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# Trauma-Based Priming and Attentional Bias to Smoking Cues: A Stroop Task Study

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Trauma-Based Priming and Attentional Bias to Smoking Cues:  
A Stroop Task Study

by

Pattie B. Sherman

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
Department of Psychology  
College of Arts & Sciences  
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## Trauma-Based Priming and Attentional Bias to Smoking Cues:

### A Stroop Task Study

Pattie B. Sherman

#### ABSTRACT

Past research has highlighted the importance of better understanding the high rate of smoking among individuals exposed to trauma. However, few studies have investigated the cognitive mechanisms that may contribute to the smoking-trauma relationship. The primary goal of the present study was to examine the associative relationship between smoking and trauma at a cognitive level, by examining the extent to which trauma-relevant pictures primed attentional biases to smoking-related words on a modified Stroop task. Eighty trauma-exposed smokers (classified as having low, medium, or high levels of post trauma symptomatology) ink-named smoking-related and neutral words after being primed with trauma-related, positive, or neutral picture cues. Although participants did not display an overall significant difference in reaction time between smoking words and neutral words, we found a significant prime x word type interaction, with slower reaction time to smoking words after being primed by trauma-related pictures. In addition, we found a significant 3-way interaction between symptom severity level, prime category, and target type. Further analyses revealed that the prime x word type interaction was significant only among individuals with the lowest and highest levels of PTSD symptomatology. A secondary aim of the study was to evaluate the relationship between smoking-related variables and posttraumatic stress disorder symptoms on a dimensional range. We found that participants who were more severely impaired at the

time of the study were more likely to report strong cravings to smoke. Overall, findings suggest that smokers who have experienced trauma exhibit an attentional bias to smoking words when primed with trauma-related picture, and that post-trauma symptoms are related to smoking motivation. Implications for treatment are discussed.

## Introduction

Cigarette smoking is the leading preventable cause of morbidity and mortality in the United States, according to the latest Surgeon General's Report (US Department of Health and Human Services, 2004). One disorder that appears to be strongly associated with smoking is posttraumatic stress disorder (PTSD). Posttraumatic stress disorder is one of the most prevalent mental disorders; it is estimated that approximately seven out of ten individuals will be exposed to at least one traumatic event during their lifetime and about 10% of the people in the United States will develop PTSD. In addition, 30% of those affected will develop chronic PTSD (PTSD that fails to remit after many years), which may cause significant impairment (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Furthermore, there is a growing body of literature suggesting that subthreshold PTSD (symptoms below the threshold for DSM-IV diagnosis) is clinically significant and as prevalent as diagnosable PTSD (Stein, Walker, Hazen, & Forde, 1997; Mylle & Maes, 2004).

It has been proposed that PTSD may be more appropriately viewed as a dimensional syndrome rather than a discrete clinical disorder, with PTSD reflecting the "upper end of a stress-response continuum" (Ruscio, Ruscio, & Keane, 2002). For example, the number and severity of PTSD symptoms are associated with increased risk for comorbid psychopathology (Blanchard, Hickling, Taylor, Loos, & Gerardi, 1994; Kulka et al., 1990; Schutzwohl & Maercker, 1999). Furthermore, subthreshold PTSD has been found to be associated with social and occupational impairment comparable to that of diagnosable PTSD (Zlotnick, Franklin, & Zimmerman, 2002). Moreover, a greater



number of subthreshold PTSD symptoms are associated not only with greater impairment, but also with a higher degree of suicidal ideation (Marshall et al., 2001).

The relationship between cigarette smoking and PTSD has only recently received research attention. Although smoking rates in the general population have decreased within the past 30 years (Giovino, Henningfield, Tomar, Escobedo, & Slade, 1995), smoking rates among individuals who have been exposed to trauma remain elevated. Lasser and colleagues (2000) reported that 45.3% of those diagnosed with PTSD were smokers compared to approximately 23% in the general population. This strong association between smoking and posttraumatic stress disorder has been found across a range of trauma types including intimate partner violence, combat exposure, childhood trauma, violent assault, and severe battering of pregnant women (e.g., Acierno, Kilpatrick, Resnick, Saunders, & Best, 1996; Anda et al., 1999; Beckham et al., 1995a; Beckham et al., 1997; Grisso et al., 1999; Schnurr & Spiro, 1999; Weaver & Etzel, 2003; Weinbaum et al., 2001).

Despite the strong association between trauma and cigarette smoking, there has been little research directed at understanding the mechanisms by which PTSD symptomatology may be related to the development and maintenance of cigarette smoking. There is some evidence that trauma-related emotional distress (i.e., negative affect) is strongly associated with smoking. Victims of trauma often report negative emotional states when remembering aspects of the event, or when confronted with physical cues related to the event. For instance, in a study conducted by Beckham et al. (1995), 84 % of smokers with PTSD reported an increased urge to smoke in response to combat memories. These findings suggest that individuals with PTSD may use smoking to cope with negative affect, similar to patterns observed in general smoking populations (Brandon, 1994; Brandon, Wetter, & Baker, 1996). Smokers also commonly report the

expectation that smoking will alleviate these negative affect symptoms (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995). To the extent that nicotine is used by individuals with PTSD to self-medicate, these smokers may be particularly resistant to cessation and prone to relapse.

Cue reactivity paradigms have recently been used to study substance craving and related processes in individuals with varying PTSD symptomatology (e.g., Coffey et al., 2002; Saladin et al., 2003). Cue reactivity research is based on the idea that classical conditioning can occur when external stimuli (e.g., drug paraphernalia) or interoceptive stimuli (e.g., cognition and affect) become reliably paired with drug administration. With recurring and consistent pairings, the stimuli associated with drug administration can elicit conditioned responses, including subjective reports of drug urges and cravings, as well as certain patterns of physiological response (Childress, McLellan, & O' Brien, 1985; Drobles, Saladin, & Tiffany, 2001; Sideroff & Jarvik, 1980; Tiffany, 1995). Many studies have been able to demonstrate substantial cue reactivity among smokers in a laboratory setting (e.g., Brandon, Piasecki, Quinn, & Baker, 1995; Carter & Tiffany, 1999b; Drobles & Tiffany, 1997; Niaura et al., 1988; Rohsenow, Niaura, Childress, Abrams, & Monti, 1990). Cue reactivity has been particularly useful for identifying situations and stimuli that may promote smoking maintenance and relapse.

In one recent study (Coffey et al., 2002) cravings in response to alcohol and cocaine cues were strongest when these cues were presented immediately after trauma cues among those with PTSD. If trauma cues increased craving in response to subsequent alcohol and cocaine cues, it may also be that they increase reactivity to smoking cues. In addition, Saladin and colleagues (2003) found that PTSD symptom severity predicted level of alcohol and cocaine craving elicited by drug cues that followed trauma-specific cues, as well as in response to trauma cues presented alone. These

findings suggest that PTSD symptom severity could be implicated in the intensity of cravings evoked by negative emotional cues and drug cues. The present study evaluated a range of PTSD symptomatology following trauma exposure (i.e., sub-clinical and clinical), as this may relate to trauma-based affective priming of reactivity to smoking cues.

In addition to traditional explicit cue reactivity paradigms, methods from the field of cognitive psychology have been increasingly applied to the addiction field; for instance, to examine cue processing biases among substance users (see review by Waters & Sayette, 2006). Several recent studies have indicated that smokers display longer reaction times to a secondary tone while viewing salient smoking cues (e.g., Cepeda-Benito & Tiffany, 1996; Juliano & Brandon, 1998; Sayette & Hufford, 1994). In addition, the Stroop task has recently been utilized to study attentional processes in addiction, similar to its use in studying cognitive features of other forms of psychopathology. In the original Stroop Color-Word test (Stroop, 1935) participants were required to name the ink color of a series of stimuli and words as rapidly and accurately as possible while disregarding the content of the word. Meaningless stimuli such as a row of X's or legitimate color words are presented and the color of the ink either matches the word or the two are incongruent. A plethora of studies have shown that participants take longer to name the physical color of incongruent color words compared to meaningless stimuli. It has been suggested that pathology words interfere with the ability to color name by capturing the participant's attention (Williams, Mathews, & MacLeod, 1996).

The modified Stroop task may be less susceptible to demand characteristics of introspective (subjective) self-report measures that typify traditional cue reactivity research, thereby minimizing the response bias intrinsic to such measures (Devineni,

Blanchard, Hickling, & Buckley, 2004; Williams et al., 1996). Moreover, some information may simply be inaccessible to conscious introspection if it resides primarily in cognitive structures only responsible for early-stage preconscious mental processes (Beck & Clark, 1997). Thus, nonintrospective measures like the modified Stroop task may be more sensitive and specific to the automatic attentional biases associated with smoking. Indeed, several researchers have utilized the modified Stroop task to demonstrate attentional bias in smoking (Drobes, Elibero, & Evans, 2006; Johnsen, Thayer, Laberg, & Asbjornsen, 1997; Watts, McKenna, Sharrock, & Trezise, 1986; Wertz & Sayette, 2001). One recent Stroop study showed that greater attentional bias among smokers was associated with short-term return to smoking following a quit attempt (Waters et al., 2003).

The present study examined the associational magnitude of trauma-based affect and smoking-related concepts using a variation of the Stroop task that incorporated priming. In line with Collins and Loftus' (1975) associative network model and spreading activation theory, cognitive concepts are stored in nodes of a network. Once a node is activated, this activation is spread to related nodes. Therefore, if two nodes are linked, based on the strength of their association, exposing a participant to one aspect of a cognitive network should prime (activate) related network nodes. From this general framework, we theorized that information regarding trauma and smoking should be closely related and reside in the same cognitive framework. Accordingly, the current study hypothesized that trauma-related cue processing would increase attentional bias to subsequent smoking cues. Thus, information regarding trauma and smoking should be closely related and reside in the same cognitive network.

The primary aim of the current study was to evaluate the associational magnitude of trauma and smoking-related cognitions. Participants' attentional biases to smoking

and neutral word categories following trauma-related, positive, and neutral picture primes were examined. We hypothesized that color naming latency to smoking words would be greater than latency to neutral words, since this would replicate prior findings. Moreover, we predicted that color-naming latency would be greatest when trauma pictures preceded smoking word cues. In addition, we predicted that participants with high PTSD symptomatology would display the greatest reaction time to smoking target words following a trauma prime. Thus, we expected to find a 3-way interaction between level of PTSD severity, prime type, and target type.

An exploratory goal of the study was to examine the relationship between smoking-related variables and PTSD symptoms on a dimensional range. We expected to find evidence of greater smoking and nicotine dependence in individuals who had more severe PTSD symptomatology. In addition, based on previous studies that have found significant correlations between “heavy” smoking and hyperarousal PTSD symptoms (Beckham et al., 1997; Weaver & Etzel, 2003), we predicted that hyperarousal symptoms would show the strongest correlations with smoking amount and nicotine dependence.

## Method

### *Participants*

The current study was approved by the university's institutional review board. Participants were 80 smokers (35 females, 45 males) recruited via flyers posted throughout the community and the University of South Florida campus, as well as newspaper and web-based advertisement. Prospective participants had to report being exposed to a Criterion A traumatic event; one which involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others (DSM-IV TR, American Psychiatric Association, 2000). Since one of the goals of the study was to examine a range of PTSD symptomatology, we recruited a sample with a full range of symptoms and periodically tracked the distribution of symptoms across the range. Potential participants were screened in person or by telephone to make an initial determination that they met the following additional inclusion criteria: between 18 and 45 years of age ( $M = 27.0$ ;  $SD = 8.6$ ), smoke at least 10 cigarettes per day for the past year ( $M = 20.6$ ;  $SD = 11.3$ ), able to speak and read English, and generally healthy. After signing the consent, participants were screened to ensure a pre-session expired carbon monoxide (CO) concentration of at least 8 parts per million (ppm) ( $M = 23.5$ ;  $SD = 11.6$ ) and a pre-session blood alcohol level of 0.

Participants were excluded from the study if they met any of the following criteria: severe, current psychiatric or substance dependence disorder (psychotic disorder, bipolar disorder [manic episode], major depression, dissociative disorder, organic mental disorder); current use of psychotropic medications, or any medications that may have

interfered with the Stroop task (e.g., neuroleptics, barbiturates, antidepressants, SSRI's, tricyclics); significant past or current medical conditions that would compromise reaction time data (e.g., neurological disease or head injury); currently engaged in a smoking cessation attempt. Individuals who successfully met all of the inclusion criteria but endorsed none of the exclusion criteria were allowed to participate. The average Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) score was 5.2 ( $SD = 2.3$ ), indicating a moderate to high level of nicotine dependence. Eighty-one percent of the participants were Caucasian, 11% African American, 4% Asian, 3% American Indian or Alaska Native, and 1% Native Hawaiian or other Pacific Islander. Fourteen percent of the participants identified themselves as Hispanic or Latino. All participants were compensated \$20 for completing the study.

#### *Experimental Design and Overview*

This study employed a 3 (Group) x 3 (Prime) x 2 (Target) mixed experimental design. The level of PTSD symptomatology was the between-subjects factor, with participants classified as having either low, medium, or high overall severity levels of PTSD. The Prime factor manipulated within-subjects whether or not priming cues were related to the participant's worst trauma experience. The experimental level exposed the participant to a trauma-related picture, whereas the control conditions exposed him/her to a neutral or positive picture. The Target factor was designed to assess attentional bias to smoking-related cues, with exposure to a smoking word as the experimental condition and exposure to a neutral word as the control condition. Thus, there were six trial types created by the two within-subject factors (see Table 1). Trial types were presented in a random manner once within each of 10 trial blocks. Participants were exposed to each trial type ten times to increase reliability by aggregating the dependent measure for that

trial type. The dependent measure was reaction time for color naming smoking-related and neutral words, which followed priming picture presentations.

Table 1

*Six Trial Types*

<u>Trial Type</u>	<u>Prime Picture</u>	<u>Target Words</u>
Trauma/ Smoking	Trauma	Smoking
Neutral/ Smoking	Neutral	Smoking
Positive/ Smoking	Positive	Smoking
Trauma/ Neutral	Trauma	Neutral
Neutral/ Neutral	Neutral	Neutral
Positive/ Neutral	Positive	Neutral

*Measures*

*Beck Depression Inventory-II* (Beck, Steer, & Brown, 1996). This measure was included to assess depressive symptoms. Reliability and validity of the BDI-II is well established.

*Mood Form* (Diener & Emmons, 1984). Self-assessment of current positive and negative mood states was rated via this 9-item form. It was important to assess the mood of the subject prior to this assessment and after the Stroop task to ensure that participants did not leave the experiment until their mood returned to baseline.

*Smoking History Form*. This form was administered in order to ascertain current smoking status and smoking history.

*The Fagerström Test for Nicotine Dependence* (Heatherton, Kozlowski, Frecker, & Fagerström, 1991), is a standard 6 item measure of nicotine dependence that ranges in scale from 0-10 points. It has demonstrated good internal consistency as well as a strong relation to biochemical indices of smoking.

*Questionnaire of Smoking Urges-Brief* (QSU-Brief; Cox, Tiffany & Christen, 2001). This 10-item questionnaire, adapted from the widely used 32-item instrument



(Tiffany and Drobes, 1991), provides a multi-factorial evaluation of self-reported craving for cigarettes. The two factors, desire to smoke because of the anticipation of pleasure (Factor 1) and desire to smoke to relieve negative affect and withdrawal (Factor 2) have reported Cronbach's alpha coefficients from .92 to .97.

*MINI International Neuropsychiatric Interview* (Sheehan et al, 1998). This interview was administered in order to evaluate psychiatric inclusion/ exclusion criteria for the study. It includes questions related to each of the major Axis I categories and can be administered in approximately 15 minutes for participants who do not have a major psychiatric disorder.

*The Posttraumatic Stress Diagnostic Scale* (PDS; Foa & Tolin, 2000). This instrument consists of 49 self-report items, which rate symptom presence and severity on a Likert-type scale. Seventeen symptoms are rated for frequency of which they are experienced in the past month in relation to the traumatic event endorsed. Items are grouped according to the DSM-IV PTSD symptom clusters; reexperiencing, avoidance, and hyperarousal. The instrument provides a diagnosis of PTSD as well as an overall symptom severity score ranging from 0-51. In addition, this self-report measure provides a level of significant distress or impairment in daily functioning based on the number of life areas affected. The PDS has excellent psychometric properties, including good internal and test-retest reliability as well as strong convergent and concurrent validity. It has been validated on a diverse trauma population (Foa, Cashman, Jaycox, & Perry, 1997).

### *Materials*

*Carbon monoxide (CO) monitor.* The participants' level of CO in parts per million (ppm) was assessed using a BreathCO carbon monoxide recorder (Vitalograph, Inc.,

Lexington, KY). CO was measured immediately following informed consent in order to confirm smoking status.

*Alcohol breathalyzer.* Alcohol breath levels were assessed using an Alcosensor IV (Intoximeters, Inc., St. Louis, MO). To be included in the study, the participant had to have a reading of 0.

*Priming stimuli.* To examine trauma-based priming, the study utilized 10 colored pictorial stimuli for each of the three prime categories: trauma-related, pleasant, and neutral. Each picture was repeated once during the study; however, the same picture was not repeated within five blocks of each other. Most of these pictures were selected from the International Affective Picture System (IAPS) (Lang, Bradley, & Cuthbert, 1996), a collection of color photographs that have previously been standardized on the dimensions of valence, arousal, and dominance. Additional trauma-related pictures came from previous research studies (e.g., Elsesser, Sartory, & Tackenberg, 2004) that have focused on reactivity to trauma-related picture cues, or from the world-wide-web. Trauma categories were limited to the following: motor vehicle accidents (35%), fire (12.5%), robbery (4%), physical assault (12.5%), being held at gunpoint (22.5%), and sexual assault (females only, 14%). Participants were asked to give an account of their worst experience during screening in order to facilitate tailoring of the trauma-related picture primes. That is, different sets of 10 pictures were used to match each participant's worst trauma experience.

*Target Stimuli.* Smoking-related words consisted of 15 words used by Drobles et al., (2006) in a recent Stroop task study. This list includes ASH, BUTT, DRAG, PACK, PUFF, SMOKE, FILTER, INHALE, CARTON, EXHALE, LIGHTER, MATCHES, TOBACCO, NICOTINE, and CIGARETTE. The neutral word list was matched to smoking-related words for length and frequency of use in the English language

according to the guidelines established by Kucera and Francis (1967). The neutral words were: AXE, PICK, TOOL, NAIL, FORK, BOLTS, ERASER, SCREWS, SHOVEL, HAMMER, SPATULA, GOGGLES, COMPASS, TWEEZERS, and CORKSCREW. These words were each used two times in the present study, with the provision that the same word appeared once within the first five and once within the last five blocks.

### *Procedure*

#### *Consent/ Initial Assessment*

Individuals who met study qualifications were scheduled for an individual appointment, which was held at the Tobacco Research and Intervention Program at the H. Lee Moffitt Cancer Center & Research Institute. Participants were scheduled in the afternoon or early evening in order to control for diurnal variability in cravings. Potential participants were instructed to smoke a cigarette a half an hour prior to their scheduled appointment to allow for standardization of smoking across participants and to reduce the influence of tobacco withdrawal on the modified Stroop task.

Upon arrival, study procedures were explained to the participant and informed consent was obtained. The purpose of the study was described as measuring the participant's reactions to various words and pictures. The participant was then administered a CO measurement to confirm smoking status and an alcohol breathalyzer to screen for recent alcohol use. Next, participants filled out the Mood Form and the QSU-Brief in order to assess current mood and cravings to smoke. The rest of the questionnaires and interviews (i.e., those related to prior trauma and smoking) were administered after the Stroop task in order to avoid excessive priming that may have interfered with reactivity to the task-related picture and word cues.

The Stroop task was programmed using Superlab Pro (Cedrus Corporation, San Pedro, CA) laboratory software. Detailed verbal instructions for the Stroop task were

provided to the participant, followed by sample trials to increase familiarity with the task. Participants were instructed to watch a 17-inch LCD, flat screen computer monitor located directly in front of them. The experimenter informed participants that (a) they would view various pairs of pictures followed by words in the center of the computer screen; and (b) they should respond as quickly and as accurately as possible to the displayed word by pressing the appropriate color labeled key of the response box, while ignoring the meaning of the word. It was explained that after responding, a brief delay would occur, followed by the next picture-word pair. Immediately prior to the start of the task, participants completed practice trials, which consisted of neutral pictures as primes and random letter strings (e.g., XYZ) as the target. There were five practice trials with no set time limit to respond, followed by 12 practice trials where there was a set time limit. During the actual task participants responded to neutral and smoking-related words following the priming picture cue. Target words randomly appeared in blue, green, or red ink approximately 1.8 cm tall (40 Arial Font) against a white background. A two-second inter-trial interval occurred once the participant selected the color of the word. Reaction times were recorded to the nearest millisecond by the computer for each trial. All participants were tested individually during the Stroop task and the experimenter remained in the room with the participant throughout the entire task.

The trial and inter-trial timing parameters were adapted from Segal et al. (1995) who used a priming Stroop methodology to study self-representation in Major Depressive Disorder. During each trial, a fixation cross (approximately 1.8 cm in length and width) was presented for .5 seconds, followed by a blank screen for .5 seconds. The prime picture was then presented on the entire screen for .8 seconds. The screen then went blank for .5 seconds, after which the target word was presented in the center of the

screen until the participant responded or a maximum of 2 seconds elapsed. Figure 1 summarizes the sequence for each trial.

<b>Fixation</b>	<b>Blank</b>	<b>Prime</b>	<b>Blank</b>	<b>Target</b>	<b>Blank</b>
.5 seconds	→ .5 seconds	→ .8 seconds	→ .5 seconds	→ 2 seconds (max)	→ 2 seconds

*Figure 1.* Trial timing parameters

Following the Stroop task, the Mood Form was re-administered to assess for change since baseline, and an interview consisting of the M.I.N.I and description of the participant's worst trauma experience was conducted. Next, the participant completed the following self-report measures: Smoking History Form, FTND, BDI-II, and the Posttraumatic Stress Diagnostic Scale.

Upon completion of the interview and questionnaires, the participant was debriefed, paid, and provided a referral to counseling resources if symptoms indicated distress.

## Results

### *Data Processing and Analytic Strategy*

The primary data analytic strategy focused on assessing the impact of priming cue picture type on color naming reaction time for smoking-relevant or neutral words among smokers who have experienced a traumatic event. Only reaction time data from correct responses were included in the analyses. Six means, representing the crossing of three prime picture types (trauma-related, positive, and neutral) with two target word types (smoking and neutral) were calculated for each participant. In addition, outlying Stroop responses were removed prior to analysis if responses were beyond three standard deviations above or below the mean for neutral or smoking words for that participant.

For the between subjects factor of PTSD symptom severity level, participants were divided approximately into thirds based on a frequency distribution of PDS symptom severity scores. Twenty-four participants were considered to have a low level of symptomatology (PDS score 0-5), 30 people had a medium level of symptomatology (PDS score 6-16), and 26 people had a high level of symptomatology (PDS score 17-44).

A three-way mixed design analysis of variance (ANOVA) was conducted; PTSD symptom severity (low, medium, high) x prime picture type (trauma-related, positive, and neutral) x target word type (smoking vs. neutral). Significant main and interaction effects were followed up with simple effect and post hoc testing. Finally, correlations between clinical symptoms questionnaire data and smoking-related variables were examined.

### *Baseline Participant Characteristics*

Table 2 shows demographic, smoking-related, and PTSD-related variables as a function of post trauma symptomatology group. Descriptive statistics were used to characterize the three groups and to ensure that groups were equivalent on major demographic variables. Differences between groups were determined using the Pearson's chi-square test for categorical variables and Analyses of Variance (ANOVA) followed up with Fisher's LSD post hoc tests for continuous variables. When differences were found, these variables were considered as potential covariates in subsequent analyses.

Table 2

*Baseline Participant Characteristics*

	<u>PTSD Symptom Severity Group</u>			<i>p</i>
	<u>Low (0-5)</u> <i>n=24</i>	<u>Medium (6-16)</u> <i>n=30</i>	<u>High (17-44)</u> <i>n=26</i>	
<u>Demographic Variables</u>				
<i>Age: M (SD)</i>	28.96 (9.48)	25.83 (6.84)	26.58 (9.5)	<i>ns</i>
<i>Gender: % male</i>	50	67	50	<i>ns</i>
<i>Race (%)</i>				
Caucasian	79.20	86.7	76.90	<i>ns</i>
African American	8.3	10.0	15.4	<i>ns</i>
Other	12.5	13.3	7.6	<i>ns</i>
<i>Hispanic (%)</i>	12.5	6.7	23.1	<i>ns</i>
<i>Education (years)</i>	14.25 (2.25) <sub>a</sub>	13.13 (1.60) <sub>b</sub>	12.73 (1.66) <sub>b</sub>	.01
<u>Smoking Variables</u>				
<i>Fagerström: M (SD)</i>	5.17 (2.30)	5.37 (2.30)	5.08 (2.26)	<i>ns</i>
<i>Years Smoking: M (SD)</i>	13.67 (10.16)	12.50 (7.96)	12.31 (9.52)	<i>ns</i>
<i>Smoking Amount (cigs per day):M(SD)</i>	18.46(7.0) <sub>a</sub>	24.67 (14.9) <sub>b</sub>	17.85 (8.22) <sub>a</sub>	.04
<i>Baseline CO: M (SD)</i>	22.71 (12.45) <sub>a</sub>	21.07 (10.07) <sub>a</sub>	14.27 (6.79) <sub>b</sub>	.01
<i>QSU-B: M (SD)</i>				
Total	32.04 (12.03)	35.77 (15.04)	40.27 (14.73)	<i>ns</i>
Factor 1	20.04 (8.06)	22.03 (8.46)	23.62	<i>ns</i>
Factor 2	12 (7.17) <sub>a</sub>	13.73 (7.48) <sub>a</sub>	16.65 (8.17) <sub>b</sub>	<i>ns</i>
<u>PTSD-Related Variables:</u>				
<i>Total PDS Symptom #: M (SD)</i>	1.83 (1.37) <sub>a</sub>	6.73 (2.67) <sub>b</sub>	23.23 (9.69) <sub>c</sub>	<.01
Reexperiencing Symptoms	.71 (.95) <sub>a</sub>	2.23 (2.13) <sub>b</sub>	5.69 (3.45) <sub>c</sub>	<.01
Avoidance Symptoms	.46 (.72) <sub>a</sub>	3.47 (2.50) <sub>b</sub>	9.31 (3.07) <sub>c</sub>	<.01
Hyperarousal Symptoms	1.0 (.93) <sub>a</sub>	4.2 (2.48) <sub>b</sub>	9.65 (3.07) <sub>c</sub>	<.01
Functional Impairment	1.04 (2.1) <sub>a</sub>	3.07 (3.38) <sub>b</sub>	7.08 (3.11) <sub>c</sub>	<.01
<i>BDI-II: M (SD)</i>	8.08 (6.63) <sub>a</sub>	12.17 (8.51) <sub>b</sub>	23.23 (9.69) <sub>c</sub>	<.01

*Note:* Means in the same row that do not share subscripts differ at  $p < .05$  in Fisher's LSD post-hoc tests.



Individuals in the three groups were comparable on all demographic variables, with the exception of education [ $F(2, 77) = 4.58, p = .01$ ]. Fisher's LSD post hoc testing indicated that individuals who reported the highest severity of PTSD symptoms had the least amount of education compared to individuals who reported low and medium levels of symptomatology ( $p = .01$ ).

For smoking related-variables, groups differed on smoking amount [ $F(2, 77) = 3.33, p < .05$ ], and baseline CO levels [ $F(2, 77) = 5.18, p < .01$ ]. For baseline CO levels, those with high PTSD symptomatology were significantly lower than those with low and medium levels of PTSD symptomatology ( $p < .01$ ). In addition, post hoc analyses revealed that individuals who reported medium levels of post-trauma symptomatology smoked significantly more cigarettes per day compared to those in both the low and high PTSD symptom severity groups ( $ps < .05$ ).

Finally, consistent with grouping the sample according to PTSD symptom severity scores, the three groups differed on overall PTSD symptoms as well as all specific symptom clusters [ $Fs(2, 77) > 27.86, ps < .001$ ] and on the BDI-II [ $F(2, 77) = 22.09, p < .001$ ].

### *Primary Analyses*

#### *Stroop Priming Task*

Table 3 displays the means and standard deviations for ink-naming latency as a function of Prime and Target categories. Contrary to our first hypothesis, there was no overall main effect for target word type on reaction time. Overall, participants took equally as long to ink-name a smoking target word ( $M = 874.77\text{ms}, SD = 141.22\text{ms}$ ) as they did to ink-name a neutral target word ( $M = 873.74\text{ms}, SD = 148.58\text{ms}$ ), [ $F(1, 79) = .05, p = .87$ ]. However, there was a significant main effect for prime type on reaction time, [ $F(2, 77) = 12.11, p < .01$ ]. Post hoc testing using paired samples t-tests with a

Bonferroni correction indicated that trauma-related priming pictures were associated with significantly slower ink-naming of target words relative to positive and neutral pictures [ $t(79) = 3.85$  and  $4.77$ ,  $p < .001$ ]. There was not a significant difference in ink-naming target words following priming by positive and neutral pictures [ $t(79) = -.79$ ,  $p = .43$ ].

Table 3

*Ink-Naming Latency of Target Words as a Function of Prime Type*

Picture Prime Category	Target Category	
	Smoking-Related	Neutral
Trauma <i>M (SD)</i>	902.81 (160.63)	888.32 (155.94)
Positive <i>M (SD)</i>	855.00 (159.42)	867.10 (151.23)
Neutral <i>M (SD)</i>	866.50 (155.00)	865.58 (159.42)

Consistent with our hypothesis, analyses revealed a significant prime x target interaction [ $F(2, 154) = 3.3$ ,  $p < .05$ ] (see Figure 2). Simple effects testing indicated that smoking words were ink named slower than neutral words only following a trauma prime, [ $F(2, 77) = 4.4$ ,  $p < .05$ ]. Differences between ink-naming smoking and neutral words following positive or neutral primes were not significant.

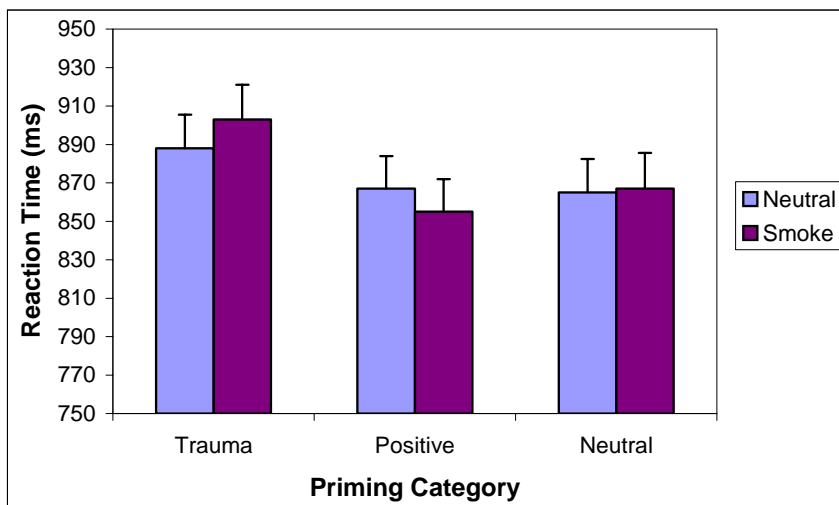


Figure 2 Overall Prime x Word Interaction

Finally, we found a significant 3-way interaction between symptom severity, prime category, and target category, [ $F(4, 154) = 3.6, p < .01$ ]. Figures 3a, 3b, and 3c show ink-naming reaction time for each prime-target combination as a function of PTSD group. Contrary to our prediction, simple effects testing revealed a significant prime x target interaction among smokers who were classified as having either low or high levels of PTSD symptomatology [ $F_s > 3.85, p_s < .05$ ], but not among those with medium levels of post trauma symptomatology [ $F(1, 29) = 1.8, p = .18$ ]. Post hoc tests indicated that smokers classified as having a low level of PTSD symptomatology were significantly affected by the trauma-related prime category on subsequent color naming of smoking words and thus displayed an attentional bias to smoking words.

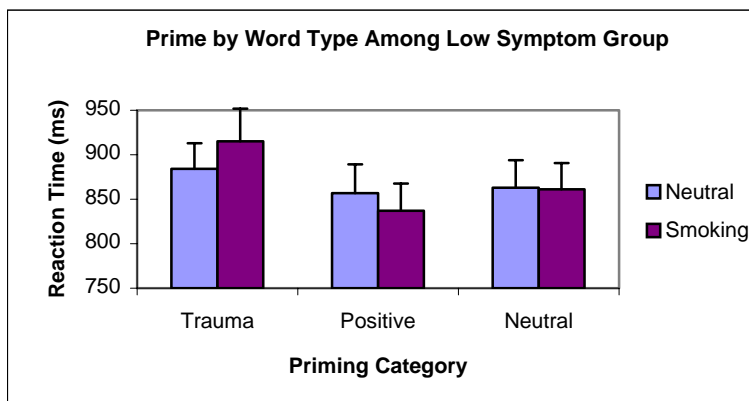


Figure 3a Prime x Word Interaction (Low)

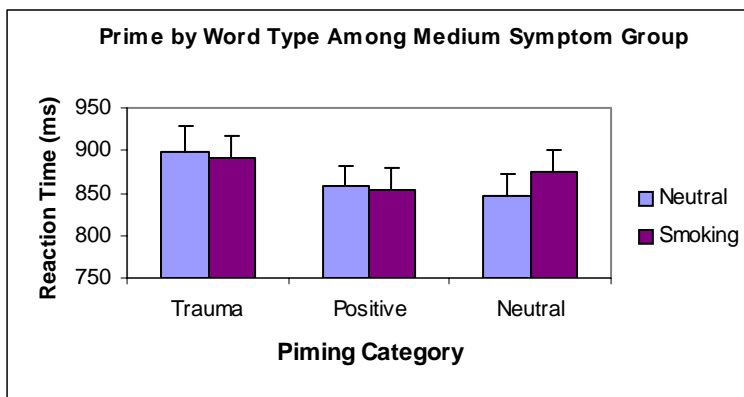


Figure 3b Prime x Word Interaction (Medium)

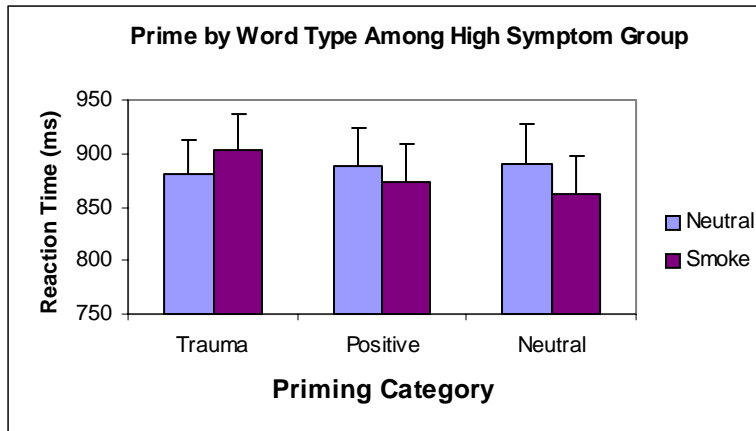


Figure 3c Prime x Word Interaction (High)

### Secondary Analysis

#### *Relationship between smoking-related variables and PTSD symptoms*

Based on previous research, we expected to find a positive relationship between indices of smoking/nicotine dependence and PTSD symptomatology. In addition, we hypothesized that hyperarousal PTSD symptoms would show the strongest relationship with smoking-related variables. Smoking variables included in these analyses included FTND (nicotine dependence), current smoking amount, CO level, number of years smoked regularly, QSU-Brief total, QSU-Brief Factor 1, and QSU-Brief Factor 2.

Table 4 displays correlations between smoking variables and measures of PTSD symptomatology. Measures of smoking amount, nicotine dependence, and number of years spent smoking were generally uncorrelated with PTSD symptomatology. QSU-Brief total scores were significantly correlated with overall PTSD symptom severity and hyperarousal symptoms,  $r(79) = .25$  and  $.33$ ,  $p < .02$ . In addition, scores on the QSU-Brief Factor 2,  $r(79) = .31$ ,  $p < .01$ , were significantly related to overall PTSD symptom severity as well as reexperiencing and hyperarousal symptom clusters. In contrast, Factor 1 was correlated with hyperarousal symptoms,  $r(79) = .24$ , but was not correlated with overall PTSD symptoms, avoidance, and reexperiencing symptoms. Interestingly,

PTSD overall severity and cluster scores were negatively correlated with carbon monoxide levels.

Table 4

*Correlations Between Measures of Posttraumatic Stress Disorder and Smoking Variables*

<u>PTSD Variables</u>	<u>Smoking Variables</u>						
	Smoking Amount (cigs/day)	Years Smoke	CO Level	FTND	QSU-B (Total)	QSU-B (Factor 1)	QSU-B (Factor 2)
PTSD Severity (overall)			-				
Severity B Cluster	-.12	-.13	.33**	-.01	.25*	.15	.31**
Severity C Cluster	-.20	-.25*	-.30**	-.07	.20	.13	.24*
Severity D Cluster	-.08	-.12	.35**	-.04	.14	.04	.21
Functional Impairment	-.06	-.01	-.22*	-.06	.33**	.24*	.35***
	-.02	-.11	-.14	-.16	.22	.16	.23*

Note. PTSD cluster categories are defined as: B = reexperiencing; C = avoidance; D = hyperarousal

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## Discussion

The primary goal of the current study was to examine the effects of trauma-related emotional priming on biased attentional processing of smoking-related cues. The main findings of our study were (1) that smokers who were exposed to a DSM-IV TR Criterion A traumatic event in their lifetime showed a significant priming effect when trauma-related pictures, as compared to neutral and positive pictures, preceded smoking-related words compared to neutral words on a modified Stroop task, and (2) that this priming effect differed as a function of symptom severity.

Overall, we were unable to replicate previous findings that smokers show an attentional bias to smoking-related target words compared to neutral words. However, previous smoking-Stroop studies did not employ the use of priming cues. It may be that the inclusion of picture primes in the present study disrupted the general smoking-related attentional bias that has previously been found. Indeed, trauma-related primes were associated with substantially slower color-naming reaction time to subsequent words, regardless of word content. Thus, a relatively subtle effect of word content may have been overshadowed by the more salient effect of picture prime category.

Importantly, a significant prime by target interaction was observed, which indicated that there was significant attentional bias to smoking-related words only when they followed trauma-related primes. Consistent with the theoretical foundation for this study, these findings suggest a strong interrelationship between activation of trauma-related cognitions and attention to smoking-related concepts among smokers who previously experienced a significant traumatic event. Although speculative, it may be that smoking as a form of self-medication for trauma-related affect serves to strengthen the association between trauma and smoking-related cognitive concepts. In turn, this close

association may drive cravings and smoking behavior in response to trauma-related cue exposure.

Furthermore, we found a significant three-way interaction between symptom severity level, prime category, and target type. Consistent with our prediction, participants classified as having high levels of PTSD symptomatology showed a stronger attentional bias to smoking-related target words after being primed with a trauma-related picture versus a neutral or pleasant picture. We speculate that at higher levels of PTSD symptomatology, processing of trauma-related cognitions may have resulted in greater emotional distress, which may have led to an increased attentional bias to subsequent smoking cues due to the strong connection between the concepts. It seems likely that PTSD symptoms persistently activate concepts related to smoking.

Contrary to our prediction, trauma-based priming cues also augmented attentional bias to smoking cues among individuals with low levels of PTSD symptomatology. One plausible explanation for this surprising finding is that individuals with low levels of PTSD symptomatology do not have the characteristically elevated avoidance and numbing symptoms exhibited by individuals with high PTSD symptoms. In effect, these individuals would be no different than the general smoking population, and would be expected to react to the trauma pictures in a manner indicative of the general smoking population. Empirical evidence suggests that smokers report smoking to relieve negative affect. Therefore, negative affect and smoking-related concepts may be interconnected among smokers, in general. Based on this possible explanation, we speculate that individuals with low PTSD symptomatology may have perceived the trauma-related pictures as simply generally aversive. Comparing general negative affect primes with trauma-based priming category in future studies may elucidate this finding further.

Regarding the lack of a significant prime by target interaction among the medium PTSD symptomatology group, one explanation for these findings is that subclinical levels of avoidance and numbing symptoms may be associated with reduced processing of the trauma-related priming cue. Thus, the effect on subsequent attentional bias to cues may have been reduced due to a relative lack of engagement with these picture cues. Alternatively, it may be that trauma-related and smoking-related concepts are not bound within a tightly woven cognitive network among this mid-level symptom group. Perhaps these individuals do not smoke for the purpose of self-medication as frequently as the high group.

The current study extends the previous research by examining trauma-related pictorial stimuli as priming cues for subsequent attentional bias to smoking words. According to theory (Waters & Sayette, 2006), attentional systems may index addiction motivation as well as contribute to related phenomena such as relapse. Specifically, the modified Stroop task indexes attentional bias by measuring the degree to which participants are slower to ink-name the color of concern-related words (smoking) than to ink name neutral words (Waters, Sayette, Franken, & Schwartz, 2005). The current study demonstrated that among trauma-exposed individuals, biased attention to smoking cues is increased by exposure to trauma cues. The increased attention to smoking cues following trauma cue exposure may be related to a form of “self-medication,” in that smoking may temporarily relieve PTSD symptoms and negative mood states. In other words, smokers who have experienced a traumatic event may be dependent on cigarette smoking due to unconscious efforts to medicate post trauma symptomatology. Recently, Beckham et al. (2005) supported this hypothesis in a prospective observational study of cues associated with smoking behavior in smokers with and without PTSD. The authors utilized ambulatory methods to monitor situational



antecedents of cigarette smoking. Findings indicate that smoking was strongly related to craving, positive and negative affect, and that post trauma symptomatology was an antecedent of smoking in smokers with PTSD but not smokers without PTSD. Furthermore, in a recent review of the literature on PTSD and smoking, Feldner, Babson, and Zolensky (2007) note that studies suggest that individuals with PTSD are motivated to smoke, at least in part, by PTSD-related factors. That is, they may smoke to reduce negative affective states associated with trauma. The authors mention that the few studies conducted in this area need to be replicated and several other motivational processes need to be examined (i.e., smoking expectancies). The present study adds to the literature on motivation to smoke among trauma-exposed individuals by using an implicit task of attention to tap into possible cognitive mechanisms of cigarette smoking maintenance in this population.

Past research has examined cue elicited substance craving and related processes in individuals with varying PTSD symptomatology (e.g. Coffey et al, 2002; Saladin et al, 2003). These studies indicate that activation of trauma-related emotions have an impact on subsequent reactions to drug cues. In addition, cue elicited subjective (cravings/urges), behavioral (puff volumes/intervals), and physiological responses to trauma cues and smoking cues in individuals with PTSD has been examined to try to better understand smoking motivation among individuals who smoke and have experienced trauma. For example, researchers (Beckham et al.,1995) have looked at smoking craving in response to trauma cues. The results of the present study provide further support for previous research by using methods from the field of cognitive psychology (e.g., nonintrospective measures) to further comprehend the trauma/smoking relationship. The study results suggest that trauma-related pictorial priming cues increase reactivity to smoking-related target words. Thus, the participant's

attention to a smoking cue was affected by what preceded the word. These results support the idea that smoking and trauma are tied tightly together in a cognitive network. This strong association may be related to the maintenance of smoking in this special population.

Correlational analyses revealed that self-reported craving was associated with overall PTSD symptom severity. Interestingly, the strongest correlations were found between Factor 2 of the QSU-Brief, which is related to relief of negative, and overall symptoms severity, reexperiencing symptoms, and hyperarousal symptoms. These findings suggest that individuals who suffer from PTSD-related symptoms, specifically hyperarousal symptoms, are more likely to report strong cravings. The current findings also support previous research studies, which have found a relationship between hyperarousal symptoms and cravings to smoke. Overall, these findings suggest that the relationship between post-trauma symptoms, especially hyperarousal symptoms and cravings can improve our understanding of the maintenance of cigarette smoking among people who have been exposed to trauma.

In contrast to previous studies, we failed to find a relationship between level of posttraumatic stress disorder symptoms and a number of other smoking-related variables. One factor that may account for this difference is sample characteristics. For instance, the current findings may relate to the restriction of range of smoking amount in our study; whereas, prior research has examined the relationship between PTSD and a wider range of smoking amounts (i.e., population based studies). By limiting the sample to smokers of at least 10 cigarettes per day, we may lose important information. In addition, the present sample was fairly young ( $M = 27$ ) compared to other samples using combat veterans ( $M = 45-47$ ) (Beckham et al., 1995b, 1997). Recently, Feldner et al. (2007) studied smokers whose mean age was 25 and found that higher levels of

posttraumatic stress symptoms predicted self-reported smoking for stimulation. It may be that younger samples are more likely to smoke for stimulation when managing posttraumatic stress symptoms.

There are several limitations to the current study. One limitation is that potential participants with severe psychiatric disorders and substance dependence as well as those taking psychotropic medications were excluded in order to focus this initial investigation on the comorbidity between smoking and PTSD symptomatology. In addition, participants were a self-selected group since they responded to recruitment advertisements. Thus, generalizability may be limited. However, this study had a number of positive methodological features, which may contribute to the generalizability of the results. It was based on a community sample, including adults of both sexes, different races, and exposure to a wide range of traumatic experiences. Another limitation of the current study is that the picture stimuli were not standardized for each participant (e.g., on rating of valence and arousal). In addition, we did not obtain subjective ratings of the picture cues at the end of the laboratory procedure. Thus, some participants may have found the picture cue set more salient than other participants. Also, the picture categories were not explicitly matched for secondary characteristics (e.g., complexity, saliency, brightness) that may have affected processing of the pictures or subsequent target words. Finally, although the current study used a within-subjects design, we did not include a control group of smokers who have never witnessed or experienced a traumatic event. Thus, it is not clear whether the trauma-related priming cues may have had similar effects in non-traumatized smokers.

This study was novel in several ways compared to other studies that have investigated the trauma/smoking relationship. First, it incorporated a priming methodology to the modified Stroop task which utilized a colored pictorial priming cue

prior to the presentation of a smoking-related or neutral word on the Stroop task. To our knowledge, this is the first study to examine the smoking-PTSD relationship using an implicit cognitive paradigm. By applying methods from the field of cognitive psychology to the addiction field, we were able to elucidate mechanisms underlying the smoking/trauma relationship literature above and beyond traditional cue reactivity indices, self-report methodology, and behavioral observation. Specifically, the results of the current study indicate that an attentional bias to smoking cues is enhanced following trauma-related priming.

Second, this study is one of the few studies to concentrate on smoking rates and PTSD symptoms among a sample of smokers who were exposed to a variety of traumatic events and had trauma-related symptomatology representative of a continuum. Past investigations have focused on more homogenous samples (i.e., severely battered women and male Vietnam combat veterans). Therefore, the results of the present study may be more generalizable since it included a heterogeneous sample.

The results of the current study, coupled with results of previous research examining treatment outcome for co-occurring substance use and PTSD, brings into question the importance of tailored treatment for smokers who have experienced trauma. Specifically, the role of cravings and attentional bias to smoking cues following trauma-evoked emotion may be more important than previously appreciated. If nicotine is used by individuals who have experienced trauma to self-medicate, these individuals may be more resistant to smoking cessation treatment and may require specialized treatment plans that incorporate post trauma symptom reduction. For example, cue exposure treatments incorporating trauma-related cues may be especially efficacious for this population.

In addition, several studies have demonstrated that nicotine dependence in veterans diagnosed with PTSD can have successful treatment outcome (e.g., McFall et al., 2005). Based on evidence-based treatments for co-occurring PTSD and substance use disorders, it appears that an integrated treatment approach (as compared to a sequential or parallel approach) to treatment may be beneficial for individuals who have experienced trauma and smoke cigarettes. Since the current study implicates a strong cognitive interconnection between trauma-related cue processing and attention to smoking cues, future research is needed to ultimately determine how best to incorporate smoking cessation programs into PTSD treatment plans.

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## Appendices

Appendix A: Mood Form

Administration # \_\_\_\_\_

Please indicate how much you are experiencing each of the following moods **right now** by placing a checkmark on EACH line.

	Not at	Very	Some	Moderate	Much	Very	
Extremely	all	slight	what	amount		much	much
Happy	_____	_____	_____	_____	_____	_____	_____
Depressed/Blue	_____	_____	_____	_____	_____	_____	_____
Joyful	_____	_____	_____	_____	_____	_____	_____
Unhappy	_____	_____	_____	_____	_____	_____	_____
Pleased	_____	_____	_____	_____	_____	_____	_____
Enjoyment/Fun	_____	_____	_____	_____	_____	_____	_____
Frustrated	_____	_____	_____	_____	_____	_____	_____
Worried/Anxious	_____	_____	_____	_____	_____	_____	_____
Angry/Hostile	_____	_____	_____	_____	_____	_____	_____



Appendix B: QSU-BRIEF

Indicate how much you agree or disagree with each of the following statements by placing a single checkmark along each line between STRONGLY DISAGREE and STRONGLY AGREE. The closer you place your checkmark to one end or the other indicates the strength of your agreement or disagreement. We are interested in how you are thinking and feeling right now as you are filling out the questionnaire.

1. I have a desire for a cigarette right now.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
2. Nothing would be better than smoking a cigarette right now.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
3. If it were possible, I probably would smoke now.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
4. I could control things better right now if I could smoke.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
5. All I want right now is a cigarette.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
6. I have an urge for a cigarette.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
7. A cigarette would taste good right now.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
8. I would do almost anything for a cigarette now.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
9. Smoking would make me less depressed.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE
10. I am going to smoke as soon as possible.  
STRONGLY DISAGREE \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_: \_\_\_ STRONGLY AGREE

Appendix C: Smoking History Form

1. How many cigarettes do you currently smoke each day? \_\_\_\_\_ cigarettes
2. What brand of cigarettes do you smoke? \_\_\_\_\_
3. How much money do you usually spend on a pack of cigarettes? \$ \_\_\_\_\_
4. How old were you when you smoked your first cigarette? \_\_\_\_\_ Years old
5. How old were you when you first became a regular smoker? \_\_\_\_\_ Years old
6. How old were you when you first became a daily smoker? \_\_\_\_\_ Years old
7. How many cigarettes were you smoking each day when you were smoking the most?  
\_\_\_\_\_ cigarettes
8. Have you tried to quit smoking?  
 Yes -----> if yes, how many times have you tried to quit? \_\_\_\_\_  
 No
9. If you would try to quit smoking now, how confident are you that you could go for one year without smoking? (Check one)  
 No confidence  
 A little confidence  
 Moderately confident  
 Very confident  
 Extremely confident

## Appendix D: FTND

After reading each statement carefully, place a check next to the answer that best fits the question. Be sure to check one answer for each question.

1. How soon after you wake up do you smoke your first cigarette?  
 Within 5 minutes  
 6-30 minutes  
 31-60 minutes  
 After 60 minutes
2. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g. in church, at the library, or in a movie theater, etc.?  
 Yes  
 No
3. Which cigarette would you hate most to give up?  
 The first one in the morning  
 All others
4. How many cigarettes a day do you smoke?  
 10 or less  
 11-20  
 21-30  
 31 or more
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?  
 Yes  
 No
6. Do you smoke if you are so ill that you are in bed most of the day?  
 Yes  
 No

## Appendix E: BDI-II

**Instructions:** This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

### 1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it

### 2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

### 3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

### 4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

### 5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

### 6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

### 7. Self Dislike

- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

### 8. Self Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

### 9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

### 10. Crying

- 0 I don't cry any more than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

**11. Agitation**

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

**12. Loss of Interest**

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

**13. Indecisiveness**

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

**14. Worthlessness**

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

**15. Loss of Energy**

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

**16. Changes in Sleeping Patterns**

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours and don't go to sleep

**17. Irritability**

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

**18. Changes in Appetite**

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat more than usual.
- 2a My appetite is much less than usual.
- 2b My appetite is much more than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

**19. Concentration Difficulty**

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

**20. Tiredness or Fatigue**

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

**21. Loss of Interest in Sex**

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

---

**PART 1**

---

Many people have lived through or witnessed a very stressful and traumatic event at some point in their lives. Indicate whether or not you have experienced or witnessed each traumatic event listed below by marking  for Yes or  for No on the answer sheet.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>22. Serious accident, fire, or explosion (for example, an industrial, farm, car, plane, or boating accident)</li> <li>23. Natural disaster (for example, tornado, hurricane, flood, or major earthquake)</li> <li>24. Non-sexual assault by a family member or someone you know (for example, being mugged or physically attacked, shot, stabbed, or held at gunpoint)</li> <li>25. Non-sexual assault by a stranger (for example being mugged, physically attacked, shot, stabbed or held at gunpoint)</li> <li>26. Sexual assault by a family member or someone you know (for example, rape or attempted rape)</li> <li>27. Sexual assault by a stranger (for example, rape or attempted rape)</li> </ul> | <ul style="list-style-type: none"> <li>28. Military combat or a war zone.</li> <li>29. Sexual contact when you were younger than 18 with someone who was 5 or more years older than you (for example, contact with genitals, breasts)</li> <li>30. Imprisonment (for example, prison inmate, prisoner of war, hostage)</li> <li>31. Torture</li> <li>32. Life-threatening illness</li> <li>33. Other traumatic event</li> <br/> <li>34. If you answered yes to item 12, specify the traumatic event on the answer sheet.</li> </ul> |
|--|---|

**IF YOU MARKED YES TO ANY OF THESE ITEMS ABOVE, CONTINUE, IF NOT, STOP HERE**

---

**PART 2**

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35. If you marked Yes for more than one traumatic event in Part 1, indicate *which one bothers you the most*. If you marked Yes for only one traumatic event in Part 1, mark the same one on the answer sheet.
- 1. Accident
  - 2. Disaster
  - 3. Non-sexual assault/someone you know
  - 4. Non-sexual assault/stranger
  - 5. Sexual assault/someone you know
  - 6. Sexual assault/stranger
  - 7. Combat
  - 8. Sexual contact under 18 with someone 5 or more years older
  - 9. Imprisonment
  - 10. Torture
  - 11. Life-threatening illness
  - 12. Other traumatic event

**Below are several questions about the traumatic event you marked in Item 14.**

15. How long ago did the traumatic event happen? (mark one)
- 1. Less than 1 month
  - 2. 1 to 3 months
  - 3. 3 to 6 months
  - 4. 6 months to 3 years
  - 5. 3 to 5 years
  - 6. More than 5 years

**For the following questions, mark  for Yes or  for No on the answer sheet.**

During this traumatic event:

- 16. Were you physically injured?
- 17. Was someone else physically injured?
- 18. Did you think that your life was in danger?
- 19. Did you think that someone else's life was in danger?
- 20. Did you feel helpless?

---

**PART 3**

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Below is a list of problems that people sometimes have after experiencing a traumatic event. Read each one carefully and choose the answer (0-3) that best describes how often that problem has bothered you IN THE PAST MONTH. Rate each problem with respect to the traumatic event you marked in Item 14.

- ⓪ Not at all or only one time
- ① Once a week or less/once in a while
- ② 2 to 4 times a week/half the time
- ③ 5 or more times a week/almost always

- 22. Having upsetting thoughts or images about the traumatic event that came into your head when you didn't want them to
- 23. Having bad dreams or nightmares about the traumatic event
- 24. Reliving the traumatic event, acting or feeling as if it was happening again
- 25. Feeling emotionally upset when you were reminded of the traumatic event (for example, feeling scared, angry, sad, guilty, etc.)
- 26. Experiencing physical reactions when you were reminded of the traumatic event (for example, breaking out in a sweat, heart beating fast)
- 27. Trying not to think about, talk about, or have feelings about the traumatic event
- 28. Trying to avoid activities, people, or places that remind you of the traumatic event
- 29. Not being able to remember an important part of the traumatic event
- 30. Having much less interest or participating much less often in important activities
  
- 31. Feeling distant or cut off from people around you
- 32. Feeling emotionally numb (for example, being unable to cry or unable to have loving feelings)

- 33. Feeling as if your future plans or hopes will not come true (for example, you will not have a career, marriage, children, or a long life)
- 34. Having trouble falling or staying asleep
- 35. Feeling irritable or having fits of anger
- 36. Having trouble concentrating (for example, drifting in and out of conversations, losing track of a story on television, forgetting what you read)
- 37. Being overtly alert (for example, checking to see who is around you, being uncomfortable with your back to a door, etc.)
- 38. Being jumpy or easily startled (for example, when someone walks up behind you)

- 
- 39. How long have you experienced the problems that you reported above? (Mark only ONE on the answer sheet.)
    - 1. Less than 1 month
    - 2. 1 to 3 months
    - 3. More than 3 months
  - 40. How long after the traumatic event did these problems begin? (Mark only ONE on the answer sheet.)
    - 1. Less than 6 months
    - 2. 6 or more months

---

#### PART 4

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Indicate if the problems you rated in Part 3 have interfered with any of the following areas of you life DURING THE PAST MONTH. Mark  for Yes or  for No on the answer sheet.

41. Work

42. Household chores and duties

43. Relationships with friends

44. Fun and leisure activities

45. Schoolwork

46. Relationships with your family

47. Sex life

48. General satisfaction with life

Overall level of functioning in all areas of your life



## Appendix G: MINI

➤ Have you been <b>consistently</b> depressed or down, <b>most of the day, nearly every day</b> , for the past two weeks ?	NO	YES	→ A
➤ In the past two weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy <b>most of the time</b> ?	NO	YES	→ A
➤ Have you felt sad, low or depressed <b>most of the time</b> for the last two years ?	NO	YES	→ B
➤ In the past month did you think that you would be better off dead or wish you were dead ?	NO	YES	→ C
➤ Have you <b>ever</b> had a period of time when you were feeling 'up' or 'high' or 'hyper' or so full of energy or full of yourself that you got into trouble, or that other people thought you were not your usual self ? (Do not consider times when you were intoxicated on drugs or alcohol.)	NO	YES	→ D
➤ Have you <b>ever</b> been persistently irritable, for several days, so that you had arguments or verbal or physical fights, or shouted at people outside your family ? Have you or others noticed that you have been more irritable or over reacted, compared to other people, even in situations that you felt were justified ?	NO	YES	→ D
➤ Have you, on more than one occasion, had spells or attacks when you suddenly felt anxious, frightened, uncomfortable or uneasy, even in situations where most people would not feel that way ? Did the spells surge to a peak, within 10 minutes of starting ? CODE YES ONLY IF THE SPELLS PEAK WITHIN 10 MINUTES.	NO	YES	→ E
➤ Do you feel anxious or uneasy in places or situations where you might have a panic attack or panic-like symptoms, or where help might not be available or escape might be difficult : like being in a crowd, standing in a line (queue), when you are away from home or alone at home, or when crossing a bridge, traveling in a bus, train or car ?	NO	YES	→ F
➤ In the past <b>month</b> were you fearful or embarrassed being watched, being the focus of attention, or fearful of being humiliated ? This includes things like speaking in public, eating in public or with others, writing while someone watches, or being in social situations.	NO	YES	→ G
➤ In the past <b>month</b> have you been bothered by recurrent thoughts, impulses, or images that were unwanted, distasteful, inappropriate, intrusive, or distressing ? (e.g., the idea that you were dirty, contaminated <b>or</b> had germs, or fear of contaminating others, <b>or</b> fear of harming someone even though you didn't want to, <b>or</b> fearing you would act on some impulse, <b>or</b> fear or superstitions that you would be responsible for things going wrong, <b>or</b> obsessions with sexual thoughts, images or impulses, <b>or</b> hoarding, collecting, <b>or</b> religious obsessions.)	NO	YES	→ H