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Attentional biases and PTSD symptomology in victims of sexual assault and motor vehicle accidents

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ATTENTIONAL BIASES AND PTSD SYMPTOMOLOGY IN VICTIMS OF SEXUAL
ASSAULT AND MOTOR VEHICLE ACCIDENTS

by
Orin R. Redmond

A Thesis

Submitted in partial fulfillment of the requirements of the
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Advisor

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ABSTRACT

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ATTENTIONAL BIASES AND PTSD SYMPTOMOLOGY IN VICTIMS OF SEXUAL
ASSAULT AND MOTOR VEHICLE ACCIDENTS
2008/2009
Dr. Bonnie Angelone
Master of Arts in Mental Health Counseling and Applied Psychology

While the field of change detection and attentional biases has become an increasingly

popular area of study and much is already known about Posttraumatic Stress Disorder

(PTSD), very little research has been done integrating these two areas. In the present

study, we chose to investigate two types of traumatic experiences prevalent in the college

population, motor vehicle accidents (MVAs) and sexual assaults. The flicker paradigm,

used to measure change detection, was utilized to examine hypersensitivity to

environments with threatening stimuli in individuals whom experienced either of these

traumas. The paradigm monitored reaction times to identifying changes that took place in

scenes involving MVA, suggested sexual aggression, or neutral stimuli. We hypothesized

that those with higher levels of PTSD symptomology would respond faster to changes

that represented their central clinical concern. The data suggested that there was a

significant main effect for interaction between reaction times (RTs) to MVA stimuli and

PTSD symptomology. However, the data did not indicate a significant main effect for

interaction between PTSD symptomology and RTs for sexual aggression stimuli.

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CHAPTER I

Literature Review

Posttraumatic Stress Disorder (PTSD) is an anxiety disorder that often develops as a response in individuals whom experience a life threatening event that is usually overwhelming and/or terror provoking (McNally, 2006). Such life threatening events might include involvement in a sexual assault, motor vehicle accident, or other situations that present a sense of danger to an individual. The two life threatening traumas mentioned above are the focus of this study due to the high prevalence rates seen in teenage and young adult populations (college years).

The majority of rape and sexual assault victims are females between the age of 16 and 24 years (Fisher, Daigle, Cullen, & Turner, 2003). It was found that in an upwards of thirty-five percent of female college students became victim to some form of sexual offense (Fisher et al., 2003) and as many as twenty percent of college women admitted to being forced into sexual intercourse (Kaltman, Krupnick, Stockton, Hooper, & Green, 2005). Of these women who were assaulted, a study found that more than forty percent met the criteria for PTSD even several months after the traumatic experience (Cortina & Kubiak, 2006). In a different study, researchers found that approximately seventy percent of women who admitted to being a victim of sexual assault also experienced another traumatic life event other than the assault (Kaltman et al., 2005).

Other traumatic life threatening events common to this age group are motor vehicle accidents (MVAs). MVAs are the leading cause of severe injuries among adults

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worldwide, accounting for over 3.5 million people injured every year (Kupchik, Strous, Erez, Gonen, Weizman, & Spivak, 2007). Motor vehicle accidents can also lead to the onset of a variety of both chronic and acute psychological symptomology and are considered to be one of the leading causes of acute PTSD in the nation (Jones-Alexander, Blanchard, & Hickling, 2005).

Individuals whom experience events like motor vehicle accidents or sexual assault are at risk to develop PTSD symptomology. This symptomology can progress into a condition of maintaining heightened awareness for any surrounding potential threats in the environment (Bryant & Harvey, 1995). Sensitivity to such conceivable threats can provoke anxiety if the individual's attention is drawn to stimuli that hold considerable perceived significance to the trauma experienced. For example, if a woman was raped while walking near a dark alley on campus, dark alleys in general could now be considered potential threats to that woman. A dark alley was an environmental factor at the time of the rape and could therefore provoke anxiety for that individual if attention is drawn to a similar alley in the future. Reminding an individual of past trauma can not only generate thoughts and feelings of reliving the traumatic event with original emotional intensity (McNally, 2006), but it can also intensify the fear that similar situations may occur (Williams, Mathews, & MacLeod, 1996). The processing of these thoughts has been found to be automatic and can elicit involuntary retrieval of trauma memories. The resurfacing, or recovery, of these memories will most often be presented in the form of intrusive thoughts or images (flashbacks, snap-shots), nightmares, and avoidance of the threat-stimuli (Cassiday, McNally, & Zeitlin, 1992; Williams, Mathews, & MacLeod, 1996). It was found that the lifetime prevalence of this disorder and

symptomology in the United States was as much as twelve percent (Cortina and Kubiak, 2006).

To aid researchers in the understanding of posttraumatic stress disorder, learning theory can help to explain the etiology and maintenance of symptoms found in PTSD. Learning theory consists of two components to the development of PTSD, classical conditioning and operant conditioning. Classical conditioning is used to illustrate the high levels of distress and fear exhibited by individuals that have experienced a trauma (Resick & Calhoun, 2001). Individuals whom experience a trauma may associate that event with other stimuli in the environment at the time. This association can occur when an individual unconsciously links a visual cue with a traumatic event. This may result in the individual experiencing fear and anxiety toward these other neutral environmental stimuli. For example, as mentioned earlier, if a woman was raped near a particular building on a college campus, the associated anxiety and arousal may be provoked by walking near any building. The individual might then interpret the anxiety with a greater risk of possibly being raped again if she were to walk near that building or a similar one.

Operant conditioning can also be used to explain avoidance behaviors and the maintenance of fear (Resick & Calhoun, 2001). Triggers (e.g. Buildings, in the case of the above mentioned example) are avoided to reduce anxiety and the fear of reoccurrence of the traumatic event. When thoughts and feelings of the event and emotions of reliving the trauma become overwhelming, certain defense mechanisms are manifested, such as avoidance or numbing. These defense mechanisms are used to help individuals cope with stress. By avoiding a trigger and removing the threat stimuli, fear and anxiety levels will decrease, therefore reinforcing this behavior. This response is known as negative

reinforcement. Without confronting the threat-stimuli, the victim of trauma will never have the opportunity to deduce that not every encounter with threatening stimuli will result in a traumatic episode (Resick & Calhoun, 2001).

The way emotional information is processed is critical to the study of etiology, maintenance of symptoms, and treatment for PTSD (Buckley, Blanchard, & Hickling, 2002). The processing of information is directed by beliefs, or schemas, already possessed by the individual, that determine how incoming experiences are received, interpreted, and stored into memory (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van IJzendoorn, 2007). There are three stages of cognitive processing, otherwise referred to as information processing (IP), in individuals with anxiety disorders. In the first stage of IP, stimuli are attended to without conscious awareness. This stage is involuntary and requires very little attention. For an individual with anxiety, although the processing is automatic, they may still have sensitivity to stimuli associated with the trauma. These stimuli are called stimuli with a negative valence, which means they have negative emotional arousing tendencies for the individual and are seen as threat-stimuli to that person in that specific situation. Not every individual with an anxiety disorder will have the same negative valence stimuli. In most cases, the negative valence stimuli are specific to that individual's trauma. The second stage of information processing is considered the activation stage. During this stage, an individual's attention is directed towards the threatening stimuli. During the third stage, specific concerns become the primary focus of the thought processes and the person must decide if they are in fact capable of coping with the arising situation. It is in these last two stages that attention is drawn to environmental stimuli that are of central concern to that individual's

beliefs and memories of the trauma (Beck & Clark, 1997). This initial reaction of directing one's attention to specific stimuli is known as a bias.

A core characteristic in persons with PTSD is a bias towards threatening environmental stimuli related to a traumatic event. This bias is formed by cognitive representations of several emotions (fear, shame, anger, guilt, etc.) that activate anxiety, warning the individual of a possible threat (Bryant & Harvey, 1995). In addition, biases can contribute to the increase of anxiety in people with PTSD and encourage avoidance behavior leading to the maintenance of the symptoms. In early stages of information processing, individuals with PTSD direct their focus toward the threatening stimuli and in later stages they direct their focus away from the stimuli. At first, the individual shows an automatic, involuntary bias towards threat-related information and once the thought process recognizes the possible danger, avoidance becomes a mechanism to relieve anxiety. Therefore, a bias is a contributing factor in the manifestation of avoidance behavior (Bar-Haim et al., 2007).

The term bias can be defined in several ways. Bias is a marked difference seen in the focus on threat-related stimuli versus neutral stimuli of individuals demonstrating high anxiety. In this definition, the researchers looked for a difference in attentional focus to threat and non-threat stimuli in anxious individuals. A bias is also a marked difference seen in the demonstration of focus between threat-related and neutral stimuli in individuals with anxiety compared to the focus between threat-related and neutral stimuli in those without anxiety. The second definition concentrates on a comparison of attentional focus on threat and non-threat stimuli between the anxious and non-anxious individuals. Since the threat-related stimuli should not represent negative valence for

non-anxious individuals, there should be no difference between reactions to threat-related and neutral stimuli for that group. If there is a difference in observed results when comparing the two groups' reactions to threat or non-threat related stimuli, evidence of a bias is present (Bar-Haim et al., 2007).

People create these biases, or beliefs, according to their focus of attention and memory of traumatic accounts and the associated environments (Resick & Calhoun, 2001). Despite the fact that the world and environment are filled with stimuli, both threatening and non-threatening, people tend to absorb minimal characterizing information. However, the characterizing information collected is usually just enough for automatic labeling to take place (Simons, 1996). During this automatic labeling, information is taken from representative snap-shots of a scene or object. This representation is usually unsatisfactory since the image tends to deteriorate almost immediately after attention is disengaged (Hollingworth, 2003). During the labeling phase, attention is executed in the form of a "priority map." For example, objects that are of central concern to the individual will be examined in more detail (Yantis & Hillstrom, 1994). This presents the idea that attention plays an important role in information processing.

Attention is defined as the adjustment in the rate and significance of information processing which causes a change in the priority of the information being processed (Williams, Mathews, & MacLeod, 1996). Normally, attention changes according to priority of incoming information, or bias, and may be directed to or away from a specific stimulus due to this attentional bias. Attentional bias causes interference and delay in information processing because attention is diverted to a particular stimulus rather than

the previously attended object. This is recognized as being largely involuntary (Constans, 2005). Attentional bias caused by threat stimuli is particularly pronounced in individuals with PTSD compared with other anxiety disorders. One reason for this may be due to a plethora of well-established trauma related thought processes (Bryant & Harvey, 1997). Attentional biases play a significant role in the development and perpetuation of PTSD symptomology. The focus on mild threats can lead to concern over harmless stimuli and cause a condition of "high alert," or elevated stress risk (Constans, 2005).

There are two paradigms that have been consistently used for the study of information processing and attentional biases in anxiety disorders, the emotional stroop task paradigm and the dot-probe paradigm. The emotional stroop task paradigm is a design that presents both threatening and non-threat related words to the participant, in which each word is printed in different ink colors. Participants identify the color of the word rather than the physical meaning of the word itself (Jones, Jones, Smith, & Copley, 2003; Bar-Haim et al., 2007; Constans, 2005). Bruce and Jones (2004) found that if the content of the word was related to the individuals' concerns, color naming response time was delayed compared to color naming for neutral stimuli. Bryant and Harvey (1995) actually found the stronger the stimulus, the slower the response. Other studies have resulted in a similar attentional bias with the emotional stroop task paradigm in alcohol users (Bruce & Jones, 2004; Sharma, Albery, & Cook, 2001), nicotine users (Waters & Feyerabend, 2000), heroin dependence (Franken, Kroon, Wiers, & Jansen, 2000), bulimia nervosa (Fairburn, Cooper, Cooper, McKenna, & Anastasiades, 1991), and rape victims with PTSD (Buckley, Blanchard, & Hickling, 2002).

The other paradigm used for measuring attentional biases is the dot-probe paradigm. In this design, two stimuli (one threat word and one non-threat word) are presented to participants for a brief period of time. They are then covered with a mask (blank screen), and are shortly followed by a small visual probe in the location of one of the previously displayed words. The participants are then responsible for naming the word replaced with the probe (Bar-Haim, 2007; Constans, 2005). Studies have resulted in an inconsistent reliability and found a lack of attentional bias, when using the dot-probe paradigm, for strong threat words (Bryant & Harvey, 1997). Although there is a lack of reliability and literature using these paradigms for the study of PTSD, it was found that when attentional biases were present with other symptomology, participants displayed slower reaction times to the stimuli for the emotional stroop task paradigm and faster reaction times to related stimuli when using the dot-probe paradigm.

Using the emotional stroop task paradigm or dot-probe paradigm to study attentional biases may be somewhat problematic (Jones, Jones, Smith, & Copley, 2002). There is little evidence that can be used to determine whether these paradigms measure attention selection early during the processing of stimuli or if the biases are related to the same response criterion later during processing (Jones, Jones, Smith, & Copley, 2002). Due to this finding, researchers have borrowed a paradigm from the visual cognition literature to measure attention selection and change blindness. The flicker paradigm is often used to measure change blindness, which refers to the failure of detection of large or significant changes in a scene (Simons & Levin, 1997; Simons & Rensink, 2005; Cole, Kentridge, & Heywood, 2004). Change blindness is observed if the participants lack the ability to recognize a change that takes place in a scene. The flicker paradigm is a method

in which two almost identical images are presented to participants with one object changed in one of the images. After the first image (pre-change) is briefly presented, it is then covered with a mask (blank screen). Shortly following the blank screen, the second image (post-change) is briefly shown. The second image is then covered with a mask and is followed by the presentation of the original pre-change image. This process will continue to "flicker" until the observer detects the change occurring between the two scenes (Rensink, O'Regan & Clark, 1997; Jones, Bruce, Livingstone, & Reed, 2006) or until the designated time period for the task expires. This paradigm relies on the individual's ability to encode, store, and recall information in the memory from the initial scene. In addition, observers must compare the initial and changed images in order to detect the change. (Angelone, Levin, & Simons, 2003; Mitroff, Simons, & Franconeri, 2002).

In the current study, we investigated PTSD symptomology in individuals who have experienced either a motor vehicle accident or been a victim of sexual aggression and examined attentional biases using the flicker paradigm. The purpose of this study is to find an effective tool that can be used to measure attentional biases associated with individuals affected by either of these traumas. With this information, clinicians can use this tool to gain insight into their client's tendencies toward attentional biases. Knowledge of these biases can help explain self-maintaining of symptomology and the occurrence of relapse after what is usually considered to be successful treatment (Jones, Bruce, Smith, & Copley, 2002). For example, if researchers were able to gain understanding behind avoidance behavior and these biases, they would be better equipped with the insight needed to develop specific relapse prevention techniques designed to

confront these threat-related stimuli. With awareness of these stimuli, victims of trauma could be better prepared to apply a variety of coping strategies to a situation for anxiety reduction.

Using the flicker paradigm is optimal because the stimuli are more realistic, lifelike, and natural. Since visual flashbacks are the most common of reliving experiences in individuals with PTSD (McNally, 2006), the pictures used in a flicker paradigm will allow for personal interpretation of a scene rather than have one word specifically targeted at one object with each presentation as with the stroop or dot-probe paradigms. Flicker paradigm has been used to examine attentional bias (faster response time to threat related stimuli compared to neutral stimuli) in problem drinkers (Jones, Bruce, Livingstone, & Reed, 2006), individuals with insomnia (Marchetti, Biello, Broomfield, MacMahon, & Espie, 2006), poor sleepers (Jones et al., 2005), and alcohol users and cannabis users (Jones, Jones, Blundell, & Bruce, 2002). It has been found that information processing biases exist in alcohol users, not just abusers and dependents (Jones, Bruce, Smith, & Copley, 2002). This poses the idea that there may be attentional biases, and information processing biases, in individuals with PTSD symptoms, not just those diagnosed with PTSD. If this is true, the information learned from studying PTSD with the flicker paradigm can be used to help individuals that share symptoms common to that of PTSD. Victims of rape and sexual assault with symptoms similar to that of PTSD, that had moved, avoided thinking about the assault, or changed jobs to remove themselves from reminders of the rape most likely did not develop PTSD (Cassiday, McNally, & Zeitlin, 1992). If individuals could have an effective measure to help pinpoint these attentional biases, working on stress reduction with these targeted stimuli

might benefit the individual and aid them in decreasing their chances of symptoms evolving into an anxiety disorder, such as PTSD.

In this study, participants were asked to view scenes containing one object change and determine whether or not they detect that change. Images presented were several pictures of natural scenes, some involving neutral stimuli while others were specific to motor vehicle accidents or sexual aggression (assault and rape). Individuals with PTSD symptomology can, at times, be hypersensitive to their surroundings and will attend to change anywhere in the visual field as long as there is something in the scene relevant to that individual's center of concern. This led to both of our hypotheses. We hypothesized that, within individuals whom have experienced a motor vehicle accident, those with higher levels of PTSD symptomology would respond faster to clinical concern threat-related stimuli than neutral stimuli compared to individuals with lower levels of PTSD symptomology. We also hypothesize that within individuals whom have experienced a trauma related to sexual aggression, those with higher levels of PTSD symptomology would respond faster to clinical concern threat-related stimuli than neutral stimuli compared to individuals with lower levels of PTSD symptomology.

CHAPTER II

Method

Participants

Participants were comprised of 375 volunteers recruited through the Introduction

to Psychology subject pool in the psychology department at a moderate sized university

in the northeastern portion of the United States. Participants were required to have normal

or corrected-to-normal vision to partake in the study. They ranged in age from 18 to 49

years. Participants identified themselves as Caucasian/White American (n =300) and

Ethnic Minority/Non-White (n=75). Overall, 48.8% of the sample was male (n = 183)

and 51.2% was female (n = 192).

Materials

Stimuli

A flicker paradigm was used to display three different types of realistic/natural

scene stimuli. These three types of stimuli involved motor vehicle accidents, suggested

sexual assault, and neutral scenes. Motor vehicle accident stimuli, contained pictures of

actual accidents (both fatal and non-fatal) as well as pictures of rescue workers and

roadside memorials (see figure 1 for an example). The images in the suggested sexual

assault category included pictures such as men physically assaulting women (i.e. men

holding women's wrist or images suggesting women being battered), sexual harassment

at the workplace, contraceptives, and women being held against their will at knife-point

(see figure 2 for an example). Images in the neutral category consisted of bedroom scenes, living room and kitchen scenes, pictures of food, pictures of animals, and other daily life images (see figure 3 for an example). The pictures presented included images both with and without people present.

Changes were created using Photoshop to add or delete objects, move the location of an object, or change the characteristics of an object. Although original pictures were labeled pre-change and altered images were labeled post-change, when shown in the flicker paradigm, the post-change image were sometimes shown first, in order so that the unaltered image was sometimes the pre-change and sometimes the post-change. In total there were four different types of changes made: addition, deletion, location and object characteristic. An example of a deletion/addition in the sexual aggression category was the removal of the Trojan helmet on a condom wrapper. An example of an addition in the MVA category was duplicating a rescue worker at the location of the accident and placing him on the other side of the scene. An example of a change in location of an object in a neutral scene was moving a stuffed animal from one side of the bed to the other. Finally, object characteristic changes consisted of changes to some property of an object such as a change to the part of an object, size or color of an object or other changes that were not addition, deletion or location. For example, an individual's hair was expanded and made longer in the post-change scene. When location or characteristics were changed or when an object was added, the changes were made to threat stimuli (MVA and sexual aggression scenes) and neutral stimuli change was made in the center of the image or to the assumed central concern of the image to avoid differences in scene detection difficulty. Although we did not have a measure to determine the central concern

of each scene, experimenters attempted to change what they thought were the greatest

threat concerns (main objects in each scene). Images were retrieved from copyright free

websites such as morquefile.com and freephoto1.com. They were also borrowed from a

picture archive program, International Affective Picture System (IAPS; Lang, Bradley, &

Cuthbert, 2005), as well as some scenes were also provided by the researchers and

assistants of this study.

Stimuli were presented using Direct RT v2004.3.0.24 on 15 inch monitors set at a

resolution of 600 x 400 controlled by Dell Intel Pentium 4 computers. Participants sat at

an approximate distance of 50cm from the computer screens with the keyboard directly in

front of the monitors on a desk. The majority of scenes (array on grey background or

picture) were 24 ½ x 18 ½ cm presented at the center of a 30 x 23cm screen and

subtended a 26° horizontal visual angle. The original and edited images were presented

for 333 milliseconds (ms) each with a blank grey screen in between that was presented

for 130ms. This procedure repeated for as long as 60 seconds total or until the change

was detected and the flicker was stopped, triggered by the participant touching the space

bar on the keyboard (see Figures 1, 2, and 3). Reaction times were recorded once the

space bar of the computer keyboard was pressed. The programs used to administer the

flicker paradigm and questionnaires were Media Lab and Direct RT.

Measures

Post-traumatic Stress Disorder Check List (PCL-C). This is a 17 item self-report

measure that uses a five point Likert scale to assess PTSD symptomology in individuals

who may have experienced trauma. Participants were asked to rate how much they were

bothered by certain problems in the last few months and report the intensity using the

Likert scale (1 – "not at all" to 5 – "extremely"). Examples of questions asked were, "Do you have repeated, disturbing memories, thoughts, or images of a stressful experience from the past?" or "Do you avoid activities or situations because they reminded you of a stressful experience from the past?" (Weathers, Litz, Herman, Huska, & Keane, 1993).

Trauma History Screen (THS). This is a self-report measure that inquires about several different traumatic experiences one may have encountered. This measure asks for age at the time of the event, descriptions of the account, and other questions dealing with the physical and emotional well-being of the victim and others involved. This measure is a basic questionnaire used for finding victimization rates of different traumatic experiences in a surveyed population. Examples of questions asked were, "Have you ever been in a really bad car, boat, train, or airplane accident?" or "Have you ever been forced or made to have sexual contact as an adult?" If the participant answered yes to any of the initial questions, they then received a follow up question such as, "When this happened, were you afraid that you or someone else might get hurt or killed?" (Carlson, Palmiere, Kimerling, Ruzek, & Burling, Unpublished manuscript)

Beck Depression Inventory (BDI). This is a 21 item self-report measure that uses a four point Likert scale to assess an individual's feelings of oneself. Ratings of zero being the least severe and three being most severe, the BDI focuses on feelings of depression and self-worth of an individual. A total score of 0-13 is viewed as minimal range, 14-19 is mild, 20-28 is moderate, and 29-63 is considered a severe range for depression. The BDI is one of the most widely used scales in evaluating depression in an individual. Examples of statements made were, "0 – I do not feel like a failure; 1 – I feel I have

failed more than the average person; 2 – As I look back on my life, all I can see is a lot of failure; 4 – I feel I am a complete failure as a person" (Beck, Ward, & Mendelson, 1961).

Procedure

This research was conducted in small groups ranging from 1-10 people. Participants viewed stimuli and completed surveys on individual computers. First, participants were asked to sign informed consent for their involvement with the study. During this time, an experimenter briefly explained that the participants would be asked to answer potentially sensitive questions and they will be seeing images that may be considered graphic. Participants were informed that they are volunteers and may leave at any time if they felt uncomfortable. Prior to completing several surveys, participants viewed 60 pairs of near identical scenes on the computer in which one object changed in each set. Since this project was a part of a larger experiment, only 30 pairs of stimuli were used for analyses. Participants' were to detect the change as quickly as possible and to trigger the space bar once they had found the change. After the participant recognized the changed and stopped the flicker, they were to write down the name of the object in the scene that changed and how it changed on a provided answer key. Each computer station had individual wall dividers which prevented any external distractions from interfering with the participants' performance and observation. Their reaction time and answer accuracy were recorded and analyzed.

After the participants completed the change detection portion of the study, they were asked to complete several surveys. These measures included the PTSD checklist (PCL), Trauma History Screen (THS), Beck Depression Inventory (BDI), and a

demographics questionnaire. Once the measures were completed, participants were excused and subsequently left the room in order to reduce distractibility of other participants engaged in the study. These participants were fully debriefed upon dismissal.

CHAPTER III

Results

MVA Analysis

There were a total of 81 participants who endorsed being involved in a serious MVA. A mixed ANOVA with one between groups variable (level of PTSD symptomology: high and low) and one within groups variable (type of stimuli viewed: related and neutral) was conducted. To examine PTSD symptomology, participant PCL scores were divided into two categories: Low (35 and less) and High (36 and greater).

There was no main effect for stimuli type ($F(1,79) = .034$, $p = .854$, partial $\eta^2 = .000$). The main effect of PTSD symptomology was also not found to be significant ($F(1,79) = .833$, $p = .364$, partial $\eta^2 = .010$). However, the stimuli type by PTSD symptomology interaction was significant ($F(1,79) = 4.129$, $p = .046$, partial $\eta^2 = .050$). Individuals with higher levels of symptomology demonstrated faster reaction times to related stimuli ($M = 8706.47$, $SD = 4910.89$) compared to neutral stimuli ($M = 9483.71$, $SD = 5676.51$). Individuals with lower symptomology were similar for both related ($M = 10679.10$, $SD = 6763.59$) and neutral stimuli ($M = 10031.71$, $SD = 6352.07$). See Table 1.

Sexual Aggression Analysis

There were a total of 33 participants who endorsed being sexually assaulted either as a child or an adult. For all 375 participants in the study, reaction time for sexual assault and neutral pictures was significantly different ($t(374) = 10.45$, $p<.05$). As such,

we use a z-score transformation to equalize reaction times used in our comparisons. A mixed ANOVA with one between groups variable (level of PTSD symptomology: high and low) and one within groups variable (type of stimuli viewed: related and neutral) was conducted on these transformed scores. There was no main effect for stimuli type ($F(1,31) = 1.368$, $p = .251$, partial $\eta^2 = .042$). The main effect of PTSD symptomology was also not found to be significant ($F(1,31) = .171$, $p = .682$, partial $\eta^2 = .005$). Finally, the stimuli type by PTSD symptomology interaction was not significant ($F(1,31) = .078$, $p = .781$, partial $\eta^2 = .003$). Individuals with high symptomology performed similarly on related and neutral images ($M = .3561$, $SD = 1.41$; $M = .5464$, $SD = 1.71$, respectively). Individuals with low symptomology also performed similarly on related and neutral images ($M = .1718$, $SD = 1.40$; $M = .2886$, $SD = 1.70$, respectively). See Table 2.

CHAPTER IV

Discussion

The study examined the interaction between reaction time to detect changes and level of PTSD symptomology in individuals who have experienced a trauma (either sexual aggression or a MVA). It was predicted that those with higher PTSD symptomology and a traumatic experience would react quicker to changes in scenes that were representative to that individual's clinical concerns, than would those with lower levels of PTSD symptomology and a related experience.

Our first hypothesis, that individuals, whom have experienced a motor vehicle accident and had higher levels of PTSD symptomology, would respond faster to clinical concern threat-related stimuli than neutral stimuli compared to individuals with lower levels of PTSD symptomology was supported. Individuals whom experienced a motor vehicle accident and had higher levels of PTSD symptomology responded faster to MVA stimuli than neutral stimuli compared to those whom had experienced a motor vehicle accident and had lower levels of PTSD symptomology. We also hypothesized that within individuals whom have experienced a trauma related to sexual aggression, those with higher levels of PTSD symptomology would respond faster to clinical concern threat-related stimuli than neutral stimuli compared to individuals with lower levels of PTSD symptomology. This hypothesis was not supported.

Because existing literature on this topic is very limited, it is difficult to establish a well defined explanation for why those with higher levels of PTSD symptomology

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responded slower on sexual aggression stimuli than those with lower levels of symptomology and not for MVA stimuli when using the flicker paradigm. One possibility is comorbid depression. As stated previously, past research supports the finding that PTSD and depression are strongly related (Orr, Claiborn, Altman, Forgue, de Jong, Pitman, & Herz, 1990) and can have an effect on the performance of an individual during a change detection task. It has also been found that attentional biases no longer exist when anxiety and depression coexist (Bar-Haim et al., 2007; Buckley, Blanchard, & Hickling, 2002). Comorbid depression can delay a person's response time for a number of reasons. Although we used a depression scale in this study, we had very few individuals reporting unwanted sexual experiences, and we did not have many individuals experiencing high levels of PTSD symptomology. We were not able to determine whether depression played a role in the current study; in the future the effects of depression could be examined in more depth.

One theory explaining the effect of comorbid depression involves emotional numbing. Emotional numbing can occur over time when an individual whom experienced a trauma avoids environmental or experiential stimuli that would otherwise remind him or her of the trauma itself. After reducing exposure to the threat stimuli and anxiety provoking situations, trauma victims can train themselves to suppress emotions associated with their traumatic experience. Therefore, when the individual eventually does encounter what might have once been threatening stimuli, the object or situation no longer provokes anxiety because emotional numbing has taken place (Litz, Schlenger, Weathers, Caddell, Fairbank, & LaVange, 1997). If participants whom experienced a motor vehicle accident or a sexual trauma used emotional numbing during the flicker

paradigm in the present study, reaction times would be affected and no attentional bias would have been found.

Another potential explanation for slower reaction times in those with higher levels of PTSD symptomology is that the scene stimuli chosen for this study might not have been representative of traumatic stimuli for those individuals that experienced sexual aggression. Stimuli used may not have been graphic enough to provoke feelings of anxiety or thoughts of reliving the trauma once experienced by that individual. It is also possible that those scenes were not specific to the traumas experienced, therefore making it difficult for individuals to connect there anxiety with the "threat-related" images.

A third possible explanation for slower reaction times might have been the type of trauma that caused higher levels of PTSD symptomology were not relevant to those being studied. For example, if someone was sexually assaulted by a family member as a child, stimuli of a woman being attacked at knife point might not provoke the same anxiety as would a picture of a child being assaulted or a picture of that person's relative. It is also possible that an individual experienced more than one traumatic event. Although some of the participants had more severe symptomology than others, it is not guaranteed that their involvement in a motor vehicle accident or an unwanted sexual experience was the cause of that symptomology. It is assumed that if the elevated PCL scores were in fact caused by another trauma, the threat-related scene stimuli chosen might not be of clinical concern to those participants.

Finally, it is a possibility that as found when using the emotional stroop paradigm, individuals with anxiety disorders exhibit a delay when confronted by stimuli that are of clinical concern to that individual. Those researchers that used the emotional stroop

paradigm discovered a "surprise" effect experienced by participants. This explains that when clinical concern stimuli were presented to each individual, he or she was surprised by the physical meaning of the word and therefore caused a delay in response time to color name that stimuli (Bruce & Jones, 2004; Sharma, Albery, & Cook, 2001; Waters & Feyerabend, 2000; Franken, Kroon, Wiers, & Jansen, 2000; Fairburn, Cooper, Cooper, McKenna, & Anastasiades, 1991; Buckley, Blanchard, & Hickling, 2002). Since flicker paradigm had never been used prior to this study to investigate attentional biases in individuals with PTSD, it is difficult to determine if life-like scene stimuli would cause participants to experience that same "surprise" effect and result in a delayed response (in the case of the sexual assault stimuli).

Evidence of cues to emotional triggers was only supported by the findings for one of the two stimuli categories. However, this could be due in part to some methodological limitations. One of the methodological limitations in the present study was a possible misrepresentation of trauma related stimuli. There was no rating scale used to measure if the scenes chosen did in fact provoke anxiety for those whom experienced either a motor vehicle accident or some form of sexual aggression. Although threatening stimuli for individuals whom experienced a trauma can often be specific to the traumatic experience, scene stimuli allow for personal interpretation. The stimuli chosen for this study might have been too specific, therefore not allowing for much personal interpretation. A difficulty scale would have also been beneficial to measure the rigor of change taking place in each scene. Without this scale, there was no way of determining whether or not one category was more difficult than the other or even whether one picture change was harder than others in that same group.

Another limitation of the present study was a non-diverse sample population. Out of 375 participants, 81 students admitted to being in a severe motor vehicle accident, but only 33 participants admitted to having an unwanted sexual experience. According to prior research, around 20-25% of female college students fall victim to some form of sexual assault and an estimated 70% of female college students have reported being exposed to sexual harassment by their male counterparts (Mitchell, Angelone, & Hirschman, 2006). Findings from the present study reported less than ten percent of college women experienced a sexual trauma. There are a few possible reasons for these findings. One explanation could in fact be a lack of sexual trauma in the sample population. Another reason could be an unwillingness to report such trauma, possibly from embarrassment, shame, anger, or any other emotion that would cause an individual to resent themselves or their involvement in the experience. One more possibility for a low number of participants disclosing unwanted sexual experiences could be the use of a questionnaire that assessed only basic sexual experiences rather than various unwanted sexual traumas. The Sexual Experiences Survey or an equivalent measure would have been an ideal measure to assess unwanted sexual experiences because it covers a series of detailed unwanted sexual events from petting, fondling to being coerced into sex by a significant other. Experiences listed in the measure progressively get more detailed and violent essentially ending with being forced into sexual intercourse by use of a weapon (Koss & Gidycz, 1985). The questions asked of our participants in the Trauma History Screen were, "Have you ever been forced or made to have sexual contact as a child?" and "Have you ever been forced or made to have sexual contact as an adult?" Some participants in the current study might have read these questions and only considered

unwanted experiences involving intercourse, not getting the full sample wanted for those that experienced an unwanted sexual trauma.

A similar problem arose with the question for MVA. The question asked of our participants using the Trauma History Screen was, "Have you ever been in a really bad car, boat, train, or airplane accident?" Participants were not given a detailed definition of "really bad" car, boat, train, or airplane accident. For one individual, a "really bad" accident might have meant someone died, while for another participant that same term might have been interpreted as the vehicle needed body work afterwards. This could present as obstacle because it is not certain how either experience would affect PTSD symptomology. This question also grouped automobile, plane, boat, and train accidents in one category. Although researchers did review descriptions to pick out the motor vehicle accidents, participants were not always clear with the type of accident he or she experienced. Researchers did their best to decipher what type of accident was experienced from the description given by the participant and would then label that data with the appropriate accident type.

While this study broke new ground being the first to look at attentional biases in individuals with PTSD symptomology using a flicker paradigm, there is still much work and improvements to be made. It is necessary to study these biases in hope to find a treatment that can be used with aiding PTSD victims in learning positive coping mechanisms and strategies.

There is a lack of literature on this topic particularly that which relates to specific areas of study such as motor vehicle accidents and sexual assault. Recommendations for future research would be to investigate other factors that might also contribute to

attentional biases in individuals with PTSD. One way is to create stimuli that are representative of traumatic experiences being studied by developing a rating scale that can be used as an initial measure to determine if the stimuli are too specific or not detailed enough. A measure of change detection difficulty should also be employed. It would not be beneficial to researchers if some stimuli in a group were very easy while others were greater in difficulty.

In summary, the current study investigated attentional biases and PTSD symptomology in individuals who have experienced sexual assault or a MVA using the flick change blindness paradigm. Individuals who experienced a MVA detected changes faster in stimuli of accidents compared to neutral stimuli. There was no difference in change detection for different stimuli for individuals who experienced sexual assault. Future research should focus on using questionnaires that would provide a more accurate portrayal of sexual experiences. In addition, it was difficult to know in the current study whether the images provoked anxiety specific to people's trauma (in the case of the sexual assault stimuli).
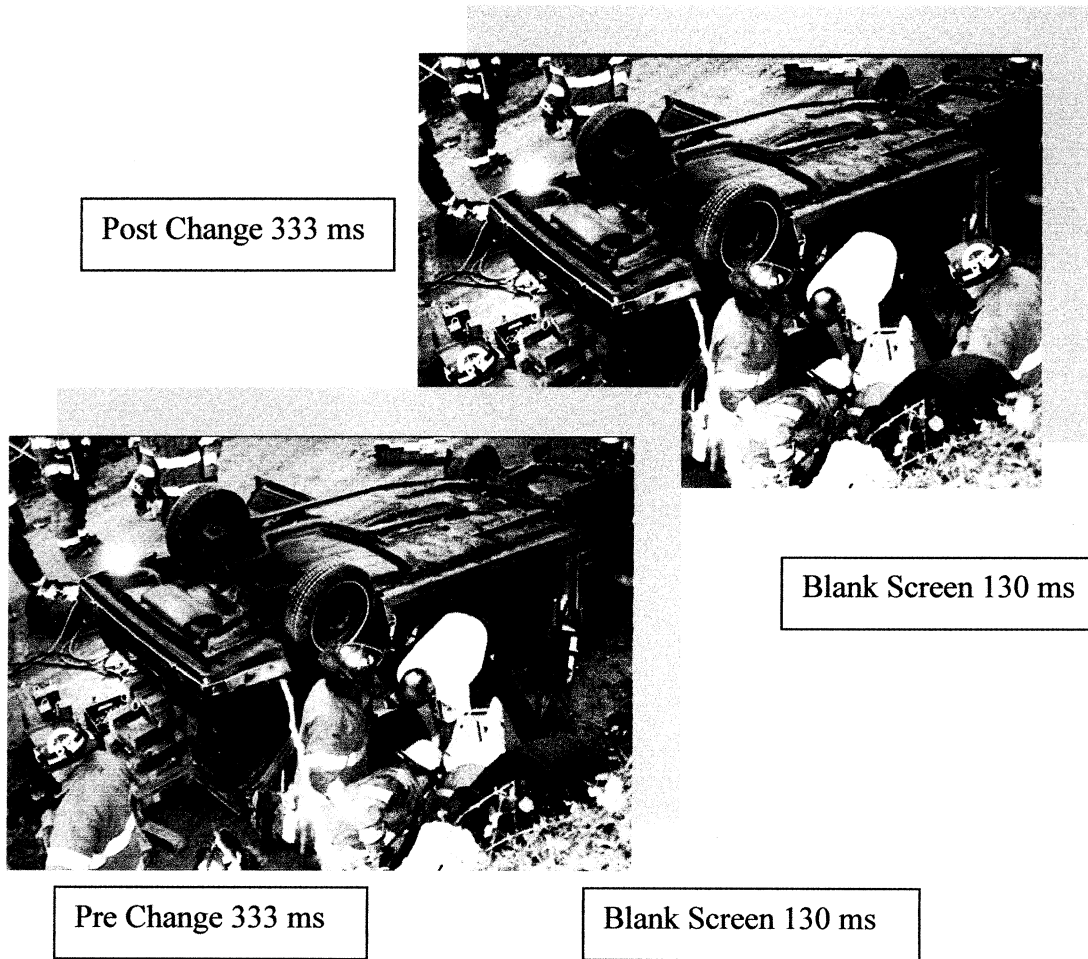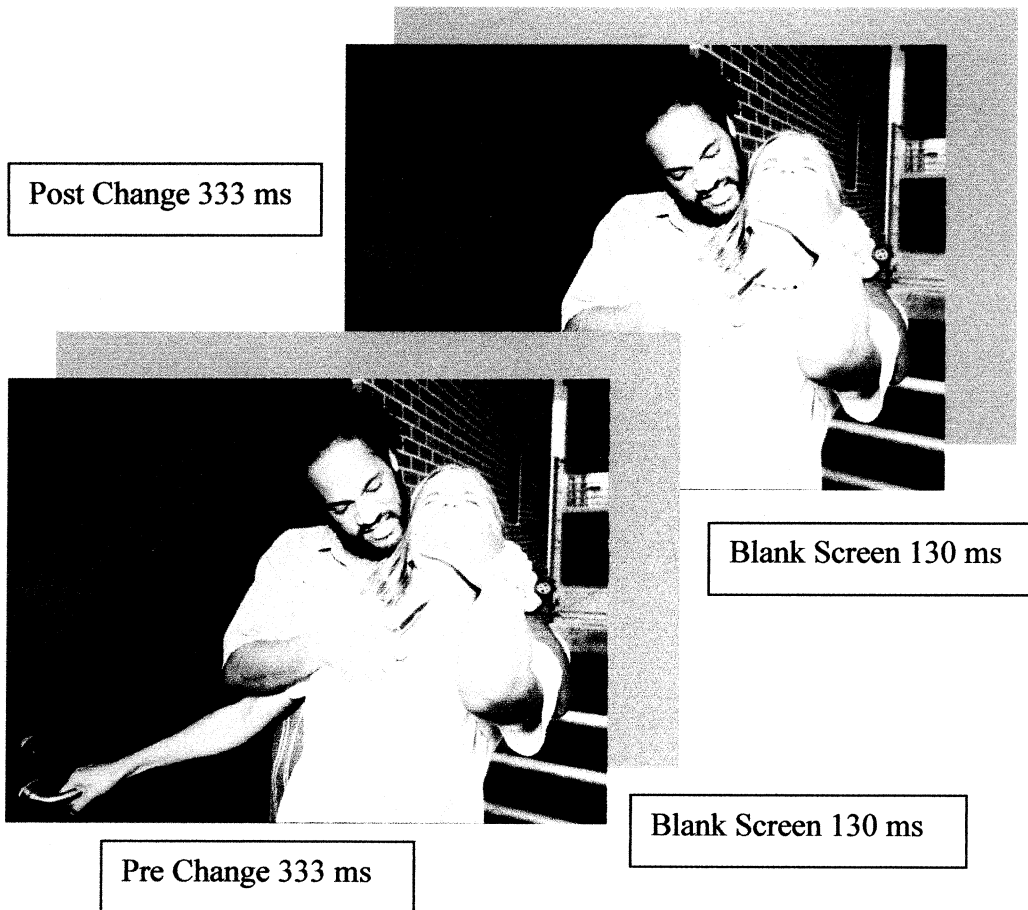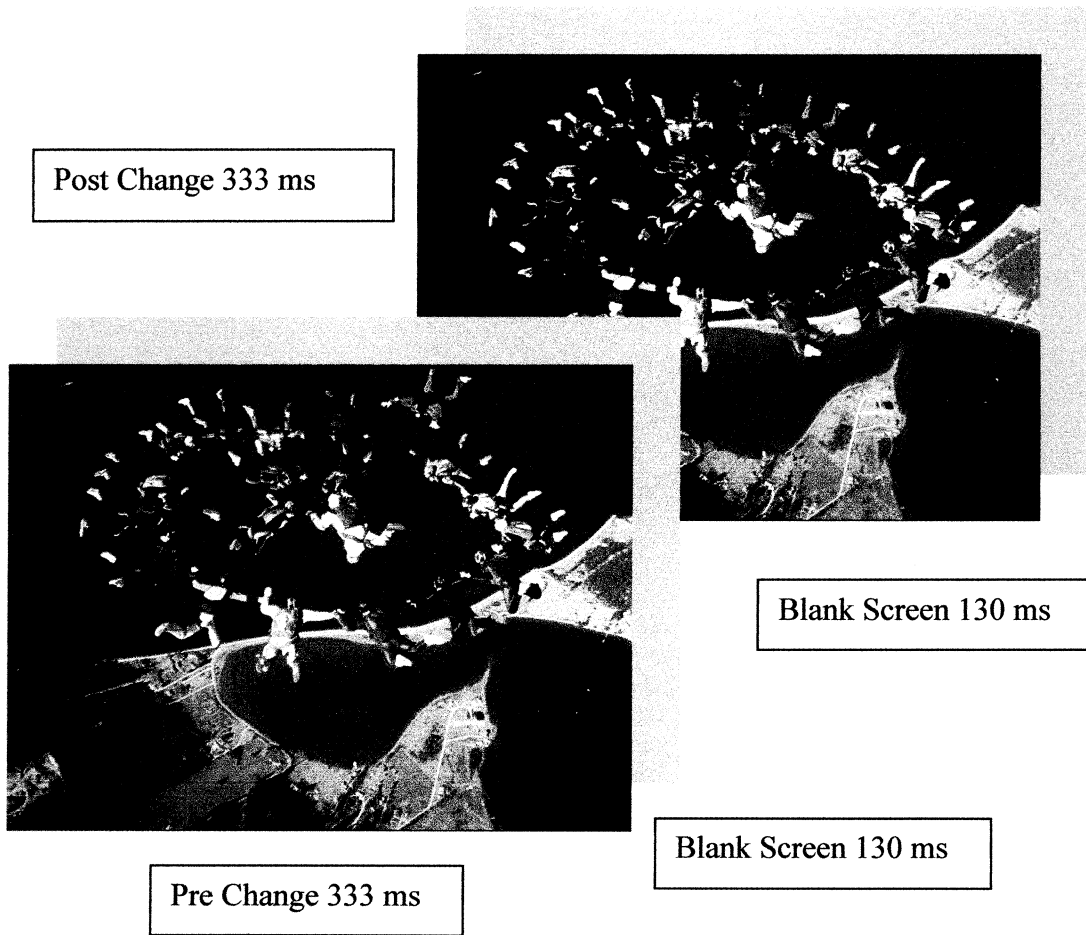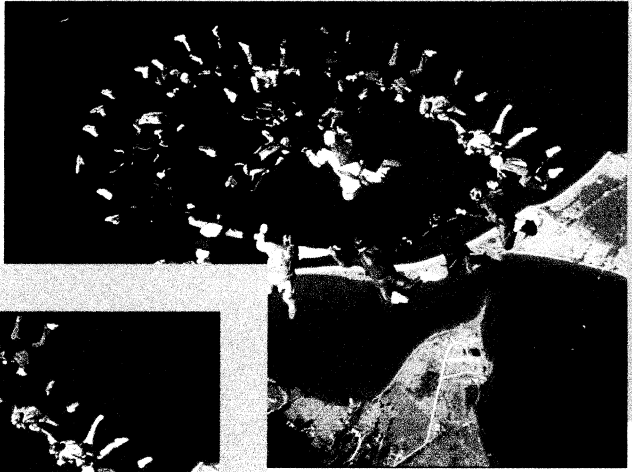
FIGURE 1

Post Change 333 ms

Blank Screen 130 ms

Pre Change 333 ms

Blank Screen 130 ms

FIGURE 2

Post Change 333 ms

Blank Screen 130 ms

Blank Screen 130 ms

Pre Change 333 ms

FIGURE 3

Post Change 333 ms

Blank Screen 130 ms

Blank Screen 130 ms

Pre Change 333 ms

TABLE 1

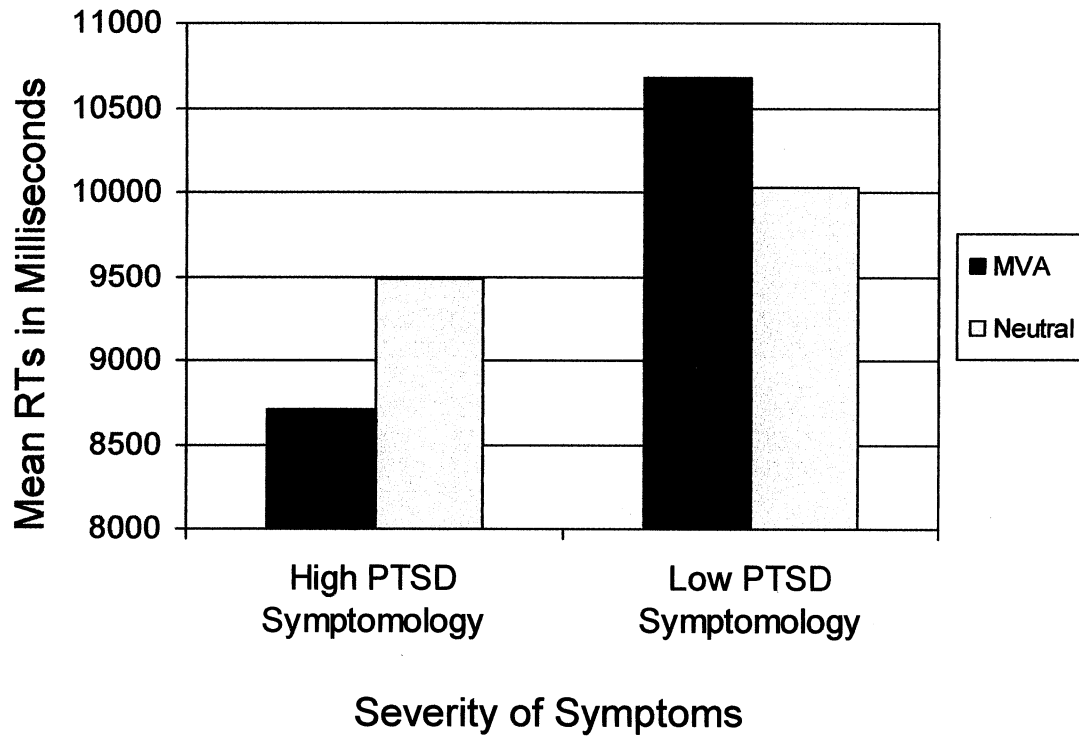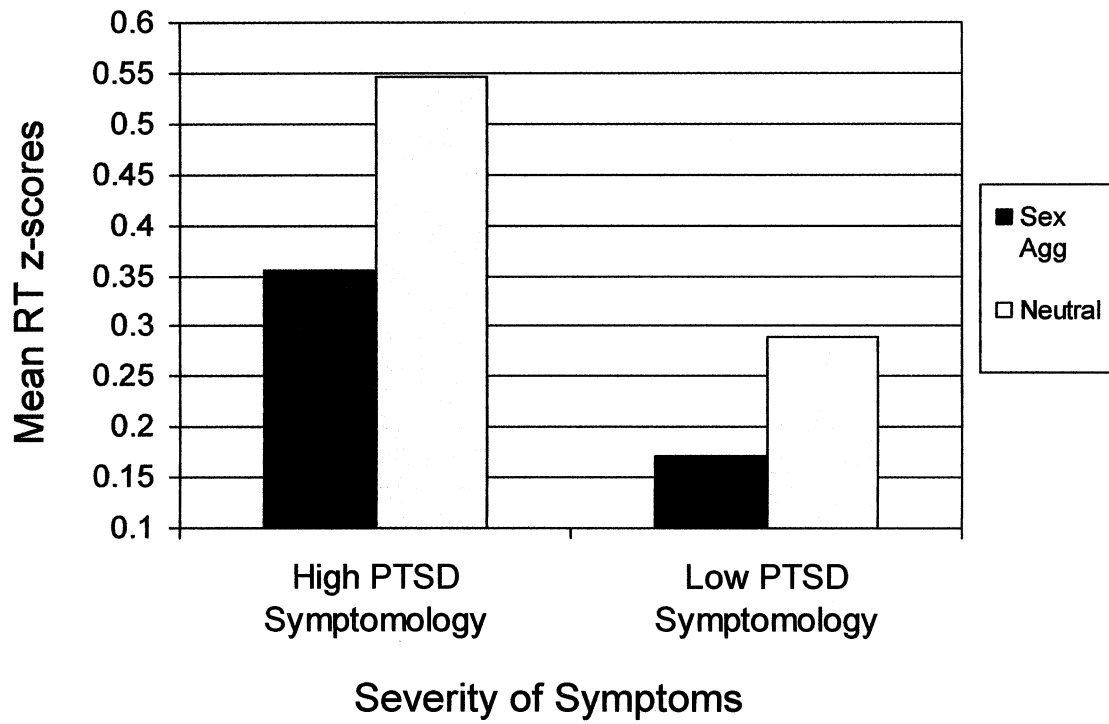# Reaction Times for MVA Related and Neutral Stimuli

TABLE 2

Reaction Times for Sexual Aggression Related and Neutral Stimuli

REFERENCES

Angelone, B. L., Levin, D. T., & Simon, D. J. (2003). The relationship between change detection and recognition of centrally attended objects in motion pictures. *Perception*, 32, 947-962.

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2007). Threat-Related Attentional Biases in Anxious and Nonanxious Individuals: A Meta-Analytic Study. *Psychological Bulletin*, 133 (1), 1-24.

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: Automatic and strategic processes. *Behavior Research and Therapy*, 35, 49-58.

Beck, A.T., Ward, C., & Mendelson, M. (1961). Beck Depression Inventory (BDI). *Arch Gen Psychiatry*, 4, 561-571.

Bruce, G., & Jones, B. T. (2004). A pictorial Stroop paradigm reveals an alcohol attentional bias in heavier compared to lighter social drinkers. *Journal of Psychopharmacology*, 18 (4), 527-533.

Bryant, R. A., & Harvey, A. G. (1995). Processing Threatening Information in Posttraumatic Stress Disorder. *Journal of Abnormal Psychology*, 104 (3), 537-541.

Bryant, R. A., & Harvey, A. G. (1997). Attentional Bias in Posttraumatic Stress Disorder. *Journal of Traumatic Stress*, 10 (4), 635-644.

Buckley, T. C., Blanchard, E. B., & Hickling, E. J. (2002). Automatic and Strategic Processing of Threat Stimuli: A Comparison Between PTSD, Panic Disorder, and Nonanxiety Controls. *Cognitive Therapy and Research*, 26 (1), 97-115.

Carlson, E. B., Palmiere, P. A., Kimerling, R., Ruzek, J. I., & Burling, T. A.

   Development and Validation of a Brief Self-Report Measure of Traumatic Events:

   The Trauma History Screen. Unpublished manuscript.

Cassiday, K. L., McNally, R. J., & Zeitlin, S. B. (1992). Cognitive Processing of Trauma

   Cues in Rape Victims with Post-Traumatic Stress Disorder. *Cognitive Therapy and*

   Research, 16 (3), 283-295.

Cole, G. C., Kentridge, R. W., & Heywood, C. A. (2004). Visual Salience in the Change

   Detection Paradigm: The Special Role of Object Onset. *Journal of Experimental*

   Psychology: Human Perception and Performance, 30 (3), 464-477.

Constans, J. I. (2005). Information-Processing Biases in PTSD. In Neuropsychology of

   PTSD: biological, cognitive, and clinical perspectives (pp. 105-130). New York:

   Guilford Press.

Cortina, L. M., & Kubiak, S. P. (2006). Gender and Posttraumatic Stress: Sexual

   Violence as an Explanation for Women's Increased Risk. *Journal of Abnormal*

   Psychology, 115 (4), 753-759.

Fairburn, C. G., Cooper, P. J., Cooper, M. J., McKenna, F. P., & Anastasiades, P. (1991).

   Selective Infromation Processing in Bulimia Nervosa. *International Journal of*

   Eating Disorders, 10 (4), 415-422.

Fisher, B. S., Daigle, L. E., Cullen, F. T., & Turner, M. G. (2003). Reporting Sexual

   Victimization to the Police and Others: Results from a National-Level Study of

   College Women. *Criminal Justice and Behavior*, 30 (1), 6-38.

Franken, I. H. A., Kroon, L. Y., Wiers, R. W., & Jansen, A. (2000). Selective cognitive processing of drug cues in heroin dependence. *Journal of Psychopharmacology*, 14 (4), 395-400.

Hollingsworth, A. (2003). Failures of Retrieval and Comparison Constrain Change Detection in Natural Scenes. *Journal of Experimental Psychology: Human Perception and Performance*, 29 (2), 388-403.

Jones, B. T., Bruce, G., Livingstone, S., & Reed, E. (2006). Alcohol-Related Attentional Bias in Problem Drinkers with the Flicker Change Blindness Paradigm. *Psychology of Addictive Behaviors*, 20 (2), 171-177.

Jones, B. T., Jones, B. C., Smith, H., & Copley, N. (2003). A flicker paradigm for inducing change blindness reveals alcohol and cannabis information processing biases in social users. *Addiction*, 98, 235-244.

Jones, B. C., Jones, B. T., Blundell, L., & Bruce, G. (2002). Social users of alcohol and cannabis who detect substance-related changes in a change blindness paradigm report higher levels of use than those detecting substance-neutral changes. *Psychopharmacology*, 165, 93-96.

Jones-Alexander, J., Blanchard, E. B., & Hickling, E. J. (2005). Psychophysiological Assessment of Youthful Motor Vehicle Accident Survivors. *Applied Psychophysiology and Biofeedback*, 30 (2), 115-123.

Kaltman, S., Krupnick, J., Stockton, P., Hooper, L., & Green, B. L. (2005). Psychological Impact of Types of Sexual Trauma Among College Women. *Journal of Traumatic Stress*, 18 (5), 547-555.

Koss, M. P., & Gidycz, C. A. (1985). Sexual Experiences Survey: Reliability and

   Validity. Journal of Consulting and Clinical Psychology, 53(3).

Kupchik, M., Strous, R. D., Erez, R., Gonen, N., Weizman, A., & Spivak, B. (2007).

   Demographic and Clinical Characteristics of Motor Vehicle Accident Victims in

   the Community General Health Outpatient Clinic: A Comparison of PTSD and

   Non-PTSD Subjects. *Depression and Anxiety*, 24, 244-250.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2005). International Affective Picture

   System (IAPS): Affective ratings of pictures and instruction manual. Technical

   Report A – 6. University of Florida, Gainesville, FL.

Litz, B. T., Schlenger, W. E., Weathers, F. W., Caddell, J. M., Fairbank, J. A., &

   LaVange, L. M. (1997). Predictors of Emotional Numbing in Posttraumatic Stress

   Disorder. *Journal of Traumatic Stress,* 10 (4), 607-618.

Marchetti, L. M., Biello, S. M., Broomfield, N. M., MacMahon, K. M. A., Espie, C. A.

   (2006). Who is pre-occupied with sleep? A comparison of attention bias in people

   with psychophysiological insomnia, delayed sleep phase syndrome and good

   sleepers using the induced change blindness paradigm. *Journal of Sleep Research*,

   15, 212-221.

McNally, R. J. (2006). Cognitive abnormalities in post-traumatic stress disorder.

   TRENDS in Cognitive Sciences, 10 (6), 271-277.

Mitchell, D., Angelone, D. J., & Hirschman, R. (2006). Sexual Aggression and College

   Students. In M. Landow (Ed.), *College Students: Mental Health and Coping

   Strategies.* Hauppauge, NY: Nova Science Publishers, Inc.

Mitroff, S. R., Simons, D. J., & Franconeri, S. L. (2002). The Siren Song of Implicit

    Change Detection. *Journal of Experiemental Psychology: Human Perception and*

    Performance, 28 (4), 798-815.

Orr, S., Claiborn, J., Altman, B., Forgue, D., de Jong, J., Pitman, R., & Herz, L. (1990).

    Psychometric profiles of post-traumatic stress disorder, anxious, and healthy

    Vietnam veterans: Correlations with psychophysiologic responses. *Journal of*

    Consulting and Clinical Psychology, 58, 329-335.

Rensink, R. A., O'Regan, J. K., & Clark, J. J. (1997). To See or Not To See: The Need

    for Attention to Perceive Changes in Scenes. *Psychological Science*, 8 (5), 368-373.

Resick, P. A., & Calhoun, K. S. (2001). Posttraumatic Stress Disorder. In Clinical

    handbook of psychological disorders: A step-by-step treatment manual (pp. 60-

    113). New York: Guilford Press.

Sharma, D., Albery, I. P., & Cook, C. (2001). Selective attentional bias to alcohol related

    stimuli in problem drinkers and non-problem drinkers. *Addiction*, 96, 285-295.

Simons, D. J. (1996). In Sight, Out Of Mind: When Object Representations Fail.

    Psychological Science, 7 (5), 301-305.

Simons, D. J., & Levin, D. T. (1997). Change blindness. *TRENDS in Cognitive Science*s,

    1 (7), 261-267.

Simons, D. J., & Rensink, R. A. (2005). Change blindness: past, present, and future.

    TRENDS in Cognitive Sciences, 9 (1), 16-20.

Waters, A. J., & Feyerabend, C. (2000). Determinants and Effects of Attentional Bias in

    Smokers. *Psychology of Addictive Behaviors*, 14 (2), 111-120.

Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993). The PTSD Checklist (PCL): Reliability, Validity, and Diagnostic Utility. Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX.

Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The Emotional Stroop Task and Psychopathology. *Psychological Bulletin*, 120 (1), 3-24.

Yantis, S., & Hillstrom, A. P. (1994). Stimulus- Driven Attentional Capture: Evidence From Equiluminant Visual Objects. *Journal of Experimental Psychology: Human Perception and Performance*, 20 (1), 95-107.

APPENDIX A

Figure Descriptions

Figure 1. This is an example of the stimuli used in the motor vehicle accident category. A starting screen appeared (grey screen with a little white cross in the center) and as soon as participants were ready they activated the flicker. The pre change image flashed for 333 ms, followed by a grey screen for 130 ms, then the post change scene for 333 ms, and finally another grey screen for 130 ms. This repeated for as long as 60 seconds or until the changed image was noticed. In this scene, a rescue worker appears in the lower right hand corner of the picture.

Figure 2. This is an example of the stimuli used in the suggested sexual aggression category. A starting screen appeared (grey screen with a little white cross in the center) and as soon as participants were ready they activated the flicker. The pre change image flashed for 333 ms, followed by a grey screen for 130 ms, then the post change scene for 333 ms, and finally another grey screen for 130 ms. This repeated for as long as 60 seconds or until the changed image was noticed. In this scene, the girl's necklace disappears and reappears.

Figure 3. This is an example of the stimuli used in the suggested sexual aggression category. A starting screen appeared (grey screen with a little white cross in the center) and as soon as participants were ready they activated the flicker. The pre change image flashed for 333 ms, followed by a grey screen for 130 ms, then the post change scene for 333 ms, and finally another grey screen for 130 ms. This repeated for as long as 60 seconds or until the changed image was noticed. In this scene, the skydiver changes from being joined in the circle formation and to letting go and leaving the circle (top right corner).

APPENDIX B

Table Descriptions

Table 1. This graph illustrates the mean reaction times for MVA and Neutral Stimuli, while considering PCL scores as a variable of main effect. On the Y-axis, time to detect changes was measured in milliseconds. The categories for severity of PTSD symptomology are on the X-axis (High and Low).

Table 2. This graph illustrates the mean reaction times for Sexual Aggression and Neutral Stimuli, while also considering PCL scores as a variable of main effect. Z-score transformations of the mean for change detection are located on the Y-axis. The categories for severity of symptomology are on the X-axis (High and Low).