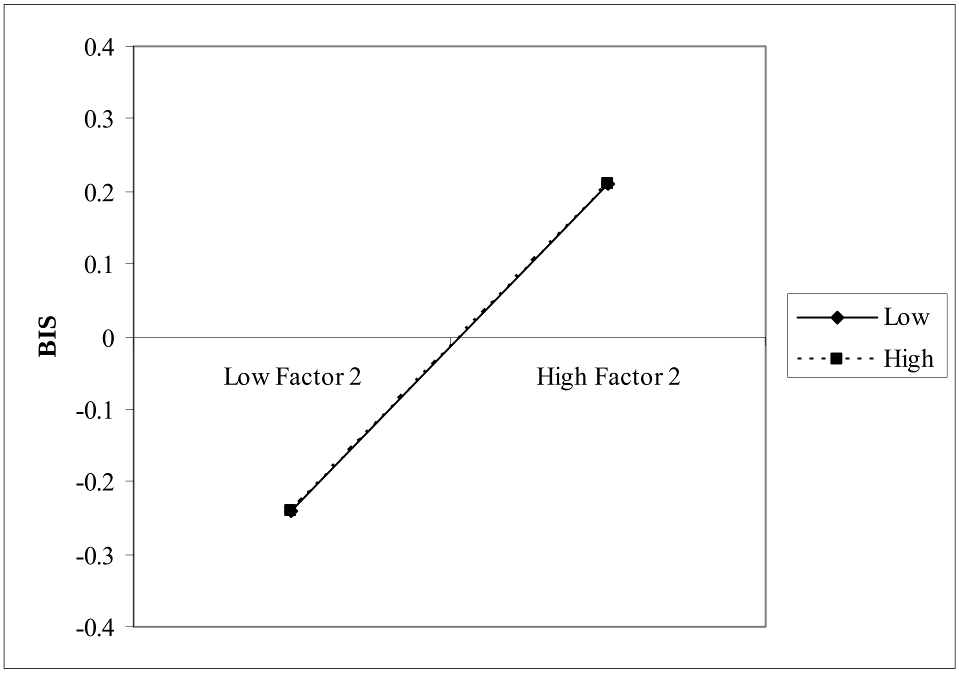

Figure 2: Relationship between Factor 2 and BIS

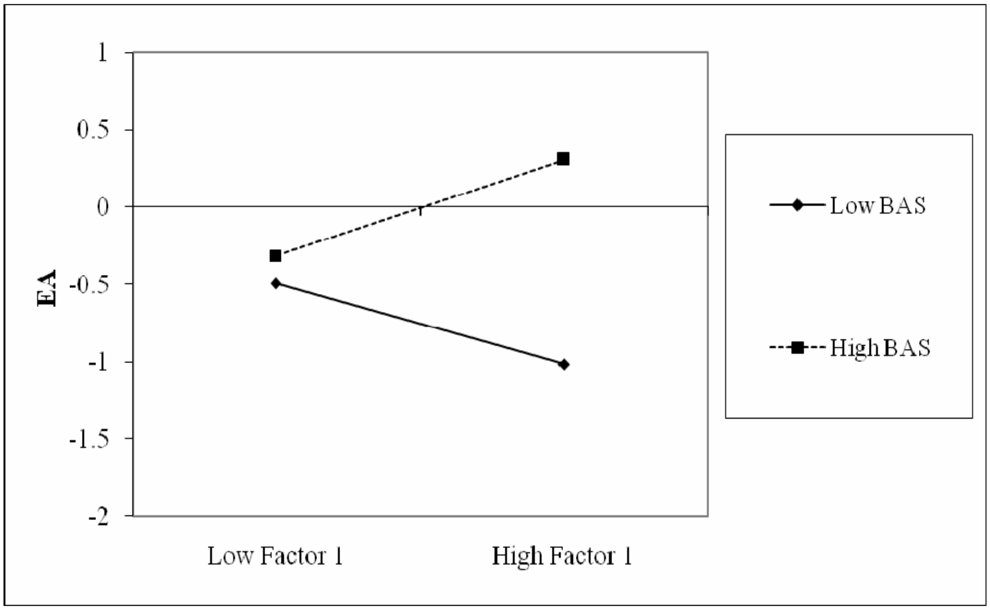

Figure 3: Moderating effect of BAS on Factor 1 and EA in the instrumental condition

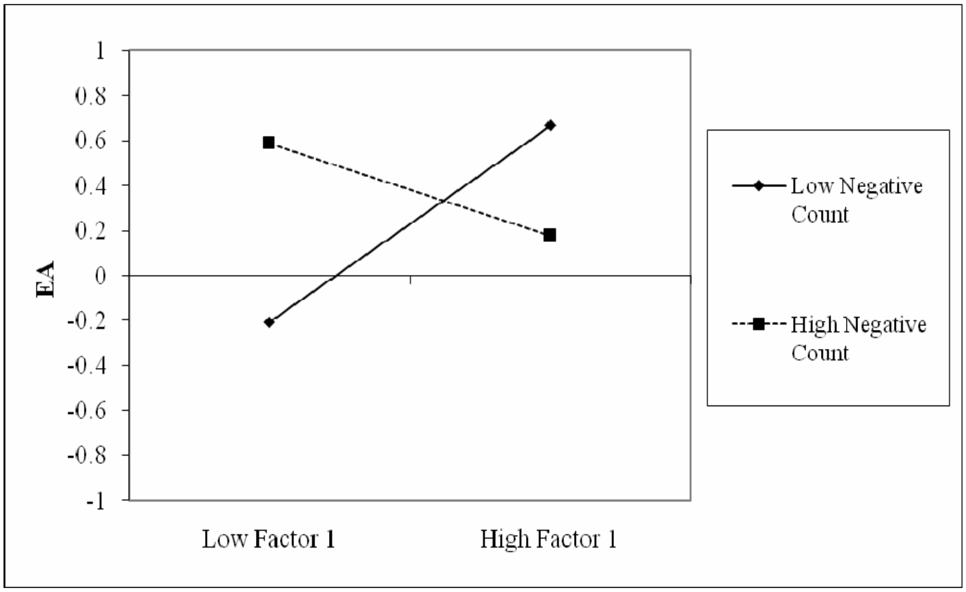

Figure 4: Moderating effect of Negative Count on Factor 1 and EA in the reactive condition

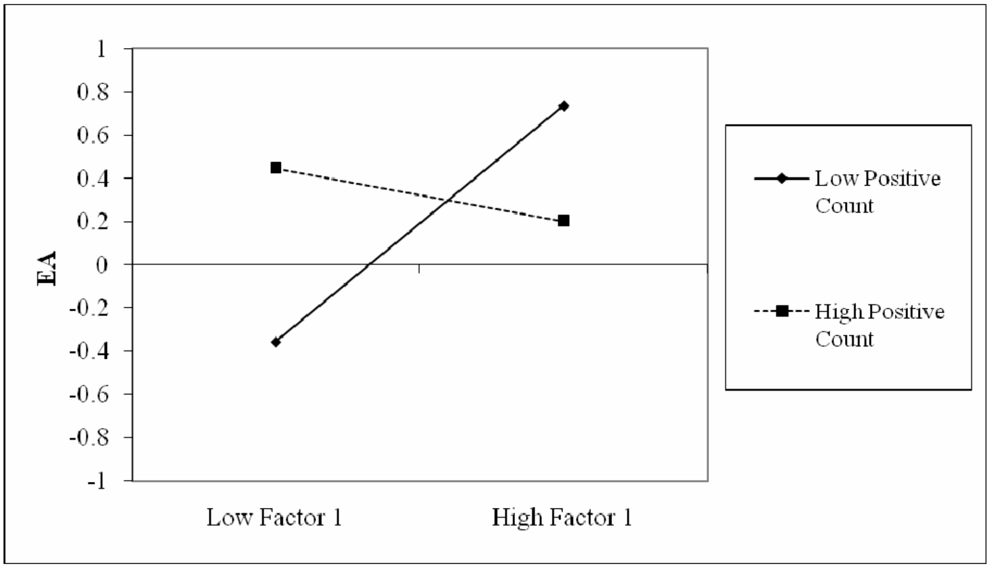

Figure 5: Moderating effect of Positive Count on Factor 1 and EA in the reactive condition