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The effects of emotional interrupt on reaction times in primary and secondary psychopathy

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The Effects of Emotional Interrupt on Reaction Times in Primary And Secondary Psychopathy

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Abstract

The emotional interrupt task is presented as a motor response task that is bracketed by emotional images. The motor response task, in this study, is presented as a reaction time task. The participants either choose the left or right finger as a response to the circle or square on the screen, respectively. The emotional images that are presented before and after the motor response task are presented as either negative, neutral or positive images, known as interrupt conditions. The reaction time that occurs during each of the interrupt conditions are affected by personality traits of each participant.

This study focused on participants who completed the Levenson Primary and Secondary Psychopathy Scale, who scored high enough to be categorized within the high scoring primary psychopathy group, high scoring secondary psychopathy group, and control group. Historically, psychopathy was an all-encompassing term to describe a personality trait used by psychologists to describe antisocial traits. Presently, psychopathy is conceptualized by many investigators to consist of two factors: primary psychopathy and secondary psychopathy. Literature has described primary psychopaths as having superficial charm, compulsive lying, and lack of empathy, whereas secondary psychopaths are described as those with a parasitic lifestyle, who are impulsive, and prone to boredom.

The results of the present study indicate that it is important to distinguish between primary and secondary psychopathy and gender because these variables moderate the relationships between reaction time and interrupt conditions. The results revealed that participants scoring high in primary psychopathic traits had faster reaction times than participants scoring high in secondary psychopathy traits. Also, control participants had a faster reaction time than participants scoring high in secondary psychopathic traits. Gender also

illustrated that females are slower than males in almost all conditions except for high scoring secondary psychopathic males who had the slowest reaction time while viewing the negative interrupt condition.

Keywords: Primary psychopathy, secondary psychopathy, emotional interrupt task, reaction time

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Introduction

The present study focused on the replication of the Mitchell, Richell, Leonard, and Blair (2006) study in which participants would take part in a motor response task while viewing emotional interrupt conditions. Specifically, the Mitchell et al. (2006) study compared psychopaths to a control group within a forensic, or prison, population. The present study replicated the methodology of the Mitchell et al. (2006) study; however, instead of focusing on primary psychopaths and a control group, the present study focused on differentiating between primary psychopaths, secondary psychopaths and the control group within a college population.

Psychopathy has been studied for years by researchers such as Hervey Cleckley, Robert Hare, and James Blair. Over time the concept has evolved and presently there are several different models and theories, as well as characteristic traits that explain psychopathy. Overall psychopaths have been characterized as having superficial charm and a grandiose sense of self-worth, along with being manipulative, and having lack of guilt and lack of empathy (Blair, Mitchell, & Blair, 2005).

Research has indicated that there are differences between the characteristics of primary and secondary psychopathy; specifically, primary psychopaths are described as having superficial charm, lack of empathy and lack of guilt, whereas secondary psychopaths are described as having impulsivity, proneness to boredom, and are highly anxious (Blair et al, 2005). Although research has described the differences between primary and secondary psychopathy, the present study wanted to further research the effects these personality traits have on a person's cognitive processing.

The current study's replication of the Mitchell et al. (2006) study also focused on participants of both sexes from a college population, rather than an all-male forensic, or prison, population. The current study's research is being conducted to generalize the results to the public, while utilizing both male and female participants. The present study hypothesizes that primary psychopaths will have faster reaction times than secondary psychopaths, while performing the motor response task; primary psychopaths will have faster reaction times than controls while performing a motor response task; and the control group will have faster reaction times than the secondary psychopaths, while performing a motor response task.

History of Psychopathy

In 1941, Hervey Cleckley published seminal work on the psychopathic personality, which provided descriptions of clinical case studies of male psychopaths. His experiences initially began mostly using men in an institutionalized hospital setting, but as time went on more women, adolescents and other diverse groups of people who had never been institutionalized started to become more available for his research (Cleckley, 1988). His original description that defined psychopathy included deficits in major affective reactions (e.g., shallow mood, labile bursts resembling affection), which is still the basis for our understanding of psychopathy. Furthermore, Cleckley went on to consider the primary feature of psychopathy to not only be a deficiency of major affective reactions, but deficient emotional reactions to life experiences with impairments in love, anger, grief, pride and joy (Marsh, Finger, Schechter, Jurkowitz, Reid, & Blair, 2011).

Throughout the history of psychopathy research, multiple concepts have been developed in an attempt to better understand psychopaths. In 1980, Robert

D. Hare developed The Psychopathy Checklist (PCL) based on Cleckley's ideas. Subsequently, the Psychopathy Checklist-Revised (1991) was developed, which has significantly advanced the field of psychopathy by giving researchers a common tool to assess psychopathic traits. Psychopathy was first developed into a two factor model, which consisted of: 1) interpersonal/affective items, such as superficial charm, pathological lying, lack of guilt, etc., and 2) impulsive/antisocial lifestyle, such as a need for stimulation, parasitic lifestyle, impulsivity, etc. (Harpur, Hare, & Hakstian, 1989). It was later revised into a three factor model consisting of arrogant and deceitful interpersonal items (i.e., superficial charm), deficient affective experience (i.e., lack of guilt), and impulsive and irresponsible items (i.e., need for stimulation) (Cooke & Michie, 2001). The ability to differentiate between these traits gives researchers the ability to develop methodology that can specifically measure the differences between these traits.

Even though advancements have been made in the field of psychopathy, research has traditionally been conducted using incarcerated individuals, i.e., individuals in a prison population (Gao & Raine, 2010). Focusing research on incarcerated individuals limits the ability of researchers to generalize psychopathy to the non-incarcerated population, otherwise known as the general population. Gao and Raine (2010) have addressed the lack of research on non-incarcerated psychopaths and compiled a literature review, which has a section dedicated to the research conducted on psychopathic traits in college students. One of the earliest studies done on a college population was conducted by Sutker and Allain (1983), which identified a subset of medical students as adaptive psychopaths, according to the Minnesota Multiphasic Personality Inventory (MMPI) scores (Butcher, Graham, Ben-Porath, Tellegen & Dahlstrom, 2003). Their research determined that the students who scored higher on

impulsivity, sensation seeking, and antisocial behavior also scored lower on self-control and socialization.

After further research supported the validity and reliability of self-report measures of psychopathy in a college population, Lynam, Whiteside, and Jones (1999) found that college students scoring higher on the Levenson Primary and Secondary Psychopathy scale (i.e., an instrument used for the assessment of primary psychopathy and secondary psychopathy in a general population (LPSP; Levenson, Kiehl, & Fitzpatrick, 1995)) showed deficiencies in passive avoidance and response set modulation. Deficient passive avoidance is characterized as the inability to withhold a response to avoid punishment meaning that they react without thinking about the consequences, which is a key theory in psychopathy (Hare, 1970). Response set modulation (hypothesized by Newman, 1998 in Cooke, Forth, & Hare; Patterson & Newman, 1993) is described as individuals with psychopathic traits being less capable of automatic shifts of attention to process peripheral information in their visual field. This means that if a psychopath has a task at hand, they are less likely to shift their attention to peripheral information irrelevant to the task. Past research has found that the amygdala is involved in bringing emotional information to the forefront of our attention and psychopaths have the ability to disregard the information irrelevant to the task (Mitchell, Richell, & Blair, 2006).

Although, psychopaths have deficiencies in passive avoidance learning and response set modulation, Cleckley (1976) described an emotional paradox in psychopaths for their ability to be able to demonstrate normal appraisal of emotional cues in abstract situations, while simultaneously demonstrating an inability to let these cues guide their judgments and behavior in these situations. Lorenz and Newman (2002) established empirical evidence to support this hypothesis using a lexical decision task, which requires that a participant

determine if a string of letters form a word or a non-word. They established that low anxious controls and low anxious psychopaths had comparable appraisal of emotional words, consistent with Cleckley's hypothesis, but that low anxious controls showed significantly greater emotion facilitation than low anxious psychopaths, which means that low anxious psychopaths show less ability to utilize the emotional cues.

A review of the research on psychopaths has revealed that they have demonstrated a deficiency in passive avoidance learning, response set modulation, and the inability to use emotional cues to determine their behavior. It has also been reported that psychopaths have been characterized as having superficial charm, lack of remorse, and a need for stimulation, within a forensic population. A trend in research has shifted towards deciphering the different traits within the broad term psychopathy. In 1948, psychologist Ben Karpman developed an explanation of the differences found within psychopaths, which lead to the study of primary versus secondary psychopaths.

Distinction Between Primary and Secondary Psychopathy

Behavioral and Emotional Distinctions. Primary psychopaths can be understood in a more traditional view, such as a person being glib and callous, but there are more dimensions to this personality trait (Hare, 1991). Research has illustrated that a psychopath can be described into two categories, i.e., primary and secondary psychopaths. Karpman (1948) was one of the first to describe the differences between primary and secondary psychopathy. Karpman (1948) described primary psychopaths as being callous, manipulative, selfish and untruthful, while referring to secondary psychopaths as a more neurotic, anxious form of psychopathy.

Furthermore, Hare (1991) revised his version of the PCL-R and in doing so, took a larger step forward in diagnosing psychopathy, along with further differentiating between the two factors of psychopathy. Factor one refers to the superficial charm, compulsive lying, lack of empathy and superficial affect, along with being referred to as the emotionally more stable psychopath (i.e., primary psychopaths). Factor two is defined as a person with a parasitic lifestyle, who is impulsive, and prone to boredom (i.e., secondary psychopath). Understanding these differences between primary and secondary psychopaths allows researchers the ability to further measure the variances on a larger scale.

Primary psychopaths have also been described as engaging in antisocial activities due to lack the emotional reactions. It is this lack of emotional reaction that would normally stop most individuals from engaging in harmful behavior towards other people (Wilkowski & Robinson, 2008). More recent research has demonstrated that primary psychopaths have also been found to be the more fearless-constrained form of psychopaths, where it seems they are reward sensitive and driven, but actually low in fun seeking or, the term more readily used, impulsive (Hughes, Moore, Morris & Corr, 2012). Furthermore, when comparing individuals with primary psychopathic traits who are less impulsive to individuals with secondary psychopathic traits, who are impulsive, the variances become clearer (Hughes et al., 2012).

Secondary psychopaths have been characterized as the more anxious form of psychopathy (Karpman, 1948). Secondary psychopaths are more neurotic and are prone to depression, anxiety, and guilt, than are primary psychopaths (Karpman, 1948). They have been characterized more in terms of impulsive behaviors (i.e., lack of behavioral restraint) than the emotional deficits seen in primary psychopaths, and they lack the ability to moderate existing behavioral patterns (Wilkowski & Robinson, 2008). Although, secondary

psychopaths demonstrate these inabilities in their functioning, it has been found that secondary psychopaths have an appropriately developed conscience, as well as having the capacity for empathy, which is opposite of the historical view of psychopathy (Hughes et al., 2012). It is further explained that their reckless or impulsive behavior is assumed to be facilitated by their hyperactive reward sensitivity rather than the fearlessness seen in primary psychopaths (Hughes et al., 2012).

Additionally, the differences that have been described, report that primary psychopaths demonstrate more of a low anxious type of psychopathy due to their characteristic of lacking empathy, while secondary psychopaths are considered highly anxious because they are the more neurotic, impulsive type of psychopaths (Karpman, 1948). In addition, the differences demonstrated in secondary psychopath's impulsive/risky behaviors is illustrated in one study which used the Iowa Gambling Task (IGT), a computerized task that shows four decks of cards (A, B, C, and D) face down (Dean, Alstein, Berman, Constans, Sugar, & McCloskey, 2013). Decks A and B have high reward, but even higher losses and are considered risky, while decks C and D have small reward and even smaller losses making these decks the better choice (Dean et al., 2013). The researchers found that only participants displaying the secondary psychopathic characteristics were associated with risky decision making on the IGT (Dean et al., 2013). This further emphasizes the distinction between primary and secondary psychopathic characteristics, while simultaneously validating the idea that secondary psychopaths are the impulsive-unconstrained type that shows high levels of impulsive, fun seeking behaviors (Hughes et al., 2012).

Kimonis, Skeem, Cauffman, and Dmitrieva (2011) found that high anxious secondary psychopaths actually manifest more institutionalized violence within a juvenile population, than do primary psychopaths. Kimonis et al. (2011) further

discussed that secondary psychopaths were found to be less psychosocially mature than primary psychopaths and therefore have the potential for greater change in their violent behavior. So even though primary psychopaths tend to function more “normally” acceptable within society, there is more optimism towards changing the violent behaviors of secondary psychopaths.

Psychophysiological and Biological Distinctions. Another distinction that can be addressed within the topic of psychopathy is psychophysiology and biology. Research has demonstrated that psychopathic individuals tend to have lower autonomic arousal; more specifically, it was assumed that psychopaths have a hypoactive autonomic nervous system (Hare, 1968). A study conducted by Aniskiewicz (1979) discovered that, generally, psychopathic individuals appeared to be more sympathetically hypo-responsive to certain situations when measured through galvanic skin responses (GSR); additionally, primary psychopaths were more hypo-responsive than secondary psychopaths. Moreover, secondary psychopaths’ exhibiting higher anxiety reactivity may have led them to having more of a response to certain situations (i.e., witnessing vicarious instigation, also known as, observing another person in distress) than primary psychopaths (Aniskiewicz, 1979).

Another area of research that has been able to establish this lower arousal rate is the startle blink response. The startle blink has been demonstrated to be a reliable measure and is able to measure the magnitude of the blink as a reaction to aversive emotional states (Vrana, Spence, & Lang, 1988). It is hypothesized that the magnitude of the startle blink could be driven by the connection with the activity in the amygdala (Hitchcock & Davis, 1986). The importance of this measure to the current study is found within the study conducted by Benning, Patrick, and Iacono (2005) where they utilized positive, neutral, and aversive images from the International Affective Picture System to measure the startle

blink. The Benning et al. (2005) study was able to determine that participants who exhibited characteristics similar to primary psychopaths tended to have a deficient startle blink. Furthermore, they were able to demonstrate additional support towards the idea that certain characteristics associated with primary and secondary psychopaths are distinct (Benning et al., 2005).

Additional differences demonstrated within secondary psychopaths are their symptoms of executive dysfunction, specifically frontal dysregulation, which is consistent with the idea that there is frontal lobe hypoactivity related to psychopaths (Ross, Benning, & Adams, 2007). Also, decreased frontal lobe functioning could lead to the inability for people with secondary psychopathic traits to inhibit impulses. It could also be theorized that the fearlessness and ability to control their impulses, in primary psychopaths, could be a sign of intact executive dysfunction (Ross et al., 2007).

Primary psychopathy and secondary psychopathy are now understood as two different factors under the broad term of psychopathy. Primary psychopaths are viewed as being more superficial and calculating, whereas secondary psychopaths are more reactive and impulsive. It has also been determined that the physiological reactions between these two groups are distinct. Researchers are studying these differences more often now than in the past, now that research is developing more tools to assess the differences among these complex characteristics. There is still so much research that needs to be done in order to develop a cohesive idea around the primary and secondary psychopathic traits. One possible way to discover differences between primary and secondary psychopathy is by further studying the emotional processes that are involved.

Emotion Systems Model

The current study is focusing on the Integrated Emotion Systems Model that was used to address the processing of emotions in psychopaths. Blair (2004) developed this model to study the different neurocognitive systems involved in emotional processing and how they function in psychopaths. It addresses four key aspects of brain functioning: 1) executive attentional mechanisms, 2) sensory representations, 3) valence representations, and 4) motor system. The model then ties these functions together to show how they all affect our bodily reactions to stimuli (Blair, 2004). It is important to note that all of these processes happen almost simultaneously to generate a response.

First the executive attentional mechanism involves the anterior cingulate and dorsolateral prefrontal cortex. The anterior cingulate involves detecting and solving conflict between opposing information and conflict between different emotions (Kanske and Kotz, 2010). When faced with emotional stimuli these specific areas can be accelerated to process the conflict quicker (Kanske and Kotz, 2010). The dorsolateral prefrontal cortex is involved in regulation of thinking and action, so when paired with the anterior cingulate cortex it takes complex relationships and converts the stimuli into a response (Coombes, Corcos, Pavuluri, & Vailancourt, 2011).

At the same time the sensory representations are being processed in the temporal cortex (Blair, 2004). The temporal cortex has two specialized areas: 1) the fusiform face area, which is proficient in visual recognition of faces and objects and 2) the parahippocampal place area, which is proficient in responses to scenes illustrating places (Epstein et al., 1999). While these areas are processing emotional information, the amygdala, which is the most crucial region for emotional processing, is determining valence representations to influence the

behavioral expression of basic emotional reactions (Blair et al., 2005). The amygdala is an important aspect that helps the body determine how it will react by engaging the basic threat system in the brain stem, which is better understood as activating the fight or flight reaction. At this point the motor system, in the premotor cortex, and striatal regions are being engaged to react. This is a key aspect of this model because it has been found that the emotions can prime the motor system for action and actually reduce its reaction time to the emotional stimuli (Blair et al., 2005).

Psychopathy Amygdala Dysfunction

The purpose of the explanation of this model is relevant to understanding this study because to understand how a psychopath will react, you need to understand the underlying neurological mechanisms causing the reaction. Psychopaths have hypothesized deficits in the amygdala and because of these deficits they do not process emotional stimuli like a “normal” person, without neurological dysfunctions (Mitchell et al., 2006). A study done by Mitchell et al. (2006) using a forensic population, found that psychopaths have a faster reaction time when viewing emotional stimuli than do a non-psychopathic population. The Mitchell et al. (2006) study found these results by using the emotional interrupt task where a participant views a series of images (positive, negative and neutral) while simultaneously performing a motor response task. They also determined that psychopaths had fewer errors when performing the motor task, while assuming that nonpsychopaths were so adversely affected by the images that they couldn’t even remember how to perform the task effectively (Mitchell et al., 2006).

Furthermore, Wilkowski and Robinson (2008) performed a reaction time task to differentiate between primary and secondary psychopathy within an

undergraduate college population. They used an implicit associations test to specifically look at the differences in how primary and secondary psychopaths adjusted to errors during reaction time tasks. They found that participants who scored high in secondary psychopathic traits, but not primary, did not adjust their behavioral performance to improve their reaction time following errors, which is consistent with their impulsive/reactive behavior (Wilkowski & Robinson, 2008).

Rationale for the Current Study

The research conducted using the emotional interrupt task to assess the integrated emotions systems model has only been conducted on forensic psychopath populations, so it is beneficial to understand if it could be applied to the general population, starting with college students. The Levenson Primary and Secondary Psychopathy scale (Levenson et al., 1995) will be the first step in applying this model to college students and, quite possibly, finding a distinction between these two personality traits, i.e., primary psychopathic traits and secondary psychopathic traits. In understanding the results of the Wilkowski and Robinson (2008) research, the current study will further address the issue in differentiating between primary psychopaths and secondary psychopaths as compared to a control group; more specifically, using the emotional interrupt task to measure reaction time in order to find the differences.

To examine these issues, participants will be administered an online survey in order to assess whether participants meet the criteria of primary or secondary psychopathy. The participants who meet the criteria will be asked to participate in the laboratory task. The purpose of our research is to examine whether college students scoring high in psychopathic traits (i.e., primary or secondary psychopaths) will resemble incarcerated psychopaths, who participated in the Mitchell et al. (2006) study, when they are presented with a

sequence of images (positive, negative and neutral) and a motor response task that will measure reaction time (i.e., how long it takes to respond in milliseconds). The current study hypothesizes that individuals with primary psychopathic traits will have faster reaction times while viewing affective stimuli than individuals with secondary psychopathic traits; individuals with primary psychopathic traits will have faster reactions times while viewing affective stimuli than the control group; and the control group will have faster reactions times while viewing affective stimuli than individuals with secondary psychopathic traits.

Methods

Participants

Participants consisted of 63 volunteers screened from a larger sample of 676 undergraduate psychology students at Eastern Washington University who participated for extra course credit. Demographic analysis of those who participated in the reaction time study, as seen in Table 1, further clarifies the breakdown of participants according to gender, age, and year in school, along with their ethnicity, as reported by the participants. The participants were prescreened through an online program, Sona, which was used to categorize participants into those scoring high in primary psychopathic traits, those scoring high in secondary psychopathic traits and those who met criteria for the control group. The analysis was organized into two blocks of 48 trials each (96 total slides). Each trial consisted of negative (n= 16), neutral (n= 16) and positive (n= 16) interrupt conditions. The reaction time and the accuracy of selecting the correct motor response were recorded and analyzed.

Design

This design was a factorial 3 x 2 x 3 split-plot repeated measures analysis of variance. The first factor was trait (primary or secondary or control); the second factor was sex, and the repeated measure factor was the interrupt condition (positive, negative, or neutral stimulus). Participants were grouped according to their results of the prescreening LPSP survey.

Materials and Procedure

Prescreening Phase. The Levenson Primary and Secondary Psychopathy (LPSP; Levenson et al., 1995) scale was used to prescreen the participants in order to obtain the participants who met criteria for primary and secondary psychopathy. The LPSP scale consisted of 26 items that endorsed a 4 point scale, including “disagree strongly, disagree somewhat, agree somewhat, or agree strongly,” in response to items, such as “People who are stupid enough to get ripped off usually deserve it” (primary psychopathy) or “I find myself in the same kinds of trouble, time after time” (secondary psychopathy). The scale included reversed items to control the response sets. Factor analysis was conducted to distinguish between primary psychopathy ($\alpha = .82$) and secondary psychopathy ($\alpha = .63$) using a .30 factor loading threshold criterion. There were no double loading items found (Levenson et al., 1995).

Participants were instructed to answer this survey on an online program, Sona, utilized by Eastern Washington University. This online program assigns an anonymous internal code for each participant. After analysis of the survey data, participants scoring above one half standard deviations for primary psychopathy and above one half standard deviations for secondary psychopathy on the LPSP scale were grouped accordingly. The participants scoring below the median split of the data collected for the primary and secondary psychopathy groups were

categorized as the control group. The participants who met criteria were emailed using their code in Sona and instructed to participate in the in lab portion of the experiment.

Emotional Interrupt Task. The emotional interrupt task assessed the impact on a person's ability to process emotional stimuli using a voluntary reaction time task. The task was based on a prior study by Mitchell et al. (2006). Participants were seated (approximately 2 feet) in front of a computer screen and were instructed to simply press one of two buttons as quickly as they can; one button will be pressed if they see the image of a circle and the other button was pressed if they saw the image of a square (counterbalanced). Each trial consisted of a fixation point, a distractor image taken from the International Affective Picture Set (IAPS; Lang & Greenwald, 1988), a shape (circle or square), the repeated IAPS image that preceded the shape, and an intertrial interval. The images used were chosen based off of the parameters set in Mitchell et al. study for the mean valence and arousal ratings. Mitchell et al. study determined that the negative and positive images had a significantly higher arousal rating than the neutral images (p = .001). Additionally, the negative images were found to have significantly higher arousal ratings than the positive stimuli (p < .05; Mitchell et al., 2006).

Each trial consisted of a fixation point for 800 ms, followed by a distractor image (IAPS) for 200 ms, followed by the reaction time target – a circle or a square for 150 ms, followed again by the same distractor image for 400 ms. A blank screen was presented for 1200 ms between trials. The IAPS images consisted of one-third negative images (n= 16), one-third positive images (n= 16) and one-third neutral images (n= 16) (Mitchell et al., 2006).

The participants experienced two consecutive trials of the same images. Each trial was randomized by E-prime software. To ensure participants were

paying attention to the images, they were instructed to “pay attention to the images as you might be asked about them later”. To validate this statement, experimenters used a questionnaire that asked about what slides they were viewing, such as “did you see a fire?” The questions were randomly mixed to ask the participants about images they saw during the experiment and about images that were not in the experiment. The dependent variable measured was reaction time. After the reaction time data was collected, the mean scores were calculated for each group: those scoring high in primary psychopathic traits, those scoring high in secondary psychopathic traits, and the control group. This study used the means to compare the reaction time between groups.

Results

Participants who met the criteria for trait scores of one half standard deviation above the mean[1] of a given trait category were assigned to the Primary Psychopathy (HPT) or Secondary Psychopathy (HST) groups, accordingly. A random sample of participants who scored below the median for the HPT and

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[1] The original screening criterion was 1-SD above the mean, but it was necessary to adjust this value for the purpose of completing the MS degree on a schedule previously agreed upon. The main reason that the adjustment was necessary was that the number of participants who met the original 1-SD criteria and also completed the laboratory task was lower than anticipated. The problem was exacerbated by the fact that the proportion of females in the HST group who completed the RT task was low, and there were two males in the HST group. The adjusted criteria of 1/2 SD above the mean corrected the imbalanced sufficiently to permit an unequal-N analysis of variance to be performed with the RT measures. The additional participants meeting the revised criterion were from a pool concurrently assessed with the same instrument who qualified for inclusion in other groups in the larger study of which the thesis was only one part.

HST groups were randomly assigned to the Control Group. Table 2 reports the frequencies in each of the three categories for those screened and for those who were subsequently invited to, and participated in, the reaction time task. The female participants who completed the reaction time task greatly outnumbered the male participants, specifically seen in the low HST male participants. The distribution of males and females among the high trait groups was unbalanced and deemed problematic.

Test of Hypothesis

Mean reaction times were calculated for each participant for two blocks of interrupt trials. Each of the two blocks consisted of 48 trials interrupted by either the positive, negative, or neutral interrupt stimuli. The overall reaction time (RT) means are reported in Table 3, and the results of an omnibus ANOVA are reported in Table 4. As can be seen in Table 4, the main effect for Interrupt Stimulus resulted in marginal significance, but the effect (Table 5), if real, was very small and did not bear on the experimental hypotheses and so will not be discussed further.

Of greater importance is the marginally significant interaction of Interrupt Stimulus and Group (Table 4). This “interaction” is illustrated in Figure 1. Specifically, the control group had the shortest RTs, the HST group had the longest RTs, and the HPT group had RTs of intermediate duration. This analysis must be interpreted with caution because of the low N and an unbalanced gender distribution across groups.

Finally, there was a marginally significant, second order Group x Gender x Interrupt Stimulus interaction (Table 4). This “interaction” is perhaps best understood by the viewing of Figures 2, 3, and 4 one at time. Figure 2 specifically illustrates that control participants have the shortest RT, the HST participants

have the longest RT, and the HPT group has the intermediate duration while viewing the neutral interrupt condition. Figure 3 specifically illustrates that males within the HST group have the longest RT of all participants while viewing the negative interrupt condition, whereas males of the HPT group have the shortest RT. When viewing each gender separately the HST female participants have the longest RT, female control participants have the shortest RT, while HPT female participants have the intermediate duration; HST male participants have the longest RT, HPT male participants have the shortest RT, and control male participants have the intermediate duration within the negative interrupt condition. Figure 4 illustrates that participants within the HST group had the longest RT; however, female control participants had the shortest RT and female HPT participants had the intermediate duration. The male HPT participants had the shortest RT and the male control participants had the intermediate duration.

Discussion

These results are consistent with the hypothesis that participants scoring high in primary traits have faster reaction times than controls for emotional interrupts when the participants are males and when the interrupts have positive or negative affective valence. Technically speaking, however, this finding does not *unambiguously* confirm the hypothesis because the interactions involving groups were significant at a marginal level and also because the female controls were somewhat faster than females scoring high in primary traits. Nevertheless, these results are entirely consistent with the previous findings reported by Mitchell et al (2006), who used only male participants. Female controls were faster than those scoring high in either primary or secondary traits for all interrupt conditions.

Perhaps the most clear-cut findings bearing on the research hypotheses were of those scoring high in secondary psychopathic traits that were slower than either the controls or those scoring high in primary psychopathic traits under all interrupt conditions. Remarkably, males scoring high in secondary traits exhibited even slower reaction times than the females scoring high in secondary traits. If these findings hold up with replication, with, e.g., greater statistical power, then the implications would be that both sex and the distinction between primary and secondary traits moderate the effect of the emotional interrupt task.

The results of the present study suggest that participants with a predominance of secondary traits process emotional interrupt conditions differently resulting in slower RT than HPT participants for both males and females. The results that were discovered for the differences between male and female HST participants also further solidify how each group and gender can process emotional stimuli.

The present results confirm prior studies in which it has been shown consistently that female reaction times are generally slower than male reaction times (Der & Deary, 2006; Sprague & Verona, 2010). Despite the lower power and unbalanced groups sizes in the present study, the replication of this gender difference in reaction time supports the validity of the of the present findings.

The current study was based on Mitchell et al. (2006) which analyzed the reaction time of an all-male forensic population while conducting a similar motor response task. Mitchell et al. (2006) discovered that participants within the psychopathy group had faster reaction times than the control group. This study went further to discover that there was a difference between HPT and HST groups when compared to a control population. An important difference between the Mitchell et al. study and the present study was that Mitchell et al. (2006) used the PCL-R and a forensic population and therefore employed more extreme

measures of antisocial tendencies. Despite the fact that the Mitchell et al. (2006) study used a forensic population along with the PCL-R, it's important to continue research with the college population while using the LPSP scale for the purpose of exploring trait dimensions as opposed to forensic classification of types.

The limitations of this study started with the low sample size and thus the low power that was observed during analysis. Although this study was able to achieve high numbers of participants for the surveys, there was an inability to attain similar numbers for participation in the laboratory reaction time aspect of the study. More extra credit was approved by the university's psychology department for the in-lab participation, but was unsuccessful at generating higher interest for participation. Another aspect of the low sample size could be contributed to the loss of data for a three month span due to computer connection issues. The low power due to the low sample size also caused issues for the results of the analysis, although the study was still able to report marginally significant results. Another limitation was the unbalanced cells when viewing sex for each group. Although the HPT group had more balanced sex ratios, the control and HST groups were highly unbalanced, especially the HST group which consisted of only 2 males and 6 females. This is another reason why specifically addressing sex would have been beneficial.

Future studies should focus on attracting more participants for the in-lab portion of the reaction time analysis. This could be done by allowing more participants to be involved from other courses rather than limiting the participants to introductory psychology courses. Studies should also consider more incentive to participate aside from extra course credit. It could be that with the saturation of studies that students could attain extra course credit from causes there to be a lack of motivation to participate within a laboratory setting. Possibly offering a monetary compensation may increase the likelihood of participation.

Furthermore, upon discovering the imbalance between genders and the effect of the gender specific reaction times, future studies should focus on attaining gender balances between groups, along with separately analyzing the groups based on gender. This was not a focus point for the current study until the analysis revealed the demonstration of gender differences.

Finally, future studies may consider using a moderate linear regression design to address the difficulty of gathering a sufficient number of participants for the study. This more efficient approach may result in a time consuming activity; however, it may take less time overall to reach the necessary sample size as compared to the approach taken by the current study, which could take years.

In this study, the differences between those scoring high in primary and secondary psychopathic traits were addressed. Although this study resulted in achieving marginal significance, many issues were presented as starting points for future research, such as focusing on sex differences, along with the importance of a higher and more balanced sample size when addressing personality traits of an extreme population. This study was also able to demonstrate differences between the reaction times of those scoring high in primary and secondary psychopathy, specifically that those scoring high in secondary psychopathic traits had an overall slower reaction time than all other participants as compared to those scoring high in primary psychopathic traits and those who met criteria for the control group. These results demonstrated the importance of the continual research on the two personality traits of primary and secondary psychopaths.

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Appendix

Table 1

Demographic Data

		Total	Percentage
Gender	Female	40	63.5
	Male	23	36.5
Age	18-20	49	77.8
	21-40	12	19
	Decline	2	3.2
Year	Freshman/Sophomore	56	88.9
	Junior/Senior	7	11.1
Ethnicity	Caucasian	44	69.8
	Hispanic	8	12.7
	African American	3	4.8
	Other	8	12.7

Table 2

Distribution of Participants by Different Trait Groups

Sex	Surveyed	Participants Who Met Screening Criteria			Participants Who Completed Interrupt Task		
		HPT	HST	Control	HPT	HST	Control
Female	475	51	43	268	14	6	20
Male	201	58	10	85	12	2	9

Note: High Primary Trait Scores (HPT), High Secondary Trait Scores (HST).

Table 3

Mean Reaction Times for Group x Gender x Interrupt Condition

		Negative Stimulus	Neutral Stimulus	Positive Stimulus
Group	Sex	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
HPT	Female	527.6 (*104.0)*	524.7 (*103.3*)	514.0 (*96.5*)
	Male	464.2 (*78.1*)	486.0(*63.4*)	462.8 (*54.8*)
HST	Female	548.7 (*134.1*)	549.9 (*131.0*)	549.2 (*133.1*)
	Male	560.2 (*30.7*)	524.5 (*24.9*)	523.5 (*26.9*)
Control	Female	497.3 (*71.6*)	496.9 (*68.3*)	499.5 (*76.7*)
	Male	473.6 (*67.8*)	471.3 (*57.9*)	465.0 (*67.7*)

Note: High Scoring Primary Traits (HPT); High Scoring Secondary Traits (HST)

Table 4

Overall Analysis of Variance of Reaction Times

Source	MS	*df*	*F*	*p*	Power
Group	25027.1	2	1.22	0.30	0.26
Gender	26017.5	1	1.27	0.27	0.19
Group x Gender	3971.4	2	0.19	0.83	0.08
Error (Group)	20535.5	57			
Stimulus	881.7	2	2.6	0.08	0.51
Stimulus x Group	693.2	4	2.0	0.09	0.59
Stimulus x Gender	331.3	2	0.97	0.38	0.21
Stimulus x Group x Gender	766.8	4	2.24	0.07	0.64
Error (Stimulus)	342.6	114			

Table 5

Mean Reaction Times for Interrupt Conditions

Stimulus	Mean (*SD*)
Negative	501.2 (*88.6*)
Neutral	503.3 (*82.2*)
Positive	496.3 (*83.9*)

Figure 1 Interrupt Condition x Group Interaction

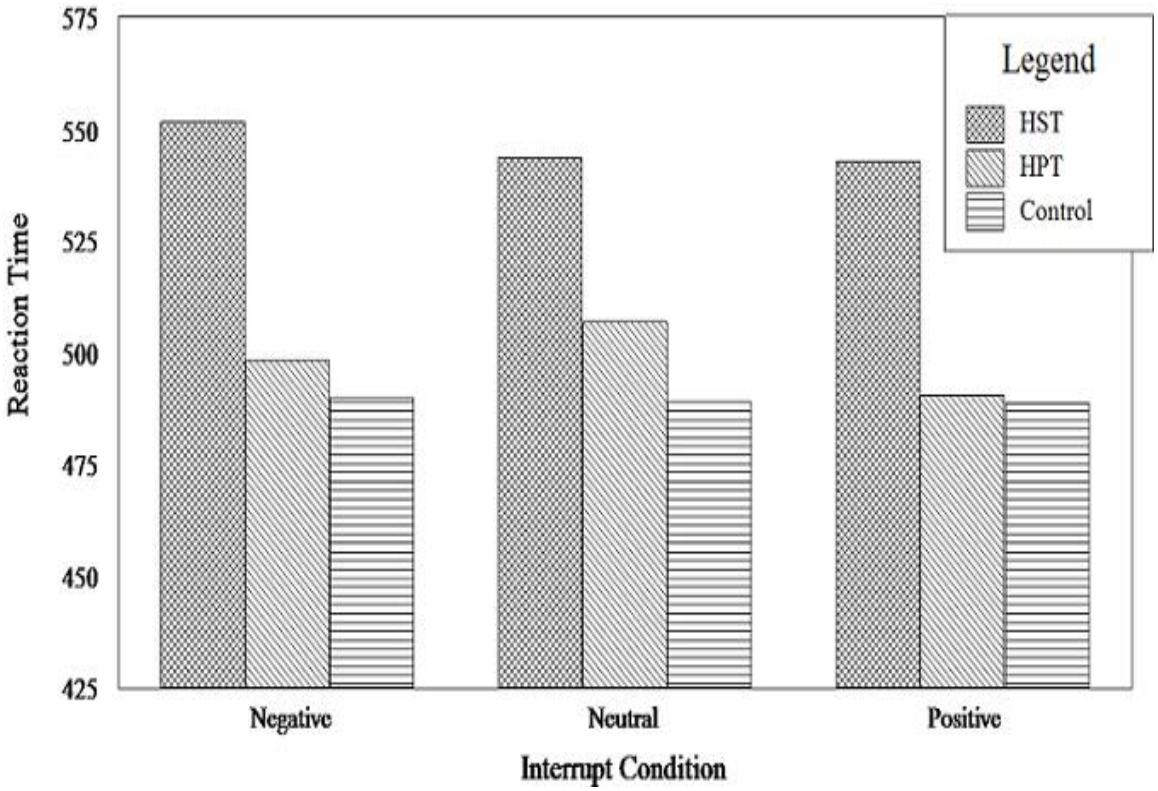


Figure 2 Group x Gender; Neutral Interrupt

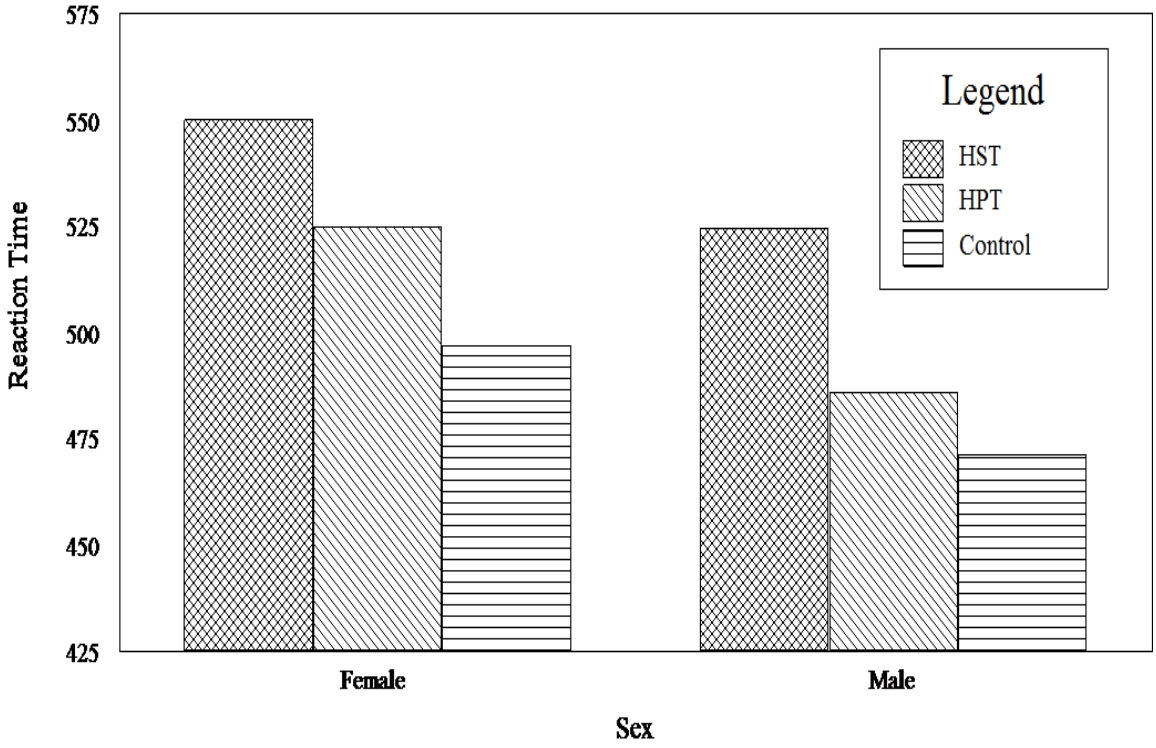


Figure 3 Group x Gender; Negative Interrupt

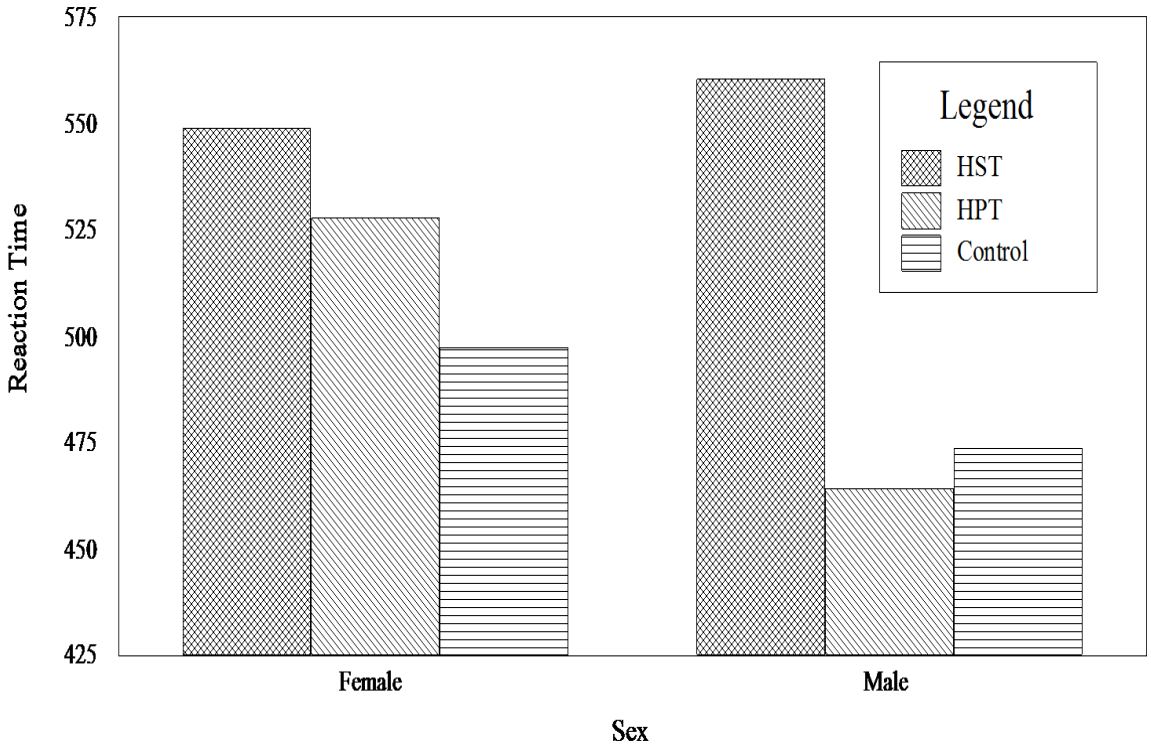
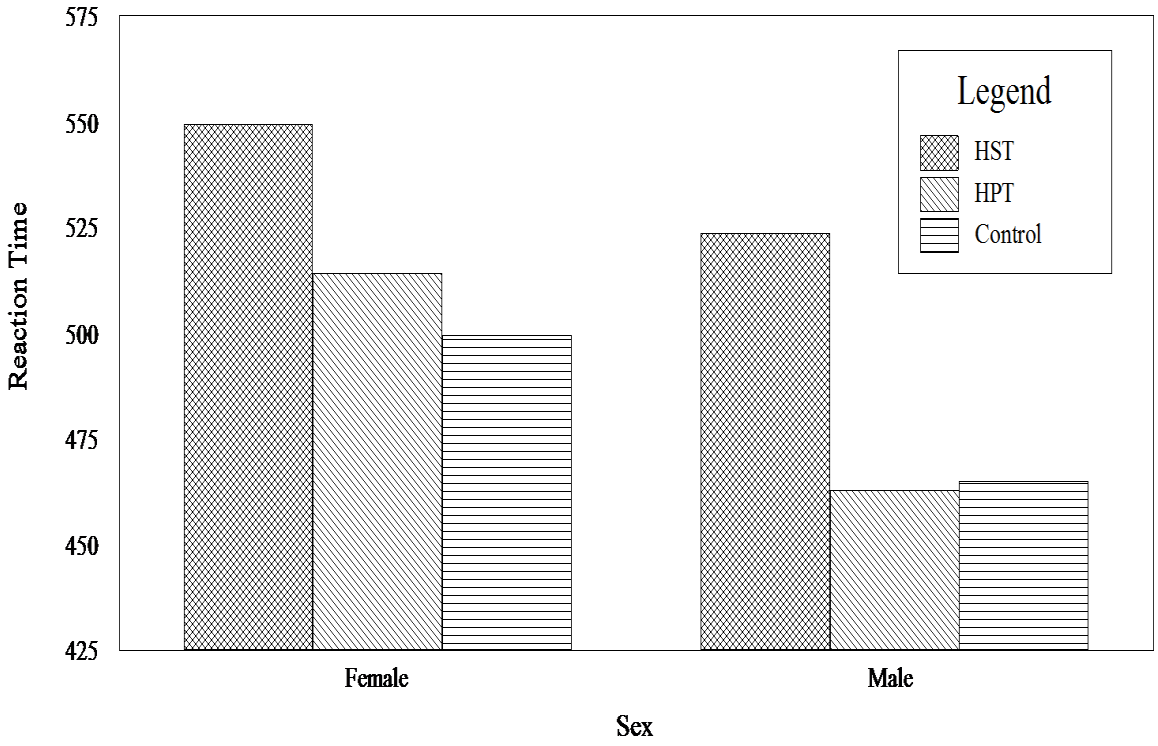


Figure 4 Group x Gender; Positive Interrupt



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