THE UTILITY OF PERITRAUMATIC EXPERIENCES IN PREDICTING POST TRAUMA PSYCHOPATHOLOGY

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by

Michelle J. Bovin

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Temple University

Deborah A. G. Drabick, Temple University

Richard Heimberg, Temple University

Peter J. Marshall, Temple University

Tania Giovannetti, Temple University

Brian P. Marx, National Center for PTSD, Veterans Affairs Boston Healthcare System and Boston University School of Medicine

Patricia Resick, National Center for PTSD, Veterans Affairs Boston Healthcare System and Boston University School of Medicine

ABSTRACT

The Utility of Peritraumatic Experiences in Predicting Post Trauma Psychopathology

Michelle J. Bovin

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Doctoral Dissertation Advisor: Deborah A. G. Drabick, Ph.D.

Prior research has indicated that posttraumatic stress disorder (PTSD) Criterion A2 (i.e., the stipulation that an individual must experience intense fear, helplessness, or horror during an event that threatened the life or physical integrity of oneself or others to be eligible for the PTSD diagnosis; *Diagnostic and Statistical Manual of Mental Disorders, 4th, ed., text rev., DSM-IV-TR*; APA, 2000) is not positively predictive of PTSD diagnostic status. However, the exact reason for the poor predictive validity is unclear. It may be that changing the operational definition of Criterion A2 (e.g., broadening the definition to include additional peritraumatic reactions) will improve its predictive validity. The current investigation attempted to answer this question, as well as examining several other aspects of the peritraumatic experience. Specifically, three studies were conducted. Study 1 examined whether the ability of the peritraumatic response to predict PTSD can be improved by reconstituting the operationalization of this experience. Study 2 investigated whether this new operationalization of the peritraumatic experience can differentiate between PTSD and other psychiatric disorders (i.e., Major Depressive Disorder, Substance Use Disorders). Study 3 explored how different methodologies for assessing responses to trauma cues (i.e., retrospective reports, self-report and psychophysiological data gathered from a laboratory-based trauma monologue) compare in their ability to predict PTSD. Two-hundred thirty four female crime victims (151 victims of rape; 83 victims of physical assault) were recruited as part of a National Institute of Mental Health (Dr. Patricia Resick, Principal Investigator) prospective

longitudinal study designed to examine factors associated with recovery from a recent assault. Results indicated that, consistent with past literature, the three Criterion A2 variables (i.e., peritraumatic fear, helplessness, and horror) were not predictive of PTSD diagnostic status or PTSD symptom severity. However, peritraumatic anxiety was predictive of PTSD diagnostic status, and a dimensional variable assessing the dissociative emotions was predictive of PTSD symptom severity. The predictive utility of the peritraumatic experience was found to be unique to PTSD; although peritraumatic anxiety was predictive of PTSD diagnostic status, none was predictive of the other forms of psychopathology examined (i.e., MDD, Substance Use Disorders). Finally, results indicated that several of the peritraumatic responses were predictive of both self-reported distress and measures of arousal (i.e., amplitude of skin conductance responses) during a laboratory-based trauma monologue. However, the three sets of measures (i.e., peritraumatic responses, self-reported distress, and psychophysiological responses) were differentially predictive of PTSD. Limitations of the study, as well as implications of the findings, are discussed.

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CHAPTER 1. INTRODUCTION

History of Criterion A2 and its Relationship to PTSD

PTSD first entered the *DSM* classification system with the publication of the third edition of the *DSM* (*DSM–III*) in 1980. Since then, the field has struggled with whether the traumatic stressor should be defined only by its objective qualities or by a combination of its objective characteristics and an individual's subjective reaction to it. In *DSM–III*, Criterion A specified that the diagnosis required the "[e]xistence of a recognizable stressor that would evoke significant symptoms in almost anyone" (APA, 1980, p. 238). Neither the diagnostic criteria nor the accompanying text explicitly made reference to how the event is subjectively experienced (i.e., the individual's peritraumatic response). Instead, the definition focused on whether the event was an "objective" stressor by invoking a normative standard (although Weathers and Keane (2007) subsequently argued that this definition actually confounds the objective and subjective aspects of the traumatic stressor).

In 1987, the revised third edition of the *DSM* (*DSM–III–R*) modified Criterion A to read "[t]he person has experienced an event that is outside the range of usual human experience and that would be markedly distressing to almost anyone, e.g., serious threat to one's life or physical integrity; serious threat or harm to one's children, spouse or other close relatives and friends; sudden destruction of one's home or community; or seeing another person who has recently been, or is being, seriously injured or killed as the result of an accident or physical violence" (APA, 1987; p. 250). Unlike the text in *DSM–III*, the accompanying text in *DSM–III–R* made reference to an individual's subjective experience of the event, noting that the stressor is "usually experienced with intense fear, terror, and helplessness" (APA, 1987; p. 247). However, the PTSD diagnostic criteria did not explicitly include this recognition of one's subjective experience

of the stressor (i.e., it was not required for the diagnosis); only the accompanying text made this point.

The PTSD Work Group for the fourth edition of the *DSM* (*DSM–IV*) deliberated over whether Criterion A should maintain its focus on the objective characteristics of the traumatic event or explicitly include an individual's subjective response (Davidson et al., 1996). Kilpatrick et al. (1998) conducted a field trial to collect data regarding the impact of alternative versions of Criterion A on PTSD prevalence rates. The authors performed an exploratory factor analysis using data on subjective reactions to the stressor event from a subset of individuals who reported a high-magnitude event as a first or only incident (n = 373).

Results revealed five distinct factors accounting for 61.5% of the variance (Kilpatrick et al., 1998). These factors were a panic–physiological arousal factor (e.g., dizziness, physical numbing; 38.5% of the variance), a cognitive–fear factor (e.g., scared, helplessness; 7.9% of the variance), an interpersonal factor (e.g., embarrassment, guilt; 6.0% of the variance), a dysphoria factor (e.g., anger, disgust; 4.7% of the variance), and a numbing–unreality factor (e.g., emotional numbing, detached as if in a dream; 4.3% of the variance). Analyses revealed that all five factors were significantly associated with the PTSD diagnosis. In addition, participants who met criteria for PTSD during the 6-month period prior to or at the time of the study had higher factor summary scores (i.e., experienced the peritraumatic responses to a higher degree) on each of the five factors, compared with those who did not meet PTSD diagnostic criteria (all Fs significant at the $p < .001$ level; Kilpatrick et al., 1998). These findings suggest that during exposure to a high-magnitude event, individuals may experience a range of peritraumatic reactions. Further, the more intense the peritraumatic reactions, the more likely the individual will later meet criteria for PTSD.

Although individuals who subsequently developed PTSD tended to experience the peritraumatic responses more powerfully, the experience of these responses did not affect prevalence rates of PTSD (Kilpatrick et al., 1998). Based on this finding, the authors of the field trial argued that the decision to include criterion A2 (as it is currently constituted) should be made on the basis of instructional utility and clarity to the mental health field rather than for improving prediction of PTSD prevalence. The *DSM–IV* subsequently adopted the current version of Criterion A that states that "the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (Criterion A1; p. 427; APA, 1994), and that the person's response to the aforementioned Criterion A1 event "…involved intense fear, helplessness, or horror" (Criterion A2; p. 428; APA, 1994).

Despite the fact that the field trial showed that the subjective response to these high magnitude events was not associated with PTSD prevalence rates, a number of studies have subsequently examined the predictive value of the current version of A2. Several cross-sectional studies have provided evidence that the experience of fear, helplessness, or horror peritraumatically is associated with PTSD (e.g., Creamer, McFarlane, and Burgess, 2005; Marmar et al., 2006; Pole, Kulkarni, Bernstein, and Kaufmann, 2006; Roemer, Orsillo, Borkovec, and Litz, 1998). However, the cross-sectional designs utilized preclude more definitive statements about the degree to which experiencing at least one of the A2 subjective reactions during trauma exposure is necessary for the subsequent development of PTSD.

Brewin, Andrews, and Rose (2000a) conducted one of the only longitudinal studies that examined the predictive validity of A2. They examined 138 victims of violent crime within a month of victimization (Time 1) and then at a 6-month follow-up (Time 2). At Time 1, the authors assessed whether participants experienced fear, helplessness, or

horror during the index event. At Time 2, the authors assessed PTSD diagnostic status. Their results showed that 89% (25 out of 28) of those who qualified for a diagnosis of PTSD at Time 2 reported that at Time 1 they “intensely” experienced either fear, helplessness, or horror peritraumatically, with the most commonly reported response being helplessness. The three individuals who did not report intensely experiencing at least one of these responses reported experiencing at least one A2 reaction “to some degree” during the index event.

In contrast to the overwhelming majority of individuals with PTSD who reportedly experienced intense fear, helplessness, or horror during their traumatic events, Brewin et al. (2000a) found that only 44% (48 out of 110) of those who did not develop PTSD reported that they intensely experienced either fear, helplessness, or horror peritraumatically. Further, the difference between the number of individuals who experienced intense fear, helplessness or horror and did not develop PTSD (i.e., 44%) was significantly less than those who experienced one of these peritraumatic emotions and subsequently developed PTSD (i.e., 89%). On the basis of these findings, the authors concluded that intense peritraumatic fear, helplessness and horror positively predict the development of PTSD in the majority of cases.

These results contrast with the findings of most other studies testing Criterion A2 as a predictor of PTSD diagnostic outcomes. In fact, the majority of studies have echoed the findings of Kilpatrick et al. (1998) that inclusion of A2 does not significantly affect prevalence rates of PTSD (e.g., Bedard-Gilligan & Zoellner, 2008; Breslau & Kessler, 2001; Schnurr, Spiro, Vielhauer, Findler, & Hamblen, 2002). However, Schnurr et al. (2002) demonstrated that, in fact, the results of Brewin et al. were consistent with those of the other studies. Specifically, in a reanalysis of the Brewin et al. data, Schnurr et al. showed that the positive predictive value (PPV; i.e., the presence of Criterion A2 predicts the presence of PTSD) was only .34 (25 PTSD cases out of 73 participants who reported

Criterion A2), whereas the negative predictive value (NPV; i.e., the absence of Criterion A2 predicts the absence of PTSD) was .95 (62 noncases out of 65 participants who did not report Criterion A2; Schnurr et al., 2002, p. 184). These findings suggested that Brewin et al.'s results are actually consistent with other findings that have shown that Criterion A2 does not demonstrate high PPV and, therefore, does not affect rates of PTSD. Other longitudinal investigations have also supported the high NPV and low PPV of Criterion A2 (e.g., O'Donnell et al., 2008).

Summary and Purpose of the Current Investigation

The literature, thus far, suggests that although A2 tends to correlate with PTSD (Creamer et al., 2005; Kilpatrick et al., 1998; Lawyer et al., 2006; Roemer et al., 1998), it is not positively predictive of the disorder (Breslau & Kessler, 2001; Kilpatrick et al., 1998; O'Donnell et al., 2008; Schnurr et al., 2002). However, the exact reason for these results is unclear. One possibility is that, currently, Criterion A2 is too narrowly defined and that broadening its definition may improve its predictive validity. Another possibility is that using a categorical, rather than a dimensional, approach to emotion may limit the PPV of A2.

The current investigation was designed to explore these possibilities, and to answer several additional questions related to the peritraumatic experience. Using a longitudinal dataset consisting of sexual and physical assault victims, three related studies were conducted. The first two studies explored theoretical questions about the nature of the peritraumatic experience. In study 1, both categorical and dimensional approaches to the peritraumatic experience were applied and compared in their ability to predict PTSD. In study 2, the ability of the peritraumatic experience to discriminate between PTSD and both theoretically similar (i.e., MDD) and theoretically distinct (i.e., alcohol/substance dependence disorder) was investigated. The third study compared how different assessments known to be associated with PTSD status compared to the

peritraumatic experience in predicting PTSD. Specifically, in study 3, retrospective reports of the peritraumatic experience and data collected during a laboratory-based trauma monologue were compared both with each other and in terms of their ability to predict PTSD. The paper concludes with a general discussion of the three studies, as well as a consideration of the implications of the findings.

CHAPTER 2. A CONSIDERATION OF ADDITIONAL PERITRAUMATIC REACTIONS

Introduction

Despite the fact that A2 is criticized for its low PPV, no longitudinal study to date has directly examined how well A2 predicts PTSD. Although Brewin et al. (2000a) used a prospective design, they examined the percentage of endorsement of the A2 emotions, rather than examining the ability of these emotions to predict subsequent PTSD (i.e., the authors did not use multiple regression analyses). It is possible that this methodological limitation has caused researchers to incorrectly conclude that A2 is not predictive of PTSD. Several lines of research suggest that additional emotions beyond fear, helplessness, and horror have the potential to predict PTSD. For example, researchers have found that emotions including anger, sadness, and disgust are common peritraumatic reactions (e.g., Adler, Wright, Bliese, Eckford, & Hoge, 2008; Brunet et al., 2001; Kilpatrick et al., 1998; Resick, 2004; Sims & Sims, 1998). Further, each of these peritraumatic emotions is associated with PTSD (e.g., Brewin et al., 2000a; Kilpatrick et al., 1998).

The emphasis on categorical emotional states in A2 reflects the widely held belief that there are qualitative differences between discrete emotion states (e.g., Cosmides & Tooby, 2000; Ekman, 1992). Yet, some have advocated for the position that affective states vary across two broad dimensions: hedonic valence and arousal (e.g., Lang, Bradley, & Cuthbert, 1990; Smith & Ellsworth, 1985). Hedonic valence determines whether an organism will move toward or away from appetitive (i.e., food, access to a potential mate) or aversive (i.e., conflict, life threat) stimuli, whereas arousal or intensity determines the strength of the response or level of activation (Lang et al., 1990). Multivariate studies have consistently found that the principal variance in emotional meaning is accounted for by these two factors (Bradley, Codispoti, Cuthbert, & Lang, 2001; Osgood, Suci, & Tannenbaum, 1957; Smith & Ellsworth, 1985). During the

traumatic stress response, where hedonic valence has already been determined (i.e., it is negative), level of arousal may be the more important dimension in the conceptualization of peritraumatic emotions (e.g., Bedard-Gilligan & Zoellner, 2008; Brewin et al., 2000a; Ozer and Weiss, 2004; Roemer et al., 1998). Thus, a dimensional framework (i.e., how aroused the individual is) may more accurately reflect the peritraumatic experience than a categorical approach (i.e., the individual emotions).

Several researchers have provided support for conceptualizing the peritraumatic experience from a dimensional perspective, particularly in terms of arousal. Rather than examine the presence or absence of a particular categorical emotion, these researchers examined the intensity of a number of peritraumatic emotions by creating a composite measure of peritraumatic distress (i.e., the Peritraumatic Distress Inventory; Brunet et al., 2001). Example items included "I felt sadness and grief" and "I felt afraid for my safety;" the response format was a Likert scale that ranged from 0 to 4 (0 = not at all, 1 = slightly, 2 = somewhat, 3 = very, and 4 = extremely true). Brunet et al. (2001) identified a significant relationship between peritraumatic distress and PTSD among both police officers and a non-police comparison group. This relationship was significant even after controlling for peritraumatic dissociation.

Further, in their meta-analysis, Ozer, Best, Lipsey, and Weiss (2003) found that peritraumatic emotional distress (including emotions such as fear, helplessness, horror, guilt, and shame) was among the strongest correlates of PTSD when compared to a number of other predictors (e.g., history of prior trauma, family history of psychopathology). Ozer et al. also reported that individuals who described having intensely negative peritraumatic emotional responses reported higher levels of PTSD symptoms or current rates of PTSD than those who did not. These findings suggest that it may not be the discrete peritraumatic emotion experienced per se but rather the

intensity of peritraumatic emotions (i.e., the felt distress) that is important to consider in terms of PTSD.

Considering emotions from a dimensional perspective is also consistent with a review of the brain substrates associated with PTSD. Given that stimuli that induce several negative emotional states (e.g., anger, fear) are processed by the same neuroanatomical substrates (e.g., the amygdala; Costafreda, Brammer, David, & Fu, 2008; Schienle, Schäfer, Stark, Walter, & Vaitl, 2005), it may not be important to determine which specific emotions are experienced peritraumatically. Rather, it may be important to consider whether the individual perceives the potentially traumatic stressor as arousing enough, such that the related neuroanatomical and cognitive systems are overactivated during the processing of the event. It may be this arousal, rather than any particular categorical emotion, that is predictive of the subsequent development of PTSD.

The literature reviewed here suggests that there is potential that the current conceptualization of the subjective response to trauma (i.e., A2) may be responsible for the lack of predictive ability demonstrated by the peritraumatic response in relation to the subsequent development of PTSD. Specifically, it is possible that by examining additional emotions, we will be able to identify those that are more predictive of PTSD than fear, helplessness, or horror. It is also possible that by conceptualizing the peritraumatic response as dimensional, rather than categorical, we will be able to predict PTSD. This would suggest that A2 fails to be predictive of PTSD because it does not fully capture an individual's level of peritraumatic arousal. However, because no longitudinal study has examined the predictive value of A2 or additional peritraumatic emotions, or the relationship of the different peritraumatic emotions to one another in terms of their predictive value, these possibilities remain empirical questions.

Hypotheses

Given previous findings suggesting that different peritraumatic emotions may cluster together (e.g., Brunet et al., 2001; Costafreda et al., 2008), it is hypothesized that the 18 peritraumatic emotions will cluster together into one distress factor. Further, this cluster of peritraumatic emotions (measured at Time 1) will be positively predictive of both PTSD diagnostic status at Time 2 and PTSD symptom severity at Time 2.

Hypothesis 1: The Peritraumatic Emotions Will Cluster Into One Distress Factor

The 18 self-reported peritraumatic emotions (see Appendix A) will cluster into one distress factor, supporting the hypothesis that it is more accurate to conceptualize the peritraumatic response as dimensional, rather than categorical. This hypothesis will be confirmed if the results of an exploratory factor analysis indicated that the best fit model is one in which each of the 18 peritraumatic emotions loads highly on a single factor.

Hypothesis 2: The Peritraumatic Emotions Will Predict PTSD

The peritraumatic distress factor, as well as the individual categorical emotions, will be positively predictive of both PTSD diagnostic status and PTSD symptom severity, supporting the hypothesis that broadening the peritraumatic response to consider emotions beyond fear, helplessness, and horror will improve the predictive ability of the construct. This hypothesis will be supported if both the distress factor and the individual peritraumatic emotions were significantly predictive of PTSD.

Methods

Participants

Participants included 234 female victims of either rape (*n* = 151) or physical assault (*n* = 83). Rape was defined as any crime involving completed vaginal, oral, or anal penetration. First-degree physical assault was defined according to Missouri statutes (i.e., where the data were collected) as an assault in which the participant experienced an injury or felt that the perpetrator was trying to kill or injure her. The

sample ranged in age from 18-57 years (*M* = 31.1, *SD* = 8.7) and was 69.4% African American, 26.2% Caucasian, 1.5% Native American, .5% Hispanic, and 2.4% Other. Most participants were single (*n* = 117; 56.8%) with annual incomes of $10,000 or less (*n* = 137; 66.8%). The majority of participants had 12 or more years of education (*n* = 155, 75.3%). Participants who were raped differed significantly from participants who were physically assaulted on three demographic variables: age (physical assault victims tended to be older), marital status (physical assault victims were more likely to be married), and income (rape victims were more likely to make < $5K/year; see Table 1).

Table 1. Demographic Characteristics[a]

Variable	*Raped Participants (n = 132)*	*Assaulted Participants (n = 74)*	*p Value*	*Cohen's d*
Age, mean (SD); in years	29.67 (8.27)	33.72 (9.00)	< .01	.46
Race/Ethnicity, No. (%)				
African American	87 (65.9)	56 (75.7)	.14	.23
Caucasian	37 (28.0)	17 (23.0)	.43	.11
Hispanic American	1 (0.8)	0 (0.0)	.46	.11
Native American	3 (2.3)	0 (0.0)	.08	.31
Other	4 (3.0)	1 (1.4)	.46	.10
Education, mean (SD); in years	12.55 (2.12)	12.51 (2.67)	.93	.01
Marital status, No. (%)	9 (6.8)	16 (21.6)	< .01	.55
Income < 5k, No. (%)	67 (50.8)	26 (35.1)	< .05	.35

[a]The sample size varies slightly across observations because of missing data.

The data from the proposed study came from a study originally conducted as part of a National Institute of Mental Health-funded research program (Dr. Patricia Resick, Principal Investigator) evaluating factors that are associated with recovery from recent assault. The original study was conducted between September 1, 1991, and August 31, 1996. To recruit participants, postcards describing the study with the researchers' phone number and detachable self-addressed stamped return postcards on which potential participants could indicate their interest in participation were sent by agency personnel to women who reported to police departments, hospitals, or victim assistance agencies that they had been the victims of rape or physical assault. Police reports were made in 94% of the cases. The total possible pool of participants is unknown because the agency personnel originally contacted potential participants through mailings, and the mailing lists were not made available to the researchers. After expressing interest in the study through a returned postcard or telephone call, potential participants were contacted by phone or mail and were screened and scheduled for the first assessment within one month of the crime.

Individuals were ineligible for participation if they were unable to come in for the initial assessment within the 4-week window subsequent to their trauma exposure. Further, to ensure informed consent and valid responses, participants who were illiterate, less than 18 years of age, appeared psychotic, or who were intoxicated at the time of assessment were also excluded. In addition, participants with a history of incest were excluded from the study. Illiteracy was determined based on the participants' ability to read and explain the consent form; if they were unable to do so, they were excluded from participating in the study. Psychosis was assessed based on the psychosis screen of the Structured Clinical Interview for *DSM-III-R* Non-Patient Version (SCID; Spitzer, Williams, Gibbon, & First, 1990), and intoxication was based on clinical judgment of the trained interviewers. Participants were also screened for the use of drugs that might

confound autonomic responses (e.g., anticholinergics, beta blockers, digitalis). In total, 11 potential participants were excluded from participating.

Procedure

Participants who completed all aspects of the study were seen for two visits, each of which had two parts conducted across two days. The first visit (Time 1) occurred within approximately the first two weeks following the crime (i.e., rape or physical assault). The second visit (Time 2) occurred approximately three months following the crime. During the first day of each visit, participants completed multiple self-report measures programmed into a laptop computer, participated in the laboratory-based portion of the study, and were interviewed to assess a variety of reactions to the crime and their trauma history. On the second day of each visit, structured diagnostic interviews were conducted. Participants were interviewed by a master's-level clinician who was experienced with working with individuals with PTSD and sexual trauma. The two sets of visits were essentially the same; the only difference was that the full Standardized Trauma Interview (Resick, 1986; Resick, Jordan, Girelli, & Hutter, 1988) was only completed at Time 1 (i.e., peritraumatic reactions were only assessed at Time 1).

Although no treatment was offered as part of the study, referral lists were distributed at each assessment session. Interviewers were trained master's-level clinicians who received ongoing supervision. Participants were compensated $50 for each assessment session.

Measures

The **Standardized Trauma Interview** (Resick, 1986; Resick, Jordan, Girelli, & Hutter, 1988) was used to assess background information, information about the crime and aftermath, and peritraumatic reactions. The structured interview obtains demographic information, information about the trauma, within-crime reactions, social

support, and treatment history. For the purposes of the current study, only the demographic information and the 18 peritraumatic emotions experienced during the traumatic event were examined. Although this measure did not assess peritraumatic horror, it did assess for a proxy for this variable (i.e., feeling shocked/surprised). In addition, the measure assessed other two emotions in A2 (i.e., feeling afraid and feeling helpless). These peritraumatic emotions, in addition to 15 additional peritraumatic experiences, were examined in the current study. For the peritraumatic experiences that were assessed, participants were asked to rate how they felt emotionally during the assault from 0 (*none of the time*) to 4 (*all of the time*; see Appendix A). Peritraumatic emotions were only assessed at Time 1. For the 18 peritraumatic variables, *n*s ranged from 217-218.

The **Clinician-Administered PTSD Scale** (CAPS; Blake et al., 1990) was used to assess the presence of current PTSD symptoms. The CAPS assesses the presence of the 17 *DSM* PTSD symptoms within the last month (APA, 1994). Items are scored on both a 0-4 frequency scale (0 = *none of the time*, 1 = *little of the time/once or twice*, 2 = *some of the time/once or twice a week*, 3 = *much of the time/several times a week*, 4 = *most of the time/daily of almost every day*), and a 0-4 intensity scale (0 = *not at all*, 1 = *a little/mild minimal distress*, 2 = *some/moderate distress*, 3 = *a lot/severe distress*, 4 = *a whole lot/extreme incapacitating distress*).

In the current study, two CAPS outcomes were examined: diagnosis and symptom severity. To receive a diagnosis of PTSD, individuals were required to meet criteria (i.e., score 1 or higher on the frequency dimension and score 2 or higher on the intensity dimension; Blake et al., 1990) for at least one reexperiencing symptom, three avoidance symptoms, and two hyperarousal symptoms (as per *DSM-IV* diagnostic criteria; APA, 1994). In addition, individuals were required to receive a symptom severity score of 45 or higher. Orr (1997) found that a CAPS severity score of 45 (i.e., the

TSEV45 rule) had the greatest concordance with physiological reactivity to a trauma narrative in adult female survivors of childhood sexual assault. Because the current study examined physiological reactivity among female assault survivors, this cutoff is ideal. This is also a common operationalization of PTSD in treatment outcome studies (e.g., Monson et al., 2006). Individual symptom scores were determined by adding the frequency and intensity values for each symptom, and then adding each of these 17 values together, providing a total PTSD score ranging from 0-136. In the current study, 115 participants had data available for determining PTSD diagnosis and symptom severity.

The CAPS consistently demonstrates sound psychometric properties (see Weathers, Keane, & Davidson, 2001, for a review). Blake et al. (1990) originally validated the CAPS in a pilot study using a sample of 25 male combat Veterans. The authors found the CAPS to display excellent interrater reliability; the reliability coefficients for frequency and intensity scores across the three symptom clusters ranged from .92 to .99. In addition, there was perfect diagnostic agreement among the raters. The internal consistency was also found to be high; alpha coefficients ranged from .73 to .85 for the three symptom clusters. Blake et al. also found the CAPS to have good convergent validity; the CAPS was strongly correlated with the Mississippi Scale (κ =.70; Keane, Caddell, & Taylor, 1988) and the PK Scale of the MMPI (κ =.84; Keane, Malloy, & Fairbank, 1984). The excellent psychometric qualities of the CAPS have been replicated in a number of other studies (e.g., Hovens et al., 1994; Neal, Busuttil, Herepath, & Strike, 1994; Radnitz et al., 1995). In the current study, the internal consistency was equally strong for both frequency (α = .89) and intensity (α = .90) scores.

Before assessing diagnostic status and symptom severity for PTSD in the current study, *DSM-III-R* PTSD Criterion D6 (physiological reactivity to trauma reminders) was

moved to the re-experiencing cluster and re-labeled PTSD Criterion B5 to be consistent with *DSM*-IV. After converting the PTSD diagnostic variables to be in line with *DSM-IV* specifications, analyses indicated that 48 participants in the current sample met criteria for PTSD at Time 2 (i.e., 42% of those assessed).

Covariates and Missing Data

Five demographic variables were included in the present study (i.e., age, race, years of education, marital status, and annual income) based on research linking each of these variables to PTSD (Brewin, Andrews, & Valentine, 2000b; Keane, Marshall, & Taft, 2006).

The effect of missing data can significantly influence results if the data are missing systematically. To examine this possibility, each of the outcome variables was converted into a dichotomous variable (i.e., missing, not missing), and the two groups were compared in terms of the background variables (i.e., age, race, years of education, marital status, and annual income) and type of assault (i.e. sexual, physical). Results indicated that for many of the outcome variables, individuals with and without missing data differed on several of the background variables (the most common were age and income) and type of assault. These differences reinforced the importance of including the background variables, as well as type of assault, as covariates in all subsequent analyses.

Baseline PTSD variables (i.e., diagnosis and severity) were not included as covariates. This decision was made in order to allow for comparisons between the analyses, regardless of the outcome variable. Therefore, each analysis, regardless of the outcome variable, included six covariates: age, race, years of education, marital status, annual income and type of assault (i.e., sexual versus physical). The continuous covariates (i.e., age and years of education) were centered to reduce multicollinearity.

Results

Hypothesis 1: The Peritraumatic Emotions Will Cluster Into One Distress Factor

To examine whether the peritraumatic emotions clustered into one factor, the peritraumatic variables were subjected to an Exploratory Factor Analysis (EFA) using SPSS Statistics 17.0 software. Factor analysis was performed using the maximum likelihood method, with raw scores and a varimax rotation, chosen to maximize the variance of factor loadings (e.g., Dien, 2010). Although a one-factor model was predicted, four separate models were run (i.e., one-, two-, three-, and four-factor solutions). The decision to run multiple models was done to ensure that the best possible model fit for the data was chosen, and because prior research has suggested that other peritraumatic experiences (e.g., behaviors) may cluster into more than one factor (e.g., Rizvi, Kaysen, Gutner, Griffin, & Resick, 2008). Therefore, it was important to examine whether this would be the case for the current analysis as well. Power for these analyses was adequate; an EFA typically requires a sample size of 200 (Tabachnick & Fidell, 2001) and the current analysis was completed on a sample of 217 participants. Prior to beginning analyses, each of the 18 peritraumatic variables (measured at Time 1) was centered to reduce multicollinearity.

Following varimax rotation, the initial eigenvalues indicated that the first factor explained 33.25% of the variance (eigenvalue = 5.98), the second factor explained 8.86% of the variance (eigenvalue = 1.59), the third factor explained 7.15% of the variance (eigenvalue = 1.29), and the fourth factor explained 5.86% of the variance (eigenvalue = 1.10). Contrary to expectations, the three-factor solution, which explained a total of 49.25% of the variance, was preferred because of the "leveling off" of eigenvalues on the scree plot after three factors and the insufficient number of primary loadings on the fourth factor (i.e., only one item loaded on the fourth factor in the four factor model). Further, in this model, the variables that loaded on each factor shared conceptual meaning (see Table 2).

Table 2. Descriptives and Results of an Exploratory Factor Analysis of Peritraumatic Responses

	M	*SD*	Factor 1	Factor 2	Factor 3	Alpha if item deleted
Cronbach's alpha			.86	.61	.61	
% of variance explained			33.25	8.86	7.15	
Eigenvalues			5.98	1.59	1.29	
Angry	2.93	1.53	**.538**	.115	.049	.850
Betrayed	2.71	1.61	**.601**	.153	.200	.835
Disgusted/repulsed	3.12	1.32	**.510**	.198	.271	.843
Embarrassed	1.96	1.71	**.606**	.106	.404	.835
Hurt	3.10	1.35	**.732**	.309	.104	.824
Sad	2.66	1.59	**.635**	.291	.164	.831
Humiliated	2.81	1.57	**.676**	.214	.331	.824
Calm	.58	1.11	-.153	**-.357**	.002	.763
Afraid	3.35	1.18	.041	**.792**	.183	.503
Worried	3.25	1.18	.256	**.595**	.176	.471
Helpless	3.17	1.26	.276	**.421**	.317	.520
Anxious	2.60	1.56	.231	**.357**	.263	.545
Terrified	3.07	1,35	.186	**.635**	.267	.463
Detached as if in a dream	1.70	1.59	-.007	.125	**.550**	.526
Confused/disoriented	2.04	1.53	.287	.142	**.401**	.542
Guilty	1.17	1.51	.329	.103	**.543**	.504
Numb	1.59	1.49	.205	.180	**.430**	.551
Shocked/surprised	3.31	1.10	.163	.162	**.196**	.615

Next, the three factors of the model were described and subjected to reliability analyses. A variable was said to load on a particular factor when its primary loading was .4 or greater (Costello & Osborne, 2005). Cross-loadings were defined as variables that loaded at .32 or greater on more than one factor (Tabachnick & Fidell, 2001). The first factor in this model included seven peritraumatic variables (i.e., angry, betrayed, disgust, embarrassed, hurt, sad, and humiliated). This factor was named the "negative affect factor" (α = .86). Item-total statistics revealed that removing each of the items decreased the total Cronbach's alpha. Only one of the variables (i.e., humiliated) cross-loaded on another factor; it loaded .68 on the negative affect factor and .33 on the dissociative factor. Because the primary loading of this variable was notably larger than its loading on either of the other factors, the decision was made to include it in the negative affect factor. Therefore, all seven variables were retained in this factor.

The second factor included six peritraumatic variables (i.e., calm, afraid, worried, helpless, anxious, and terrified). This factor was named the "fear factor" (α = .61). Item-total statistics revealed that the removal of “calm” resulted in an increase in Cronbach's α (from .61 to .76). Therefore, calm was omitted from all subsequent analyses. There were no cross-loadings for any of the variables included in this factor.

The third factor included five peritraumatic variables (i.e., detached as if in a dream, confused, guilt, numb, and shocked). This factor was named the "dissociative factor" (α = .61). Omitting “shocked” increased Cronbach's α to .62. Further, shocked did not load highly on any of the three factors (all loadings < .20). These findings suggest, from a purely statistical perspective, that shocked should be dropped from all subsequent analyses. However, shocked has important theoretical relevance for the current study; it was a proxy for the PTSD Criterion A2 peritraumatic emotion "horror." Therefore, additional analyses using the dissociative factor were examined both with and without this variable, to allow for the examination of both the effect of this important

theoretical variable as well as the most statistically sound version of the factor. There was one cross-loading variable in this factor (i.e., guilty); it loaded .54 on the dissociative factor and .33 on the negative affect factor. However, similar to humiliated, the primary loading of this variable was notably larger than its loading on the other factor; therefore, the decision was made to retain it in the dissociative factor. The frequency of endorsement of each of the categorical emotions included in the three factors was examined for descriptive purposes (see Table 3).

The original hypothesis regarding a single distress/arousal factor had suggested that the hypothesis would be confirmed if the peritraumatic emotions clustered into a single factor in the EFA. This prediction was not borne out. However, to fully test the dimensional hypothesis (Hypothesis #1), as well as to test the prediction that both the dimensional and categorical models would predict PTSD (Hypothesis #2), the decision was made to construct three dimensional scales based on the results of the EFA, and compare these to the individual categorical emotions in predicting the two PTSD definitions collected at Time 2 (i.e., diagnostic and symptom severity). The three scales were constructed by adding the values of each of the peritraumatic emotions contained within each factor (i.e., negative affect factor, fear factor, and dissociative factor). Results indicated that these three scales were moderately correlated (see Table 4).

Table 3. Frequency of Endorsement of the Categorical Peritraumatic Emotions

	% experiencing at least "a little bit"[1]	% experiencing "most of the time" or "all of the time"[2]
Negative Affect Factor		
Angry	83.5	73.0
Betrayed	79.4	66.5
Disgusted/repulsed	89.4	76.2
Embarrassed	65.1	44.9
Hurt	88.9	78.4
Sad	79.4	66.1
Humiliated	81.7	67.4
Fear Factor		
Afraid	93.1	84.4
Worried	93.6	80.2
Helpless	91.7	77.1
Anxious	81.7	62.4
Terrified	91.3	72.5
Dissociative Factor		
Detached as if in a dream	62.8	34.9
Confused/disoriented	75.2	46.4
Guilty	45.9	23.8
Numb	63.3	31.2
Shocked/surprised	96.8	79.3

Note. [1] % of sample that endorsed 1 or greater on the Standardized Trauma Interview
[2] % of sample that endorsed 4 or 5 on the Standardized Trauma Interview

Table 4. Correlations Between the Three Dimensional Peritraumatic Emotion Scales

Scale	*Negative Affect Scale*	*Fear Scale*	*Dissociative Scale*
Negative Affect Scale	—	—	—
Fear Scale	.53**	—	—
Dissociative Scale	.54**	.49**	—

***p* < .001.

Hypothesis 2: The Peritraumatic Emotions Will Predict PTSD

To test the prediction that both the dimensional and categorical models would predict PTSD diagnosis and PTSD symptom severity, SPSS software was used. The six Time 1 covariates (age, level of education, income level, minority status, marital status and rape versus physical assault) were entered in the first step for all analyses. To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, pseudo-R^2 (for PTSD diagnostic status) and R^2 (for PTSD symptom severity) were examined. SPSS calculates both a Cox and Snell and a Nagelkerke pseudo-R^2. The current study examined the Nagelkerke pseudo-R^2, which adjusts the Cox and Snell pseudo-R^2 so that the range of possible values extends to 1 (and is therefore closer to the Ordinary Least Squares (OLS) R^2). This value provides useful information for the purposes of the current study because it is a measure of the improvement from the null model to the fitted model. Further, because these pseudo-R^2 values have meaning when they are compared to another pseudo-R^2 value of the same type, on the same data, predicting the same outcome, in the current set of analyses, the Nagelkerke pseudo-R^2 values can be compared to each other to determine which model best predicts the outcome. Effect sizes for R^2 were conceptualized according to Cohen (1962)'s conventions (i.e., .2 is a

small effect, .5 is a medium effect, and .8 is a large effect), and effect sizes for pseudo-R^2 were conceptualized according to Kirk (1996)'s conventions (i.e., .01 is a small effect; .06 is a medium effect; and .14 is a large effect).

PTSD diagnostic status. The categorical emotions were examined individually within each of the three factors. G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (power ranged from 69-76%). Analyses considering the negative affect peritraumatic variables (i.e., angry, betrayed, disgust, embarrassed, hurt, sad, and humiliated) indicated that none of the variables predicted PTSD diagnostic status (Nagelkerke pseudo-R^2 = .11; all βs < .10; p > .10; n = 108). Among the fearful peritraumatic variables (i.e., afraid, worried, helpless, anxious, and terrified), anxious was the only variable that predicted PTSD (the association was in a positive direction; Nagelkerke pseudo-R^2 = .16; n = 109; see Table 5). Among the dissociative peritraumatic variables (i.e., detached as if in a dream, confused, guilt, numb, and shocked), none of the variables predicted PTSD diagnosis (Nagelkerke pseudo-R^2 = .12; all βs < .23; p > .10; n = 109).[1]

Table 5. Logistic Regression of Posttraumatic Stress Disorder (PTSD; Diagnostic Status) on Fearful Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-.18	.56	.83
Age	-.02	.03	.98
Education	< -.01	.10	1.00
Minority Status	-.33	.53	.72
Income	-.20	.54	.82
Marital Status	-.42	.53	.66
Afraid	.25	.27	1.29
Worried	-.08	.25	.93
Helpless	.10	.23	1.11
Anxious	**.48**	**.20**	**1.61***
Terrified	-.30	.23	.74

Note. Δ Nagelkerke pseudo-R^2 = .11; Nagelkerke pseudo-R^2 = .16; OR = odds ratios.
*p < .05.

Next, the three dimensional scales were examined in three separate regression analyses. G*Power 3 (Faul et al., 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (84% power). Results indicated that none of the scales significantly predicted PTSD diagnosis (all βs < .10; *ps* > .08). In addition, a limited amount of variance in PTSD was explained by the negative affect scale (Nagelkerke pseudo-R^2 = .07; n = 108), the fear scale (Nagelkerke pseudo-R^2 = .09; n = 109), and the dissociative scale (Nagelkerke pseudo-R^2 = .08; n = 109).

In comparing these two sets of analyses, it appears that all of the analyses which included the categorical emotions explained more variance in PTSD than did the dimensional scales. In addition, whereas none of the dimensional scales was predictive

of PTSD diagnostic status, one of the categorical variables (i.e., anxious) was significantly predictive of the outcome variable.

PTSD symptom severity. For the following hierarchical logistic regression analyses, Time 2 PTSD symptom severity served as the outcome variable.

The categorical emotions were examined individually within each of the three factors. G*Power 3 (Faul et al., 2007) indicated that, for the negative affect factor, the power to detect a large effect was excellent (i.e., 99% power); however, it was only adequate to detect a medium effect (i.e., 73% power). Results of this analysis indicated that none of the variables predicted PTSD symptom severity (R^2 = .13; all βs < 4.24; p > .10; n = 106). For the fearful peritraumatic variables, G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power); however, it was not quite adequate to detect a medium effect (i.e., 68% power). Results indicated that none of the variables predicted PTSD symptom severity (R^2 = .11; all βs < 4.20; p > .10; n = 107). For the dissociative peritraumatic variables, G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power); however, it was only adequate to detect a medium effect (i.e., 73% power). Results indicated that none of the variables predicted PTSD symptom severity (R^2 = .18; all βs < 3.83; p > .05; n = 107).[1]

Next, the three dimensional scales were examined in three separate regression analyses. G*Power 3 (Faul et al., 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (83% power). Results indicated that neither the negative affect scale (n = 107) nor the fear scale (n = 108) significantly predicted PTSD symptom severity (both βs < .97; ps > .09). In addition, a limited amount of variance in PTSD symptom severity was explained by the negative affect scale (R^2 = .09) and the fear scale (R^2 = .09). In contrast, the dissociative scale was significantly positively associated with PTSD symptom severity,

and the model explained more variance in the outcome variable than either of the other two models (*n* = 108; see Table 6).

Table 6. Hierarchical Multiple Regression of Posttraumatic Stress Disorder (PTSD) Symptom Severity on the Dissociative Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-2.67	6.32	.07
Age	.23	.38	1.26
Education	.53	1.32	1.70
Minority Status	-3.02	6.54	.05
Income	2.14	6.57	8.50
Marital Status	-11.73	6.79	$< 10^{-23}$
Dissociative Scale	**1.87**	**.63**	**6.49***

Note. $\Delta R^2 = .08$; $R^2 = .14$; OR = odds ratios.
*$p < .05$.

In comparing these two sets of analyses, it appears that all of the analyses which included the categorical emotions explained more variance in PTSD symptom severity than did the dimensional scales. However, whereas none of the individual categorical emotions was significantly predictive of the outcome variable, the dissociative scale did significantly predict PTSD symptom severity.

Discussion

The results suggest that, whereas the categorical models explained more variance in both definitions of PTSD than did the dimensional models, the two models differed in their predictive ability. Specifically, whereas one of the categorical variables was predictive of PTSD diagnostic status (i.e., anxiety), none of the dimensional models were predictive of this outcome. In contrast, whereas none of the categorical variables

were predictive of PTSD symptom severity, one of the dimensional models was predictive of this outcome (i.e., dissociative scale).

Three distinct peritraumatic factors were identified in the EFA: a negative affect factor, a fear factor, and a dissociative factor. The A2 emotions were divided between two factors: the fear factor (which included afraid and helpless) and the dissociative factor (which included shocked, the study's analogue to horror). This finding, and those of the subsequent analyses that examined the predictive ability of each of the factors, contrast with the *DSM-IV*'s definition of the peritraumatic experience (i.e., A2). Criterion A2 would suggest that fear, helplessness, and horror would factor together (which the current study found that they do not) and that they would be the most predictive of PTSD (the current study found that none of them are predictive of PTSD).

These findings are, however, somewhat in line with the findings of Kilpatrick et al. (1998). In the *DSM-IV* field trial, Kilpatrick et al. identified five factors: panic/physiological arousal, cognitive/fear, interpersonal, dysphoria, and numbing/unreality. The negative affect factor in the current study (i.e., angry, betrayed, disgusted, embarrassed, hurt, sad, and humiliated) included all of the reactions listed in Kilpatrick et al.'s dysphoria factor (i.e., anger, disgust, and sadness). However, the negative affect factor also included reactions from Kilpatrick et al.'s interpersonal factor (i.e., embarrassment and violated trust; in the negative affect factor, these are "embarrassed" and "betrayed"). The other two reactions in the negative affect factor (i.e., hurt and humiliated) were not assessed in the field trial.

The fear factor in the current study (i.e., afraid, worried, helpless, anxious, and terrified) demonstrated some overlap with Kilpatrick et al.'s cognitive/fear factor (i.e., both include fear and helplessness). However, whereas Kilpatrick et al.'s cognitive/fear factor includes confusion and surprise, in the current study, these reactions were included in the dissociative factor. Further, Kilpatrick et al. did not assess for several of

the reactions that factored into the fear factor of the current study (i.e., worried, anxious, and terrified). The dissociative factor in the current study overlaps somewhat with Kilpatrick et al.'s numbing/unreality factor (i.e., both include detached as if in a dream and emotional numbing). However, the dissociative factor also includes reactions that factored into Kilpatrick et al.'s interpersonal factor (i.e., guilt) and their cognitive/fear factor (i.e., confusion and surprise). None of the reactions in the current study overlapped with Kilpatrick et al.'s panic/physiological arousal factor; this factor was made up of physical reactions (e.g., dizziness, chest pain) that the current study did not assess.

It is possible that the differences found between the findings of the current study and those of Kilpatrick et al. (1998) are merely a product of the differing samples. The Kilpatrick et al. study did not capture peritraumatic reactions soon after the traumatic event. The sample consisted of treatment seekers who may have been many years post-trauma. Kilpatrick et al.'s largely Caucasian (83%) sample consisted of both men and women (67% female) with a range of traumatic events, whereas the current study was largely African American (69%) and consisted of only recent female victims of interpersonal violence. The differing samples employed may suggest that the results of the current study are a more accurate depiction of this specific sample; they may not generalize to samples consisting of both genders, different types of trauma, or varying ethnicities. However, they could also be more accurate due to the proximity in time with the crime and the lower risk of memory distortion.

Another possible explanation for the differences between the two sets of findings is that, although the peritraumatic responses indexed in the two studies overlapped, they were not identical. Specifically, the current study assessed for peritraumatic responses that captured the degree of fear the participants experienced (i.e., afraid, worried, anxious, and terrified); Kilpatrick et al. instead assessed for different fear content (i.e.,

scared, fear of going crazy or losing control of emotions, and fear of death or serious injury). As mentioned previously, the current study also assessed for two other peritraumatic responses that Kilpatrick et al. did not examine (i.e., hurt and humiliated), and Kilpatrick et al. asked participants about 13 peritraumatic responses that the current study did not assess (nine of which related to physiological activity). If both studies had assessed for identical responses, it is possible that more overlap would be displayed. Even with these study differences, the notable overlap between the findings suggests that, contrary to expectations, peritraumatic responses may cluster into several distinct factors regardless of the sample employed, be it Caucasian men and women assessed for a range of traumatic events or African American females who are recent victims of interpersonal violence.

Neither the categorical negative affect factor (i.e., angry, betrayed, disgusted, embarrassed, hurt, sad, and humiliated) nor the negative affect scale, was predictive of PTSD. This finding was unexpected. Although past studies have indicated that some of these peritraumatic emotions may be correlated with PTSD (e.g., anger, Brewin et al., 2000a; Feeny, Zoellner, & Foa, 2000; Kilpatrick et al., 1998; sadness, Kilpatrick et al., 1998; disgust, Foy, Sipprelle, Rueger, & Carroll, 1984; Kilpatrick et al., 1998), this is the first study to examine whether these emotions are in fact predictive of later PTSD (i.e., to examine the effects of a range of peritraumatic emotions longitudinally).

Similar to other studies (e.g., Adler et al., 2008; Andrews, Brewin, Rose, & Kirk, 2000; Brunet et al., 2001; Reynolds & Brewin, 1999; Resick, 2004; Riggs, Dancu, Gershuny, Greenberg, & Foa, 1992; Sims & Sims, 1998), the negative affect emotions were found to be commonly experienced peritraumatically by 65% (embarrassed) to 89% (hurt) of the sample (see Table 3). Further, a large percentage of participants in the current study endorsed experiencing these emotions most or all of the time during the trauma; percentages ranged from 45% (percent of participants who indicated they felt

embarrassed during most or all of the trauma) to 78% (percent of participants who indicated they felt hurt during most or all of the trauma; see Table 3).

These findings may lend further support to the fact that the most commonly experienced peritraumatic emotions are not necessarily predictive of PTSD. However, it is worth noting that most studies that have examined the peritraumatic response have not controlled for demographic variables (e.g., Bedard-Gilligan & Zoellner, 2008; Kilpatrick et al., 1998; Schnurr et al., 2002). It is unclear whether additional peritraumatic responses would have been predictive of the outcome variable if these covariates were not included in the current study.

The fear factor of peritraumatic emotions (i.e., afraid, worried, helpless, anxious, and terrified) contained only one categorical emotion (anxiety) that predicted PTSD; this was also contrary to predictions. However, this finding is somewhat in line with the current conceptualization of the disorder. Many well-respected theories of PTSD conceptualize PTSD as an anxiety disorder, and argue that fear is the core emotion that drives the development and maintenance of PTSD symptoms (e.g., conditioning theories, emotional processing theory; Cahill & Foa, 2007). It is notable, however, that these theories are not completely supported by the current study, based on the fact that none of the other fear emotions predicted PTSD symptoms.

Subsequent analyses revealed that the fear factor emotions were the most commonly endorsed (at least 82% of the sample endorsed experiencing at least one of these emotions during the trauma; see Table 3). Further, a large percentage of participants in the current study endorsed experiencing these emotions most or all of the time during the trauma; percentages ranged from 62% (percent of participants who indicated they felt anxious during most or all of the trauma) to 84% (percent of participants who indicated they felt afraid during most or all of the trauma; see Table 3). Interestingly, peritraumatic anxiety was experienced by the smallest percentage of

participants compared with the other emotions in this factor. In contrast, afraid and helplessness were very common reactions during the traumatic event (93% and 92% of participants indicated that they experienced fear or helplessness, respectively, during the trauma; see Table 3).

In addition to providing support for the idea that peritraumatic emotions commonly experienced during a traumatic event do not necessarily predict PTSD, this finding also suggests a potential reason for why the A2 emotions are not predictive of PTSD. Speculatively, it is possible that these results are suggestive of a ceiling effect; peritraumatic emotions that are experienced most commonly may not be predictive of PTSD because they cannot effectively discriminate different groups (i.e., almost everyone experiences these emotions). Instead, emotions that are endorsed relatively less frequently may be able to discriminate between those who will and will not develop PTSD because they are endorsed by a smaller number of individuals. Alternatively, it is possible that the less commonly endorsed emotions are the key to predicting who will subsequently develop PTSD because they only occur when the reaction to the traumatic event is most extreme. Future research is needed to examine both of these possibilities.

The dissociative factor of peritraumatic emotions (i.e., detached as if in a dream, confused, guilty, numb, and shocked) did not contain any categorical emotions that were predictive of PTSD status. Again, this was contrary to expectations. Although shocked (i.e., horror) did not predict the subsequent development of PTSD, it was the most commonly endorsed peritraumatic response; nearly 97% of the sample reported feeling shocked at some point during the trauma (see Table 3). This is inconsistent with past research, which has suggested that horror was the least commonly endorsed A2 emotion (e.g., Reynolds & Brewin, 1999). It is possible that this is a product of the phrasing, sample and/or methodology; whereas Reynolds and Brewin examined intrusive memories among a mixed gender sample, the current study assessed

peritraumatic responses among female crime victims. Therefore, it is possible that intrusive memories are not equivalent to the peritraumatic experience. It is also possible that women are more likely to experience horror, particularly in response to interpersonal crime. Shocked may be a more common way of describing the emotion of horror or may have its own meaning (i.e., extremely surprised, stunned). However, the veracity of these suggestions awaits empirical study.

Contrary to expectations, the exploratory factor analysis conducted in the current study did not yield one distress factor; as discussed, three distinct factors were identified, each of which behaved differently in predicting the outcome variables. However, when an additional test of this hypothesis was examined (i.e., each factor defined by the EFA was considered as a separate dimensional scale), a somewhat different picture emerged. Whereas one of the categorical emotions in the fear factor was predictive of PTSD diagnostic status (i.e., anxiety), none of the three dimensional scales was predictive of this outcome variable. Further, the odds ratios for all three scales (all ORs < 1.10) were smaller than for anxiety (1.61; see Table 5). In contrast, whereas none of the categorical emotions was predictive of PTSD symptom severity, the dissociative scale was, with a large odds ratio according to Cohen (1962; 1.5 = “small;” 2.5 = “medium;” 4.3 = “large;” see Table 6). This is consistent with the large body of literature that has identified an association between peritraumatic dissociation and PTSD (e.g., Bremner & Brett, 1997; Ehlers, Mayou, & Bryant, 1998; Gershuny & Thayer, 1999; Marmar et al., 1999; O’Toole, Marshall, Schurek, & Dobson, 1999; Ozer et al., 2003; Resick, Churchill, & Falsetti, 1990; Rizvi et al., 2008; Shalev, Peri, Canetti, & Schreiber, 1996; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996).

The results of these findings suggest that, whereas the categorical emotions may be better at predicting diagnostic status, the dimensional scales more accurately predict PTSD symptom severity. These findings suggest that both the categorical and

dimensional models provide important, albeit somewhat different, information regarding the subsequent development of PTSD.

The finding that the three different peritraumatic models (i.e., negative affect, fear, and dissociative) differentially predicted PTSD may also have implications regarding peritraumatic brain activation. Specifically, it may suggest that peritraumatic emotions, in contrast to other types of emotions, are associated with different patterns of brain activation. Specifically, research has shown that hyperactivity in the amygdala (Haas & Canli, 2008), in combination with deficits in the hippocampus (Bremner et al., 1995) and mPFC (van der Kolk, 2001), is implicated in PTSD. The brain regions associated with the development of PTSD have been linked to the experience of fear (e.g., Büchel,Morris, Dolan, & Friston, 1998; LaBar, Gatenby, Gore, LeDoux,& Phelps, 1998; LeDoux, 1996; Shin et al., 2005), as well as in response to anger-related, sadness-related, and disgust-related stimuli (e.g., Costafreda et al., 2008; Kédia, Berthoz, Wessa, Hilton, & Martinot, 2008; Schienle et al., 2005; Wang, McCarthy, Song, & LaBar, 2005). However, it is possible that different peritraumatic emotions affect the brain differently; whereas some peritraumatic emotions may cause the dysregulation of these three brain substrates, others may not. Future research is needed to explore this question.

Overall, the findings of this study suggest that the peritraumatic emotional experience does not explain a significant amount of variance in PTSD. It is notable that examining additional peritraumatic emotions beyond A2 did identify one emotion that was predictive of disorder, and that conceptualizing the emotional experience from a dimensional perspective aided in the prediction of PTSD symptom severity. However, from a diagnostic perspective, these results suggest that the peritraumatic emotional experience does not substantially aid in predicting PTSD, a finding highlighted by the small effect of the only significant peritraumatic emotion. At this time, the evidence does

not provide a strong case for including the peritraumatic experience as a component of the PTSD diagnosis. Of note, recent theorizing has suggested that it is not just the affective response, but the combination of affective, cognitive, and behavioral peritraumatic responses which define an event as traumatic and are associated with the subsequent development of PTSD (Bovin & Marx, 2011). Future research is needed to explore whether examining additional elements of the peritraumatic response provide larger significant effects in predicting PTSD.

CHAPTER 3. PREDICTING PTSD VERSUS OTHER PSYCHIATRIC DISORDERS

Introduction

The investigations described in Chapter 2 focused on examining criticisms that Criterion A2 is unable to predict PTSD. However, PTSD Criterion A2 also has been criticized for being unable to distinguish between PTSD and other psychiatric disorders, and the limited research that has examined this question appears to be consistent with this claim (e.g., Creamer et al., 2005; Punamäki, Komproe, Qouta, Elmasri, and de Jong, 2005; Reynolds & Brewin, 1999). For example, in a study examining intrusive memories among individuals diagnosed with Major Depressive Disorder (MDD) alone or PTSD with or without MDD, results indicated that, although PTSD sufferers reported helplessness as a result of their intrusive memories more frequently than individuals diagnosed with only depression, reports of fear were equally common among the two groups. Horror rarely was reported by either group (Reynolds & Brewin, 1999). Although Reynolds and Brewin argued that their findings regarding the emotions accompanying intrusive memories broadly supported the *DSM-IV* proposal that the events associated with PTSD arouse fear, helplessness or horror, it is unclear whether emotions accompanying intrusive memories are actually indicative of the peritraumatic experience.

Other research has added credence to the claim that the peritraumatic experience may not distinguish between PTSD and depression. For example, in a study that investigated the effects of trauma in 585 Palestinian men and women, Punamäki et al. (2005) found that peritraumatic dissociation was associated with both PTSD and depressive symptom severity. Further, in a cross-sectional design which used both data from Time 1 of this study as well as data from an additional sample, Rizvi et al. (2008) found that peritraumatic behavioral responses (i.e., both active and passive) were associated with both PTSD and depression severity.

Although Rizvi et al. (2008)'s examination of the behavioral peritraumatic responses supported the idea that the peritraumatic experience cannot distinguish between PTSD and MDD, a different picture emerged when Rizvi et al. examined the peritraumatic emotional experience. Specifically, Rizvi et al. found that peritraumatic negative affect (e.g., peritraumatic anger, guilt, surprise) was associated with depression severity (β = .27) but only approached significance in its association with PTSD severity (β = .15), despite both analyses being adequately powered to detect a medium effect (i.e., power to detect a medium effect was more than 99% for both sets of analyses according to Cohen, 1962). Fear was not significantly associated with the severity of either disorder. However, it is worth noting that Rizvi et al. examined PTSD symptoms within one month of the crime (i.e., individuals could not yet be diagnosed with PTSD). Further, the authors used a self-report measure (i.e., the Beck Depression Inventory; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), rather than a diagnostic interview to assess for depressive symptoms. Therefore, it is unclear from this study whether the peritraumatic emotions can discriminate between the full diagnoses of PTSD and MDD.

It is possible that A2 specifically has been unable to discriminate between PTSD and other psychiatric disorders (e.g., MDD) due to symptom overlap. In 2008, Miller, Fogler, Wolf, Kaloupek, and Keane examined the latent structure of psychiatric disorders that are often comorbid with PTSD (e.g., MDD, substance use disorders) in a sample with a high prevalence of PTSD. The authors found that the best fit model was a 3-factor solution with two correlated internalizing factors (i.e., anxious-misery and fear) and one externalizing factor. Notably, PTSD, along with MDD, only loaded significantly on the anxious-misery factor (a factor associated with anhedonia, worry, and rumination). Alcohol and drug use disorders cross-loaded significantly both on the externalizing factor (with antisocial personality disorder) and on the anxious-misery factor. However, the alcohol and drug use disorders loaded more highly on the externalizing factor (*r*s = .673

and .536, respectively) than they did on the anxious-misery factor (*r*s = .366 and .264, respectively). Miller et al.'s findings suggested that, although peritraumatic experiences may be unable to differentiate between PTSD and comorbid disorders that are very similar to PTSD (i.e., other disorders associated with anhedonia, worry, and rumination; e.g., MDD), they may be able to differentiate between PTSD and comorbid disorders that are less similar to PTSD (i.e., the externalizing disorders, e.g., substance disorders).

Although the majority of studies that have examined the ability of peritraumatic experiences to differentiate between PTSD and other psychiatric disorders have focused on disorders that are diagnostically similar to PTSD (e.g., MDD; Reynolds & Brewin, 1999; Rizvi et al., 2008), one notable exception is a study conducted by Creamer et al. (2005). These authors examined the rates of A2 among a number of affective disorders, anxiety disorders, and substance use disorders. However, these authors did not directly compare the predictive ability of A2 for substance use disorders versus PTSD. In fact, Creamer et al. (2005) removed the 158 individuals who met criteria for PTSD in the previous 12 months from the analyses before examining rates of A2 endorsement among the other disorders. Further, individuals who met criteria for alcohol and drug use disorders were often comorbid for other forms of psychopathology which are more diagnostically similar to PTSD (e.g., affective disorders). Therefore, it remains unclear if A2 would be able to discriminate between PTSD and other, less overlapping disorders.

The possibility that Criterion A2 may be able to distinguish PTSD from disorders that display less symptomatic overlap is in line with current theorizing that whereas PTSD and MDD may share a common underlying vulnerability (Breslau, Davis, Peterson, & Schultz, 2000), disorders such as alcohol and substance dependence may result from the experience of PTSD symptoms, rather than the experience of the trauma itself. Specifically, PTSD and substance disorders may be related because individuals with PTSD use substances in an effort to reduce or control distress-related symptoms

(i.e., the self-medication hypothesis; Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Therefore, we would expect the peritraumatic experience to predict the more proximal disorders (e.g., PTSD, MDD), but be less successful at predicting disorders that occur more distally (e.g., alcohol and substance dependence).

To date, no study has explicitly compared the predictive ability of A2 for diagnostically similar disorders with that of dissimilar disorders. The literature is also limited because studies to date have mostly focused on the conventional definition of A2, and have not included additional peritraumatic reactions; it is therefore unclear if peritraumatic experiences other than those that currently constitute A2 might be better able to distinguish between PTSD and other comorbid disorders. Although examining a number of peritraumatic experiences (in addition those already included in A2) in terms of their ability to longitudinally predict different forms of psychopathology may still not be able to discriminate between PTSD and diagnostically similar disorders (e.g., MDD), this method may be able to differentiate between the development of PTSD and less overlapping disorders (e.g., alcohol and substance use disorders).

Hypotheses

Previous research suggests that, whereas peritraumatic emotions may not be able to discriminate between PTSD and other disorders with significant symptom overlap (e.g., MDD), they may be able to distinguish between PTSD and disorders with less symptom overlap (e.g., substance dependence disorders; Miller et al., 2008). Based on these findings, it is predicted that the individual peritraumatic categorical emotions, as well as the three peritraumatic scales, measured at Time 1, will be unable to discriminate between PTSD and MDD, but will be able to differentially predict PTSD and substance dependence.

Hypothesis 1: The Peritraumatic Emotions Will Be Unable To Discriminate Between PTSD and MDD

The individual categorical peritraumatic emotions, as well as the three peritraumatic scales, will be unable to discriminate between Time 2 PTSD and Time 2 MDD. This hypothesis will be supported if the peritraumatic emotions explained the same amount of variance in the two disorders, and if the same peritraumatic emotions significantly predict each disorder.

Hypothesis 2: The Peritraumatic Emotions Will Discriminate Between PTSD and Alcohol/Substance Dependence

The individual categorical peritraumatic emotions, as well as the three peritraumatic scales, will discriminate between Time 2 PTSD and Time 2 substance dependence disorder. This hypothesis will be supported if the peritraumatic emotions explain different amounts of variance in the two disorders, and if different peritraumatic emotions significantly predict each disorder.

Methods

Participants

The participants examined in this investigation were identical to those described in Chapter 2 (see Table 1 for demographic characteristics).

Procedure

The procedure used in this investigation was identical to that described in Chapter 2.

Measures

Similar to the measures described in Chapter 2, in the current investigation, the Standardized Trauma Interview (Resick, 1986; Resick, Jordan, Girelli, & Hutter, 1988) was used to assess participants' peritraumatic experiences. Further, the CAPS (Blake et al., 1990) was used to assess PTSD diagnostic status. Because this study was interested in examining the difference in the ability of the peritraumatic emotions to predict the diagnostic status of several different forms of psychopathology (i.e., PTSD,

MDD, alcohol/substance dependence disorder), PTSD symptom severity was not examined in the current study.

The current investigation also used data from one additional interview measure. Specifically, the **Structured Clinical Interview for DSM-III-R-patient version** (SCID; Spitzer, Williams, Gibbon, & First, 1988) was used to identify individuals who met criteria for MDD and substance dependence disorder. The SCID is a diagnostic interview developed based on criteria from the *DSM-III-R*. At the time when the data for this study was collected, the SCID for *DSM-III-R* was the most recent version of the SCID. The SCID has been widely used to determine diagnostic status. Each Axis I disorder is coded as present, not present, or probable, based on structured questions that map onto the *DSM-III-R* criteria. In the current study, 114 participants had data available for determining a diagnosis of MDD, and 101 participants had data available for determining a diagnosis of substance dependence disorder.

The SCID has shown good interrater reliability, particularly for MDD and substance dependence. For instance, in a study examining the interrater reliability for the SCID, Skre, Onstad, Torgersen, and Kringlen (1991) examined 54 audiotaped SCID interviews conducted on an adult Norwegian sample. The authors found that interrater reliability was high for MDD ($\kappa = .93$) and psychoactive substance use disorder ($\kappa = .93$). Other studies have found good interrater reliability (although the kappas do not tend to be as high as those found by Skre et al.). For instance, using videotaped interviews conducted with 75 psychiatric outpatients, Riskind, Beck, Berchick, Brown, and Steer (1987) examined SCID interrater reliability for MDD and found it had good reliability ($\kappa = .72$); the authors did not examine substance dependence. Further, the SCID was found to have good convergent validity; in a study that examined 370 participants (308 psychiatric patients and 62 community controls), the SCID demonstrated satisfactory levels of agreement with the Mini International Neuropsychiatric Interview clinician-rated

version (MINI-CR) for MDD (κ = .84; Sheehan et al., 1997). In addition, in a study that examined 554 university students, the SCID exhibited high levels of agreement with the Substance Dependence Screening Questionnaire (SDSQ; κ = .90; Vázquez, Blanco, & López, 2007). In the current study, the internal consistency was equally strong for both MDD (α = .92) and substance dependence disorder (α = .92).

In order to be consistent with current diagnostic practices (i.e., *DSM-IV* classification), both MDD and psychoactive substance dependence were examined for possible transformation from the *DSM-III-R* system, the classification scheme that was current when the data were collected. For MDD, *DSM-III-R* required that, to meet criteria for the diagnosis, individuals could not have experienced a manic or hypomanic episode (APA, 1987). The *DSM-IV* added to this requirement somewhat, specifying that an individual has not experienced a manic, hypomanic, or mixed episode in order to meet criteria for the disorder (APA, 1994). However, because the *DSM-IV* criteria for a mixed episode requires that the individual meets criteria for both a manic episode and a major depressive episode (APA, 1987), the *DSM-III-R* criteria have already accounted for this (i.e., no one who meets criteria for a manic episode will be included in those classified as meeting criteria for MDD). Because all other symptoms are identical, no changes were necessary for this variable. Analyses indicated that 25 participants in the current sample met criteria for MDD at Time 2 (i.e., 22% of those assessed).

Unlike MDD, the diagnostic criteria for psychoactive substance dependence vary somewhat more from *DSM-III-R* and *DSM-IV.* Specifically, whereas *DSM-III-R* requires at least three out of nine symptoms to be endorsed to meet criteria for substance dependence, *DSM-IV* requires at least three of only seven symptoms to be endorsed. However, the seven symptoms included in *DSM-IV* are identical to eight of the nine symptoms included in *DSM-III-R*. The exception is symptom 4 in *DSM-III-R* (i.e., "frequent intoxication or withdrawal symptoms when expected to fulfill major role

obligations at work, school, or home…or when substance use is physically hazardous…," APA, 1987, p. 168); this symptom is not included in *DSM-IV*. In addition, whereas *DSM-III-R* includes two symptoms that reflect withdrawal (items 8 and 9), *DSM-IV* only includes one symptom (item 2). To ensure that *DSM-IV* criteria were met in the current study, symptom 4 from *DSM-III-R* was removed from the dataset. In addition, *DSM-III-R* symptoms 8 and 9 were combined into one symptom (i.e., participant endorsed symptoms 8 and/or 9; participant did not endorse either symptom). The additional symptom (i.e., symptoms 1-3 and 5-7) were then converted into dichotomous variables (endorsed, not endorsed). The seven symptoms (items 1-3, 5-7, and the new composite variable of symptoms 8 and 9) were then summed. Participants with summed scores of three or more were labeled as meeting criteria for *DSM-IV* psychoactive substance dependence.

After converting to *DSM-IV* standards, initial analyses revealed that the number of participants who met criteria for psychoactive substance dependence at Time 2 was quite small (n = 8; 8% of those assessed). Therefore, individuals meeting criteria for alcohol dependence were combined with those meeting criteria for substance dependence. This is theoretically consistent with the findings of Miller et al. (2008); in their analysis of the latent structure of psychiatric disorders that are often comorbid with PTSD, alcohol and substance dependence cross-loaded similarly. Alcohol dependence was also assessed with the SCID. Similar to the findings for MDD and substance dependence disorder, the interrater reliability for detecting alcohol dependence using the SCID has been found to be excellent (e.g., κ = .96, Skre et al., 1991; κ = .94, Martin, Pollock, Bukstein, & Lynch, 2000). In the current study, internal consistency was adequate (α = .84). Because alcohol dependence was assessed identically to substance dependence in both *DSM-III-R* and *DSM-IV,* the same strategy of conversion described above was used to identify individuals who met criteria for *DSM-IV* alcohol dependence

at Time 2 (*n* = 20; 18% of those assessed). By combining these two disorders, a somewhat larger sample of individuals was identified (*n* = 23; 19% of those assessed). This combination was used in subsequent analyses.

Covariates and Missing Data

Similar to the first study, described in Chapter 2, five demographic variables were included in the present study (i.e., age, race, years of education, marital status, and annual income) based on research linking each of these variables to PTSD (Brewin, Andrews, & Valentine, 2000b; Keane, Marshall, & Taft, 2006).

Also consistent with Chapter 2, analyses were conducted to examine whether the data were missing systematically. Similar to Chapter 2, results indicated that for many of the outcome variables, individuals with and without missing data differed on several of the background variables (the most common were age and income) and type of assault. These differences reinforced the importance of including the background variables, as well as type of assault, as covariates in all subsequent analyses.

None of the baseline diagnostic variables were included as covariates. The reasoning for this decision was similar to that in Chapter 2; by keeping the covariates constant between analyses, comparisons could be made regarding the predictive value of the peritraumatic variables. Therefore, each analysis, regardless of the outcome variable, included six covariates: age, race, years of education, marital status, annual income and type of assault (i.e., sexual versus physical). The continuous covariates (i.e., age and years of education) were centered to reduce multicollinearity.

Results

To examine how the Time 1 peritraumatic emotions fared in predicting PTSD diagnostic status at Time 2 in comparison to both Time 2 MDD and Time 2 alcohol/substance dependence, logistic regressions were conducted. It was predicted that, whereas the peritraumatic experiences would be unable to discriminate between

PTSD and MDD (Hypothesis #1), they would be able to differentiate between PTSD and alcohol/substance dependence disorder (Hypothesis #2). Seven regressions were run for each of the outcome variables; each regression included the six Time 1 covariates in the first block. Based on the findings described in Chapter 2, the effect of each of the three peritraumatic factors (i.e., negative affect factor, fear factor, dissociative factor) was examined for each of the outcome variables. Further in line with the findings described in Chapter 2, the dimensional scales, as well as the categorical emotions, were examined. In the categorical models, the peritraumatic variables from one of the peritraumatic factors were entered in the second block. In the dimensional models, one of the three scales (i.e., negative affect, fear, dissociative) was entered in the second block. Mplus software was used for these analyses. Effect sizes were conceptualized according to Kirk (1996)'s conventions: .01 is a "small" effect; .06 is a "medium" effect; and .14 is a "large" effect.

To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, pseudo-R^2 (for PTSD diagnostic status) was examined. Mplus calculates a McKelvey and Zavoina pseudo-R^2. Studies have attempted to assess the accuracy of various types of pseudo-R^2 by predicting a continuous latent variable through OLS regression and a corresponding dichotomous variable through logistic regression and comparing the pseudo-R^2 to the OLS R^2. These analyses have indicated that the McKelvey and Zavoina pseudo-R^2 was the closest to the OLS R^2 (UCLA Academic Technology Service, n.d.).

Descriptive Analyses

Prior to testing the hypotheses, descriptive analyses were conducted to examine attrition rates for the two diagnostic outcomes that had not been examined in Chapter 2 (i.e., MDD and alcohol/substance dependence). Results indicated that at Time 1 62

participants met criteria for MDD. At Time 2, 33 of these participants had dropped out of the study, and 29 remained. By Time 2, 20 of these participants still met criteria for MDD. For alcohol/substance dependence, at Time 1, 23 participants met criteria for alcohol or substance dependence. By Time 2, only 5 of these participants attrited; of the 18 who remained, 14 still met criteria for a substance dependence disorder. Of note, based on the criteria for alcohol/substance dependence disorder, the individuals who met criteria for these disorders at Time 1 necessarily met criteria prior to the trauma. However, the current study only examined those individuals who met criteria for these disorders at Time 2 (which presumably included both individuals who met criteria for the disorders prior to the trauma and those who met criteria for the disorders after the trauma).

Analyses were also conducted to examine the rates of comorbidity between PTSD, MDD, and alcohol/substance dependence disorder. Results indicated that, of those participants who met criteria for PTSD, 42% also met criteria for MDD (20 out of 48 participants), and 23% also met criteria for alcohol or substance dependence disorder (11 out of 48 participants). For participants who met criteria for MDD, 87% also met criteria for PTSD (20 out of 23 participants), and 38% also met criteria for alcohol or substance dependence disorder (8 out of 21 participants). Finally, for participants who met criteria for alcohol or substance dependence disorder, 55% also met criteria for PTSD (11 out of 20 participants) and 40% also met criteria for MDD (8 out of 20 participants).

Hypothesis 1: The Peritraumatic Emotions Will Be Unable To Discriminate Between PTSD and MDD

Negative affect factor. The negative affect factor emotions were examined in two separate regressions, with PTSD and MDD as the outcome variables. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent for both

regressions (i.e., power ranged from 98-99%); however, power was not adequate to detect medium effect (i.e., power ranged from 66-69). As predicted, the negative affect factor predicted similar amounts of variance for PTSD (McKelvey & Zavoina pseudo-R^2 = .14) and MDD (McKelvey & Zavoina pseudo-R^2= .16). Contrary to expectations, none of the negative affect peritraumatic variables was significantly predictive of PTSD (all βs < .23; all *p*s > .16; *n* = 108) or MDD (all βs < .25; all *p*s > .15; *n* = 104).

Two regressions were also conducted using the dimensional model. G*Power 3 (Faul et al., 2007) indicated that for both regressions the power to detect a large effect was excellent (i.e., 99% power) and the power to detect medium effect was adequate (i.e., power ranged from 81-83%). None of the dimensional models explained as much of the variance in the outcome variables as did the categorical models. Further, the model predicted different amounts of variance for PTSD (McKelvey & Zavoina pseudo-R^2 = .08) and MDD (McKelvey & Zavoina pseudo-R^2 = .02). Similar to the categorical results, the negative affect scale was not significantly predictive of PTSD (β = .02; *p* > .28; *n* = 108) or MDD (β = -.001; *p* > .96; *n* = 104).

Fear factor. Next, the fear factor emotions were examined in two separate regressions, with PTSD and MDD as the outcome variables. G*Power 3 (Faul et al., 2007) indicated that for the two analyses, the power to detect a large effect was excellent (i.e., 99%); however, power was not adequate to detect a medium effect (i.e., power ranged from 71-74%). Contrary to expectations, the fear factor predicted different amounts of variance for PTSD (McKelvey & Zavoina pseudo-R^2 = .21) and MDD (McKelvey & Zavoina pseudo-R^2= .14). Although none of the variables predicted MDD (all βs < .21; all *p*s > .18; *n* = 105), anxious was predictive of PTSD (the association was in a positive direction; *n* = 109; see Table 7).

Table 7. Logistic Regression of Posttraumatic Stress Disorder (PTSD; Diagnostic Status) on the Fearful Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-.10	.35	.90
Age	-.01	.02	.99
Education	< -.01	.07	1.00
Minority Status	-.19	.34	.83
Income	-.14	.36	.87
Marital Status	-.24	.34	.79
Afraid	.17	.19	1.18
Worried	-.05	.17	.95
Terrified	-.19	.16	.82
Helpless	.07	.18	1.07
Anxious	**.29**	**.14**	**1.34***

Note. Δ McKelvey and Zavoina pseudo-R^2 = .15; McKelvey and Zavoina pseudo-R^2 = .21; OR = odds ratios.
*p < .05.

Two regressions were also conducted using the dimensional model. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., power ranged from 81-83%). Similar to the results for the negative affect factor, the dimensional model again produced a somewhat different picture. Similar to the categorical model, the amount of variance explained in PTSD (McKelvey & Zavoina pseudo-R^2 = .11) differed from the amount explained in MDD (McKelvey & Zavoina pseudo-R^2 =.01). However, unlike the categorical results, the fear scale was not significantly predictive of either PTSD (β = .06; p > .09; n = 109) or MDD (β = .01; p > .72; n = 105).

Dissociative factor.[1] Finally, the dissociative factor emotions were examined in two separate regressions, with PTSD and MDD as the outcome variables. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99%); however, power was not adequate to detect a medium effect (i.e., power ranged from 71-74%). Contrary to expectations, the amount of variance explained in PTSD (McKelvey and Zavoina pseudo-R^2 = .14) differed from the amount explained in MDD (McKelvey and Zavoina pseudo-R^2 = .23). None of the peritraumatic variables were significantly predictive of PTSD (all βs < .14; all *p*s > .19; *n* = 109) or MDD (all βs < .26; all *p*s > .05; *n* = 105).

Two regressions were also conducted using the dimensional model. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., power ranged from 81-83). The dimensional model presented a similar pattern of results as the categorical model. Specifically, the amount of variance explained in PTSD (McKelvey & Zavoina pseudo-R^2 = .10) differed from the amount explained in MDD (McKelvey & Zavoina pseudo-R^2 =.03). Similar to the categorical results, the dissociative scale was not significantly predictive of PTSD (β = .06; *p* > .09; *n* = 109) or MDD (β = .01; *p* > .72; *n* = 105).

Hypothesis 2: The Peritraumatic Emotions Will Discriminate Between PTSD and Alcohol/Substance Dependence

Negative affect factor. The negative affect factor emotions were examined in two separate regressions, with PTSD and alcohol/substance dependence disorder as the outcome variables. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent for both regressions (i.e., power ranged from 98-99%); however, power was not adequate to detect medium effect (i.e., power ranged from 66-69%). As predicted, the amount of variance explained for PTSD was different than the

amount of variance explained in alcohol/substance dependence (McKelvey & Zavoina pseudo-R^2 = .24). Contrary to expectations, none of the negative affect peritraumatic variables was significantly predictive of PTSD (all βs < .23; all *p*s > .16; *n* = 108) or alcohol/substance dependence (all βs < .27; all *p*s > .21; n = 109).

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Fear factor. Next, the fear factor emotions were examined in two separate regressions, with PTSD and alcohol/substance dependence disorder as the outcome variables. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99%); however, power was not adequate to detect a medium effect (i.e., power ranged from 71-74%). Contrary to expectations, the fear factor predicted similar amounts of variance for PTSD (McKelvey & Zavoina pseudo-R^2 = .21) and alcohol/substance dependence (McKelvey & Zavoina pseudo-R^2 = .24). Although none of the variables predicted alcohol/substance dependence (all βs < .19; all *p*s > .27; *n* = 110), anxious was predictive of PTSD (see Table 7).

Two regressions were also conducted using the dimensional model. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., power ranged from 81-83). Similar to the negative affect factor, the dimensional model again produced a somewhat different picture. Similar to the categorical model, the amount of variance explained in PTSD (McKelvey & Zavoina pseudo-R^2 = .11) was similar to the amount explained in alcohol/substance dependence (McKelvey & Zavoina pseudo-R^2 =.13). However, unlike the categorical results, the fear scale was not significantly predictive of either PTSD (β = .06; *p* > .09; *n* = 109) or alcohol/substance dependence (β = -.02; *p* > .66; *n* = 110).

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Two regressions were also conducted using the dimensional model. G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., power ranged from 81-83%). The dimensional model presented a similar pattern of results as the categorical model. Specifically, the amount of variance explained in PTSD (McKelvey & Zavoina pseudo-R^2 = .10) was similar to the amount explained in alcohol/substance

dependence (McKelvey & Zavoina pseudo-R^2 =.13). Similar to the categorical results, the dissociative scale was not significantly predictive of PTSD (β = .06; $p > .09$; $n = 109$) or alcohol/substance dependence (β = -.02; $p > .66$; $n = 110$).

Discussion

Although one of the peritraumatic reactions examined in this study was predictive of PTSD (i.e., anxiety), neither the individual categorical emotions nor the dimensional scales were predictive of disorders that are diagnostically similar to (i.e., MDD) or different from (i.e., alcohol/substance dependence) PTSD. Although this is in line with expectations regarding alcohol/substance dependence (i.e., that the peritraumatic experience would discriminate between PTSD and diagnostically different disorders; Hypothesis #2), it contrasts with expectations regarding MDD (i.e., it was predicted that the peritraumatic experience would be unable to discriminate between PTSD and diagnostically similar disorders; Hypothesis #1). The peritraumatic reaction that predicted PTSD was consistent with the results reported in Chapter 2; peritraumatic anxiety predicted PTSD status, whereas none of the peritraumatic reactions in the negative affect factor or the dissociative factor predicted this outcome variable.

The lack of predictive value of the peritraumatic variables with regard to MDD and alcohol/substance dependence does not appear to be a product of attrition. That is, it does not appear to be the case that the results can be explained by the possibility that participants who met criteria for MDD or alcohol or substance dependence at Time 1 were more likely to drop out of the study than those who did not meet criteria for these disorders. As noted above, at Time 1 62 participants met criteria for MDD. At Time 2, 33 of these participants had dropped out of the study, and 29 remained. By Time 2, 20 of these participants still met criteria for MDD. Therefore, it appears it was equally likely for participants with MDD to stay in the study as it was for them to attrite. This was true for individuals with alcohol/substance dependence disorder as well. At Time 1, 23

participants met criteria for alcohol or substance dependence disorder. By Time 2, only 5 of these participants attrited; of the 18 who remained, 14 still met criteria for a substance dependence disorder.

Although the results do not appear to be a product of attrition, it is possible that these results are a product of comorbidity. As noted above, 42% of participants who met criteria for PTSD also met criteria for MDD (20 out of 48 participants). Although not quite as notable as the results for MDD, many participants in the current study who met criteria for PTSD also met criteria for alcohol or substance dependence disorder. Specifically, 23% of participants who met criteria for PTSD also met criteria for alcohol or substance dependence disorder (11 out of 48 participants). It is possible that the current study was unable to find peritraumatic variables that were predictive of MDD or alcohol/substance disorders because the variance was captured by PTSD. Future research is needed to determine whether peritraumatic emotions can differentiate individuals who meet criteria for MDD, alcohol dependence disorder, or substance dependence disorder but not PTSD after a traumatic event from those who do not subsequently meet criteria for any of these disorders.

It is surprising that none of the peritraumatic variables significantly predicted either MDD or alcohol/substance dependence. One possibility may be that, whereas PTSD is linked specifically to the traumatic event, MDD and alcohol/substance dependence may not. It is possible that the peritraumatic variables may predict more proximal disorders and not more distant ones. Of note, this relationship is further complicated by the fact that individuals with premorbid psychopathology are at higher risk for developing PTSD (e.g., Ozer et al., 2003). An individual with a lifetime history of psychopathology experiences another episode as a result of the trauma may also develop PTSD. In this case, the peritraumatic experience may only capture the variance of the PTSD rather than the comorbid disorder.

To unravel this complicated relationship, studies are first required to examine whether the peritraumatic experience can predict the immediate development of MDD and/or alcohol/substance dependence disorder after a traumatic event in individuals without a history of premorbid psychopathology. If there are aspects of the peritraumatic experience that are predictive of this population, it would give credence to attempting to determine if the peritraumatic experience could also predict psychopathology for other populations (e.g., individuals with a history of premorbid psychopathology, individuals who develop other forms of psychopathology in concert with PTSD, individuals who develop other forms of psychopathology at a more temporally distant point).

The findings with regard to the amount of variance explained (as measured by McKelvey and Zavoina pseudo-R^2) present a more complex picture than those regarding individual betas. Surprisingly, the amount of variance explained by the peritraumatic models was generally more similar for the diagnostically dissimilar outcomes (i.e., PTSD and alcohol/substance dependence) than for the diagnostically similar outcomes (i.e., PTSD and MDD). Further, PTSD was not the best explained outcome for any of the three peritraumatic models. Specifically, in considering the categorical models, the negative affect factor of peritraumatic reactions explained more of the variance for alcohol/substance dependence (.24) than it did for PTSD or MDD (.14 and .16, respectively). This was also true for the fearful reactions; these variables explained more of the variance for alcohol/substance dependence (.24) than for PTSD or MDD (.21 and .14, respectively). This is particularly surprising because one of the peritraumatic reactions (i.e., anxiety) predicted PTSD; however, the model still failed to explain as much of the variance as it did for alcohol/substance dependence. Interestingly, the dissociative factor explained more variance in MDD (.23) than in alcohol/substance dependence (.16), although it predicted more of the variance in alcohol/substance dependence than in PTSD (.14).

Overall, the dimensional models demonstrated a similar picture, although the McKelvey and Zavoina pseudo-R^2 were smaller for the dimensional models than for the categorical models. This is unsurprising considering that the dimensional models included fewer predictors than did the categorical models (7 versus 11-13). However, the differences in the amount of variance explained by each of the models must be interpreted with caution. Specifically, because there is no significance test to date which estimates how differences in explained variance compare to one another, it is unclear if the "larger" effects are significantly greater than chance. Although it is accurate to say that models with a larger McKelvey and Zavoina pseudo-R^2 are "bigger" than models with a smaller McKelvey and Zavoina pseudo-R^2, without a test to compare these values to each other, it cannot be concluded that one is statistically larger than the other. This conclusion awaits the development of more sophisticated statistical tests.

Considering the findings in terms of the diagnoses, for the categorical models, MDD was best explained by the dissociative model, PTSD was best explained by the fear model, and alcohol/substance dependence was explained equally well by the negative affect and the fear models. The results of the dimensional models were identical with one exception; alcohol/substance dependence was explained equally well by all three models. This difference may be a product of the dimensional models' less accurate prediction of diagnostic status, as evidenced by the results presented in Chapter 2 (i.e., the categorical emotions were more accurate in their prediction of PTSD diagnostic status, the dimensional scales were more accurate in their prediction of PTSD symptom severity).

Speculatively, the findings that different peritraumatic factors explained differing variance for the three disorders may suggest that different types of peritraumatic reactions may be more important for the prediction of other forms of psychopathology. For example, peritraumatic dissociative reactions may be more predictive of MDD,

whereas fearful reactions, and reactions involving other forms of negative affect, may be more predictive of alcohol/substance dependence. It is possible that, when these disorders occur as a result of a traumatic event, individual reactions may emerge as significant predictors of the disorders.

If the amount of variance explained is indicative of peritraumatic reactions that are most predictive of a given form of psychopathology, this is also somewhat in line with the theorizing of Miller et al. (2008). That is, alcohol/substance dependence was explained by both the negative affect factor (which includes emotions such as anger, an externalizing emotion) and the fear factor (which is associated with emotions linked to the anxious-misery cluster). Further, the finding that the peritraumatic responses that explained the most variance in MDD (i.e., the dissociative reactions) did not explain as much of the variance in alcohol/substance dependence, and vice versa, are also in line with Miller et al. However, the finding that the only significantly predictive peritraumatic variable predicted PTSD but neither of the other outcomes (including MDD), and the finding that the amount of variance explained by the models was more similar for PTSD and alcohol/substance dependence than for PTSD and MDD, are contrary to Miller et al.'s conceptualization of these diagnoses. It is unclear if Miller et al.'s conceptualizations of PTSD, MDD, and alcohol/substance dependence do not apply to the peritraumatic emotions, or if the results of the current study are not consistent with Miller et al.'s theorizing because of high levels of comorbidity or the inability of the peritraumatic emotions to predict the occurrence of more distal forms of psychopathology. Studies such as the ones described above are needed to examine this possibility.

CHAPTER 4. METHODOLOGICAL ISSUES ASSOCIATED WITH CRITERION A2: RESPONSES TO AN IDIOGRAPHIC TRAUMA NARRATIVE

Introduction

PTSD is unique in that, unlike other disorders listed in the *DSM*, it requires a specific etiology (i.e., a traumatic stressor; Criterion A). Methodologically, this requires individuals to retrospectively recall aspects of an event (including his/her reactions to that event) that occurred in the (potentially distant) past. Although reporting symptoms of PTSD requires some reflection (e.g., assessments of Criteria B, C, and D typically ask trauma victims to report on current symptoms that have occurred within the past month; Blake et al., 1995), as do reports of symptoms of other *DSM* disorders (e.g., MDD requires the individual to report on symptoms that have occurred within the past two weeks; Spitzer et al., 1988), reporting on Criterion A necessarily requires reflection because, by definition of the diagnosis, the event occurred in the past. Further, according to the specifications of *DSM-IV*, the diagnosis of PTSD cannot be rendered until at least one month has passed since the traumatic event occurred (APA, 1994). This suggests that if an individual is being assessed for PTSD, the traumatic event he/she experienced occurred *at least* one month prior to the assessment, a requirement not placed on any other diagnostic criterion of PTSD, or any other *DSM* disorder.

In terms of the peritraumatic experience specifically, the fact that individuals are asked to retrospectively recall their reactions to a traumatic event has implications for assessment. Although assessing an individual's peritraumatic experience through the use of retrospective reporting may be the most direct way to ascertain the individual's response, it may not be the most accurate (e.g., Southwick, Morgan, Nicolaou, and Charney, 1997). Retrospective reporting is subject to number of potential biases and errors (e.g., Rubin, Berntsen, & Bohni, 2008; Weathers & Keane, 2007). For instance, reports can be subject to forgetting and memory deficits (Candel & Merckelbach, 2004)

and social desirability concerns (e.g., reluctance to reveal experiencing particular events or emotions for fear of stigma; Krinsley, Gallagher, Weathers, Kutter, & Kaloupek, 2003; Rosen & Lilienfeld, 2008). Further, these reports can be confounded by current goals and attitudes (Rubin et al., 2008), which can lead retrospective reports to be skewed by factors such as secondary gain (Candel & Merckelbach, 2004).

In an effort to circumvent the biases associated with retrospective reporting, researchers have exposed trauma survivors to trauma-related stimuli in the laboratory and observed their reactions. These stimuli (e.g., startling sounds, standardized trauma cues, idiographic trauma cues), and the naturalistic reactions they produce, potentially serve as a proxy for how traumatized individuals respond to these cues outside of the laboratory. This method bypasses the problems associated with retrospective reporting because it measures how the individual responds in the moment, rather than asking the individual to recall a previous response. Further, this methodological approach is in line with Rubin et al. (2008)'s theorizing; these authors argue that it is the memory of the trauma, and not the trauma itself, which determines PTSD symptoms. Therefore, how an individual currently responds to trauma cues, rather than how they responded during the trauma, may more accurately predict PTSD.

One trauma-related stimulus commonly used in the laboratory is the idiographic trauma narrative. The trauma narrative paradigm involves having participants provide either a brief written or verbal first-person account of their traumatic experience (e.g., Alvarez-Conrad, Zoellner, & Foa, 2001; Burke & Bradley, 2006). Researchers commonly collect data on participants' self-reported distress and psychophysiological reactivity to, and recovery from, exposure to such cues. Self-reported distress levels are often measured by asking participants to rate their subjective units of distress (i.e., SUDS ratings) from a scale ranging from *as relaxed and calm as you have ever been* to *as upset or uncomfortable as you have ever been* (Wolpe, 1958). SUDS ratings have been

used as an outcome measure as a way to assess a participant's distress when exposed to traumatic stimuli (e.g., Josman, Reisberg, Weiss, Garcia-Palacios, & Hoffman, 2008). Further, SUDS ratings have been employed in treatment-outcome studies as a method for measuring improvement; if the treatment is successful, participants will report lower SUDS ratings when exposed to traumatic stimuli at the end of treatment than they did at the beginning (e.g., Fairbank & Keane, 1982; Ironson, Freud, Strauss, & Williams, 2002). Reductions in SUDS ratings have been found to be correlated with reductions in PTSD symptoms (Ironson et al., 2002).

Psychophysiological reactivity to trauma cues and regulation in response to trauma cues are also commonly assessed during trauma-related laboratory challenge studies. Basal skin conductance (SC) is a physiological index influenced by the autonomic nervous system (Davis & Cowles, 1989). Increases in SC from baseline levels reflect increases in sympathetic nervous system activity, and it is generally thought to be an indication of emotional reactivity or arousal level (Raskin, 1973).

Heart rate (HR) is also a measure of autonomic nervous system activity (Cacioppo, Berntson, et al., 1994). However, unlike SC, HR can be a product of both sympathetic (acceleratory) and parasympathetic (deceleratory) influences (Sokolov & Cacioppo, 1997). Both SC variability and HR variability are typically measured in trauma cue reactivity studies because they both provide more "objective" measures of participants' responses to trauma related stimuli (i.e., they are not based on self-report).

Studies have demonstrated that both SC and HR reactivity are related to PTSD status. In a recent meta-analysis, Pole (2007) examined 58 resting baseline studies, 25 startle studies, 17 standardized trauma cue studies, and 22 idiographic trauma cue studies (i.e., trauma narrative studies) that compared adults with and without PTSD on a number of psychophysiological variables. Pole reported that the most robust correlates of PTSD were higher resting HR, larger HR responses and slower SC habituation slopes

to startle, and larger HR responses to both standardized and idiographic trauma cues. Pole also found that PTSD was related to elevations in resting SC and greater SC response to startle cues and both standardized and idiographic trauma cues. Although Pole argued that the generalizability of some of these findings is questionable due to the overreliance of studies on samples of male Veterans, he did note that the studies examining SC and HR in response to idiographic trauma cues were balanced by gender. Presumably then, these results do generalize to women for studies that utilize an idiographic trauma cue paradigm.

These two different methods of assessment (i.e., peritraumatic retrospective reports and responses to trauma-related stimuli in a laboratory setting) each has its own unique strengths and weaknesses. Using retrospective reports allows researchers to directly assess what responses individuals had during a traumatic event. However, this approach can be affected by a number of biases. In contrast, using responses gleaned during a laboratory-based trauma monologue avoids the problems associated with retrospective reporting by measuring individuals' current responses to trauma-stimuli. However, although this method is designed to be a proxy for an individual's experience outside of the laboratory to trauma cues, the way an individual reacts to trauma cues outside of the laboratory may not be identical to the way they react within a laboratory setting. Further, because individuals are not actually being subjected to a traumatic event in the laboratory (i.e., they are not in fear for their lives), the experience they have in the laboratory may be vastly different from the one they had during their traumas. Another weakness of this approach is that, unless they are directly asked about the specific categorical emotions they are experiencing, this approach does not provide specific information about participants' emotional experience.

No research to date has compared these methods to determine if one produces data that is more likely to predict the development of PTSD. However, research has

suggested that both of these approaches are significantly correlated with PTSD (e.g., Ironson et al., 2002; Kilpatrick et al., 1998; Pole, 2007). Therefore, it is possible that these two methods will be quite similar in their predictive ability, and that both will significantly predict PTSD. A comparison of an individual's retrospective report of his/her experience during the trauma to his/her reactions to trauma cues after the trauma awaits empirical examination.

Hypotheses

Retrospective reports of the peritraumatic experience and responses to a laboratory challenge assess different types of reactions; whereas the former attempts to assess how an individual responds during a trauma, the latter attempts to assess how an individual responds after a trauma to trauma-related cues. Despite their differences, both assessments are correlated with PTSD. Therefore, it is predicted that the data from the two methods will be equivalent (i.e., they will be highly concordant with each other and will be equally successful in predicting PTSD). Further, because of the temporal ordering of the responses, it is predicted that the three peritraumatic factors identified in study 1 (Chapter 2) will predict both the SUDS ratings and the psychophysiological responses measured at both Time 1 and Time 2.

Hypothesis 1: The Peritraumatic Emotions Will Predict the SUDS Variables

The individual peritraumatic categorical emotions, as well as the three peritraumatic scales, will significantly predict self-reported distress (SUDS) at Time 1 and Time 2 in response to a trauma narrative. This hypothesis will be supported if the distress factor and the individual peritraumatic emotions significantly predicted the SUDS ratings.

Hypothesis 2: The Peritraumatic Emotions Will Predict the Psychophysiological Variables

The individual peritraumatic categorical emotions, as well as the three peritraumatic scales, will significantly predict psychophysiological (i.e., HR, SC) reactivity to, and recovery from, a trauma narrative, measured at both Time 1 and Time 2. This hypothesis will be supported if individual peritraumatic emotions significantly predicted psychophysiological response.

Hypothesis 3: The SUDS Variables Will Predict PTSD

Self-reported distress (SUDS) in response to a trauma narrative will significantly predict both PTSD diagnostic status and PTSD symptom severity. This hypothesis will be supported if the individual SUDS ratings (Time 1 and Time 2) significantly predicted PTSD.

Hypothesis 4: The Psychophysiological Variables Will Predict PTSD

Psychophysiological (i.e., HR, SC) reactivity to, and recovery from, a trauma narrative will significantly predict both PTSD diagnostic status and PTSD symptom severity. This hypothesis will be supported if the individual psychophysiological responses (Time 1 and Time 2) significantly predict PTSD.

Hypothesis 5: The Peritraumatic Variables, SUDS Variables, and Psychophysiological Variables Will Equivalently Predict PTSD

The individual peritraumatic categorical emotions, the three peritraumatic scales, the SUDS ratings (Time 1 and Time 2), and the measures of psychophysiological response (Time 1 and Time 2) will not differ significantly in their ability to predict PTSD diagnostic status and PTSD symptom severity. This hypothesis will be supported if the amount of variance explained by the peritraumatic emotions, the SUDS ratings, and the psychophysiological responses is equivalent in the prediction of PTSD, and each of the individual variables are significantly predictive of PTSD.

Methods

Participants

The participants examined in this investigation were identical to those described in Chapter 2 (see Table 1 for demographic characteristics).

Procedure

The procedure used in this investigation was identical to that described in Chapter 2. Laboratory assessments were conducted in an 8-ft ×10-ft room that was sound-insulated and temperature- and humidity-controlled. During the laboratory portion of the study, the participant was seated in a comfortable armchair in the laboratory room, and physiological monitoring devices were attached. The assessment began approximately 5 minutes later to allow physiological readings to stabilize. There were five 5-minute phases of the laboratory assessment (i.e., baseline 1, neutral phase, baseline 2, trauma phase, baseline 3). Participants sat alone for the first, third, and fifth phases and were told to relax but were not instructed on what to think about. Before each speaking phase (neutral and trauma), the interviewer gave each participant a prompt sheet that listed possible topics to discuss.

During the neutral phase, participants described an event from the prompt sheet to the interviewer. The prompts were topics that would require the participant to recall and describe some past neutral event (e.g., a movie they saw, a meal they cooked). The interviewer did not speak during this time, so that five minutes of just the participant's speaking could be recorded. During the trauma phase, the participant described the assault (rape or physical) in detail, including aspects such as where she was, what the assailant said and did, and what her thoughts and reactions were. The prompt questions included time, location, and their emotions, thoughts, and behaviors during the assault. Similar to the neutral phase, the interviewer did not speak so that five minutes of just the participant speaking could be recorded. HR and SC were collected throughout the entire laboratory portion of the study; at the end of each of the 5 phases, a SUDS score was obtained from participants.

Measures

Similar to the measures described in Chapter 2, in the current investigation, the Standardized Trauma Interview (Resick, 1986; Resick, Jordan, Girelli, & Hutter, 1988) was used to assess participants' peritraumatic experiences. Further, the CAPS (Blake et al., 1990) was used to assess PTSD diagnostic status and PTSD symptom severity.

The current investigation also used several additional measures. **Subjective Units of Distress Scale (SUDS) scores** (Wolpe, 1958) were obtained at the end of each physiological phase to assess participants' distress levels. SUDS scores ranged from 0 (*as relaxed and calm as you have ever been*) to 10 (*as upset or uncomfortable as you have ever been*). Because Time 1 SUDS ratings were measured during the same visit as the peritraumatic variables, and Time 2 SUDS ratings were measured during the same visit as PTSD diagnostic status and symptom severity, it was possible that each of these variables would be correlated with the peritraumatic and PTSD variables, respectively, because of the temporal proximity of their measurements. Therefore, the measurements at both time points were examined in the current study. For the Time 1 SUDS variables, *n*s ranged from 141-142; for the Time 2 SUDS variables, $n = 73$.

The current investigation also analyzed data from the laboratory portion of the study. **Heart rate** (HR) was measured continuously during the laboratory portion of the study by a Coulborn Instruments (Allentown, PA) modular system. HR measurements were obtained with an optical blood flow transducer attached to the distal phalanx of the second finger of the participant’s non-dominant hand. This signal was converted by a tachometer (Coulbourn, Model S77-26) into beats/min, which is typical for PTSD studies (e.g., Bryant, Harvey, Guthrie, & Moulds, 2003; Ehlers et al., 2010; Forneris, Butterfield, & Bosworth, 2004). Analog outputs from the physiological devices were converted to digital signals by an analog-digital converter (Coulbourn, Model S25-12). A Coulbourn LabLinc Interface was used to interface digital outputs with an IBM-compatible computer

to allow for real-time waveform display of the data. HR measures were collected at a rate of 5 samples/sec. Data reduction was performed as described below. In the current study, for Time 1 HR variables *n* = 130; for Time 2 HR variables, *n* = 68. Examining HR was particularly relevant for the current study because it tends to vary by PTSD diagnosis, with individuals meeting criteria for PTSD demonstrating larger HR responses to idiographic trauma cues (Pole, 2007), which was what was employed in the current study.

Skin conductance (SC) was also measured by a Coulbourn Instruments modular system. Measurements were obtained with silver/silver chloride 9-mm electrodes filled with isotonic paste and attached to the first and third fingers at the distal phalanx of the participant's non-dominant hand. Electrodes were attached to a skin conductance module (Coulbourn, Model S71-22), which applied a constant voltage (0.5 V) and was used in the AC coupled (quick change) mode. Similar to HR, a Coulbourn LabLinc Interface was used to interface digital outputs with an IBM-compatible computer to allow for real-time waveform display of the data, and SC measures were collected at a rate of 5 samples/sec. Data reduction was performed as described below. In the current study, for Time 1 SC variables *n*s ranged from 129-131; for Time 2 SC variables, *n*s ranged from 66-68. Examining SC was also relevant for the current study because, like HR, it tends to vary by PTSD diagnosis, with individuals meeting criteria for PTSD demonstrating slower SC habituation slopes to startle and greater SC response to idiographic trauma cues (Pole, 2007).

Data Reduction and Analyses

Preparing the Physiological Variables

To evaluate SC waveforms, a computer scoring algorithm was used. Any response in excess of 0.10 µS was counted as a valid skin conductance response. The amplitude of each valid response (trough to peak) was determined, and an average

amplitude expressed in microsiemens was calculated per phase. HR was calculated as beats per minute, and averages were calculated for each phase. The voltage outputs from the nonspecific movement data were reduced with the mean square successive difference statistic (δ^2; Leiderman & Shapiro, 1962). This statistic is related to the variance but gives a measure of the variability between successive points of data. These calculations created physiological variables for each time period (i.e., Time 1 and Time 2): average heart rate for each of the five phases and average skin conductance waveform amplitude for each of the five phases.

Transforming Variables

Prior to conducting analyses, the distributions of each of the variables were examined. Three of the variables were found to be significantly non-normal based on an examination of skew and kurtosis. Specifically, phase three HR Time 2 and phase five HR Time 2 were both slightly negatively skewed and both distributions were highly leptokurtic, and phase three SC Time 1 was extremely positively skewed and highly leptokurtic. A cubed transformation was found to be most useful for the phase three HR Time 2 variable; although this made the distribution somewhat positively skewed, it made the distribution much more mesokurtic. In contrast, a squared transformation was most appropriate for the phase five HR Time 2 variable; similar to the transformation described above, this made the distribution somewhat positively skewed but significantly less leptokurtic. Finally, a cubed root transformation was found to be best for the phase three SC Time 1 variable; this transformation made the distribution closer to normal in terms of both skew and kurtosis. All relevant subsequent analyses were conducted using both the original and transformed variables. When the results from the original analyses (i.e., using the untransformed variables) were not significantly different from the results of the analyses using the transformed variables, only the original results were reported.

However, when the results differed from each other, each version of the results was presented.

Analyzing SUDS and Psychophysiological Variables

As described above, the SUDS variables and psychophysiological variables were collected during five 5-minute phases (i.e., baseline 1, neutral phase, baseline 2, trauma phase, baseline 3). This provided several ways in which SUDS and psychophysiological reactivity could be estimated. In the current study, the psychophysiological data were examined in two ways. First, scores during the third baseline period (i.e., phase five) were considered, while controlling for the second baseline period (i.e., phase three). This method has been used successfully in other papers examining similar effects, including one that used this dataset (i.e., Pineles et al., 2011). This method allows for an estimation of how well participants regulate their emotions, because it examines their reactivity after relating a trauma narrative while controlling for their reactivity prior to relating the narrative.

Reactivity was also evaluated by examining the trauma narrative phase (i.e., phase four) while controlling for the second baseline period (i.e., phase three). Similar methods have been used successfully in past research studies with this dataset (e.g., Gutner et al., 2010) and with other datasets as well (e.g., Orr et al., 1998; Orr, Pitman, Lasko, & Herz, 1993). Unlike the previous method, which allows examination of how well the participants regulate emotions, this method allows for the examination of how activated the participants were during the relating of the trauma narrative, while controlling for their activity prior to talking about their traumatic event. By examining both of these methods, the current study provides a unique opportunity to examine both activation and regulation in response to talking about a traumatic event.

Covariates and Missing Data

Similar to Chapters 2 and 3, five demographic variables were included in the present study (i.e., age, race, years of education, marital status, and annual income) based on research linking each of these variables to PTSD (Brewin, Andrews, & Valentine, 2000b; Keane, Marshall, & Taft, 2006).

Also consistent with Chapters 2 and 3, analyses were conducted to examine whether the data were missing systematically. Again, results indicated that for many of the outcome variables, individuals with and without missing data differed on several of the background variables (the most common were age and income) and type of assault. These differences reinforced the importance of including the background variables, as well as type of assault, as covariates in all subsequent analyses.

Baseline PTSD variables were again not included as covariates. Therefore, each analysis, regardless of the outcome variable, included six covariates: age, race, years of education, marital status, annual income and type of assault (i.e., sexual versus physical). The continuous covariates (i.e., age and years of education) were centered to reduce multicollinearity.

Results

Hypothesis 1: The Peritraumatic Emotions Will Predict the SUDS Variables

Prior to examining the relationships between the categorical peritraumatic emotions and the SUDS variables, bivariate correlations between each of the three factors of peritraumatic emotions (i.e., negative affect, fear, and dissociative) and the outcome variables (phase five SUDS at Time 1; phase four SUDS at Time 1; phase five SUDS at Time 2; and phase four SUDS at Time 2) were computed. Only peritraumatic emotions that were significantly correlated with the outcome variable were included in subsequent analyses. This allowed for the most efficient use of statistical power.

After the correlational analyses, hierarchical linear regressions were conducted. The six covariates, as well as phase three SUDS, were entered in the first step. In the

categorical models, the significantly correlated peritraumatic variables from one of the peritraumatic factors (i.e., negative affect factor, fear factor, dissociative factor) were entered in the second block. In the dimensional models, one of the three scales (i.e., negative affect, fear, dissociative) was entered in the second block. The SUDS variables (phase five SUDS at Time 1; phase four SUDS at Time 1; phase five SUDS at Time 2; and phase four SUDS at Time 2) served as the four separate outcome variables.

Mplus software was used for these analyses. To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, R^2 was examined. G*Power 3 (Faul et al., 2007) indicated that for the analyses involving the categorical emotions, the power was excellent (i.e., 99% power to detect both a large and a medium effect). For the analyses involving the dimensional models, the power to detect a large effect was excellent (i.e., power ranged from 94-99%). The power to detect a medium effect for the Time 1 analyses was adequate (i.e., 89% power); however, the power to detect a medium effect for the Time 2 analyses was not adequate (i.e., 56%). Effect sizes were conceptualized according to Cohen (1962)'s conventions: .2 is a "small" effect; .5 is a "medium" effect; and .8 is a "large" effect.

Time 1.

Negative affect factor. In conducting analyses with the categorical model, correlational analyses indicated that two peritraumatic emotions from the negative affect factor were significantly correlated with phase five SUDS (i.e., angry, $r = -.19$, $p < .05$; humiliated, $r = .17$, $p < .05$), and three peritraumatic emotions from the negative affect factor were significantly correlated with phase four SUDS (i.e., disgust, $r = .17$, $p < .05$; hurt, $r = .19$, $p < .05$; and humiliated, $r = .22$, $p < .05$). Two hierarchical linear regressions were run using the significantly correlated variables in step two (covariates were included in step one). Results of the first regression ($n = 226$) indicated that phase three

SUDS, as well as both angry and humiliated, predicted phase five SUDS (i.e., baseline three; see Table 8). Interestingly, whereas the association between humiliated and the outcome variable was positive, the association between angry and phase five SUDS was negative. Results of the second regression (n = 226) indicated that only phase three SUDS (i.e., SUDS at baseline two; β = .27; p < .01) predicted phase four SUDS; none of the peritraumatic variables predicted phase four SUDS (all βs < .24; all ps > .10).

Table 8. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 1 During Baseline Three on the Negative Affect Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.36	.51	1.44
Age	-.02	.03	.98
Education	<.01	.11	1.00
Minority Status	-.06	.50	.94
Income	.74	.47	2.09
Marital Status	-.34	.48	.71
SUDS13	**.38**	**.09**	**1.45***
Angry	**-.45**	**.15**	**.64***
Humiliated	**.35**	**.15**	**1.42***

Note. ΔR^2 = .08; R^2 = .21 (f^2 = .27); OR = odds ratios; SUDS13 = subjective units of distress at Time 1 assessed at baseline 2.
*p < .05.

Analyses using the dimensional model presented a different pattern of results. Specifically, although phase three SUDS was a significant predictor of both phase five SUDS (β = .41; p < .01; n = 132) and phase four SUDS (β = .25; p < .05; n = 133), the negative affect scale did not significantly predict either phase five SUDS (β = -.01; p > .78) or phase four SUDS (β = .05; p > .09).

Fear factor. In examining the categorical model, results of the correlation analyses indicated that two peritraumatic emotions from the fear factor were significantly correlated with phase five SUDS (i.e., worried, $r = .19$, $p < .05$; helpless, $r = .26$, $p < .01$), and three peritraumatic emotions from the fear factor were significantly correlated with phase four SUDS (i.e., worried, $r = .24$, $p < .01$; helpless, $r = .19$, $p < .05$; and terrified, $r = .22$, $p < .01$). Next, two hierarchical linear regressions were run. Results of the first regression ($n = 226$) indicated that only phase three SUDS (i.e., SUDS at baseline two; $\beta = .37$; $p < .001$) predicted phase five SUDS; none of the peritraumatic variables predicted phase five SUDS (all βs < .39; all ps < .10). Results of the second regression ($n = 226$) indicated that only phase three SUDS (i.e., SUDS at baseline two; $\beta = .23$; $p < .05$) predicted phase four SUDS; none of the peritraumatic variables predicted phase four SUDS (all βs < .36; all ps > .10).

Analyses using the dimensional model again presented a different pattern of results. Similar to the categorical model, the phase three SUDS was significantly predictive of phase five SUDS ($\beta = .39$; $p < .01$) whereas the fear scale was not ($\beta = .06$; $p > .24$; $n = 132$). However, in contrast to the categorical model, both phase three SUDS and the fear scale were positively associated with phase four SUDS ($n = 133$; see Table 9).

Table 9. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 1 During the Trauma Phase on the Fear Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.20	.52	1.22
Age	-.01	.03	.99
Education	-.14	.11	.87
Minority Status	-.63	.51	.53
Income	-.32	.48	.73
Marital Status	-.02	.49	.98
SUDS13	**.22**	**.10**	**1.25***
Fear Scale	**.11**	**.05**	**1.12***

Note. $\Delta R^2 = .03$; $R^2 = .11$; OR = odds ratios; SUDS13 = subjective units of distress at Time 1 assessed at baseline 2.
*$p < .05$.

Dissociative factor. In conducting analyses with the categorical model, correlational analyses indicated that none of the peritraumatic emotions from the dissociative factor was significantly correlated with phase five SUDS (all *p*s > .05). However, four peritraumatic emotions from the dissociative factor were significantly correlated with phase four SUDS (i.e., detached as if in a dream, $r = .24$, $p < .01$; confused, $r = .23$, $p < .01$; numb, $r = .27$, $p < .01$; and shocked, $r = .19$, $p < .05$). Because none of the peritraumatic emotions was correlated with phase five SUDS, only one hierarchical linear regression was run ($n = 226$). Results indicated that both phase three SUDS and shocked were significantly positively associated with phase four SUDS (i.e., trauma narrative phase; see Table 10).

Table 10. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 1 During the Trauma Phase on the Dissociative Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.02	.49	1.02
Age	< - .01	.03	.99
Education	-.12	.11	.89
Minority Status	-.71	.51	.49
Income	-.32	.48	.73
Marital Status	-.17	.48	.84
Detached	.22	.15	1.25
Confused	.16	.14	1.17
Numb	.26	.15	1.29
SUDS13	**.20**	**.10**	**1.23***
Shocked	**.37**	**.19**	**1.45***

Note. $\Delta R^2 = .11$; $R^2 = .19$ ($f^2 = .23$); OR = odds ratios; SUDS13 = subjective units of distress at Time 1 assessed at baseline 2.
*$p < .05$.

Similar to the categorical model, regression analyses indicated that phase three SUDS was significantly predictive of phase five SUDS (β = .40; $p < .01$) whereas the dissociative scale was not (β = .05; $p > .35$; $n = 132$). Also in line with the categorical model, both phase three SUDS and the dissociative scale were significantly positively associated with phase four SUDS ($n = 133$; see Table 11).

Table 11. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 1 During the Trauma Phase on the Dissociative Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.12	.49	1.13
Age	.01	.03	1.01
Education	-.14	.11	.87
Minority Status	-.63	.50	.53
Income	-.27	.47	.76
Marital Status	-.09	.48	.91
SUDS13	**.21**	**.10**	**1.23***
Dissociative Scale	**.15**	**.05**	**1.55***

*Note.*Δ R^2 = .06; R^2 = .13; OR = odds ratios; SUDS13 = subjective units of distress at Time 1 assessed at baseline 2.
*p < .05.

Summary. In predicting Time 1 SUDS variables, several individual categorical emotions were predictive of the outcome variable. Specifically, angry and humiliated significantly predicted phase five SUDS (i.e., baseline three), and shocked significantly predicted phase four SUDS (i.e., trauma phase). Several of the dimensional scales were predictive of the SUDS variables as well. Specifically, both the fear scale and the dissociative scale significantly predicted phase four SUDS.

Time 2.

Negative affect factor. In conducting analyses with the categorical model, correlational analyses indicated that one peritraumatic emotion was correlated with phase five SUDS (i.e., humiliated, r = .32, p < .01), and one peritraumatic emotion was correlated with phase four SUDS (i.e., humiliated, r = .28, p < .05). Two hierarchical linear regressions were run. Results of the first regression (n = 224) indicated that both phase three SUDS and humiliated were significantly positively associated with phase

five SUDS (i.e., baseline three; Table 12). Similar to the previous regression, results of the second regression (*n* = 224) indicated that both phase three SUDS and humiliated were significantly positively associated with phase four SUDS (i.e., trauma phase; Table 13).

Table 12. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During Baseline Three on the Negative Affect Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.36	.63	1.44
Age	.02	.03	1.02
Education	< -.01	.10	1.00
Minority Status	-.47	.50	.63
Income	.54	.49	1.71
Marital Status	-.31	.52	.74
SUDS23	**.80**	**.15**	**2.23***
Humiliated	**.44**	**.16**	**1.55***

Note. $\Delta R^2 = .07$; $R^2 = .41$ ($f^2 = .70$); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

Table 13. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During the Trauma Phase on the Negative Affect Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-.33	.78	.72
Age	.02	.04	1.01
Education	.03	.13	1.03
Minority Status	-1.03	.61	.36
Income	.67	.60	1.95
Marital Status	-.59	.65	.55
SUDS23	**.48**	**.18**	**1.61***
Humiliated	**.44**	**.20**	**1.55***

Note. $\Delta R^2 = .06$; $R^2 = .26$ ($f^2 = .36$); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

The results of the dimensional model were in line with those of the categorical model. Results indicated that both phase three SUDS and the negative affect scale were significantly positively associated with both phase five SUDS (*n* = 71; see Table 14) and phase four SUDS (*n* = 71; see Table 15).

Table 14. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During Baseline Three on the Negative Affect Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.01	.62	1.01
Age	.02	.03	1.02
Education	.01	.11	1.01
Minority Status	-.61	.52	.54
Income	.39	.52	1.47
Marital Status	-.54	.54	.58
SUDS23	**.81**	**.15**	**2.25***
Negative Affect Scale	**.07**	**.04**	**1.07***

*Note.*Δ R^2 = .03; R^2 = .37; OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*p < .05.

Table 15. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During the Trauma Phase on the Negative Affect Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-.49	.74	.61
Age	.02	.04	1.02
Education	.09	.13	1.09
Minority Status	-1.14	.62	.32
Income	.40	.61	1.49
Marital Status	-.95	.64	.39
SUDS23	**.48**	**.18**	**1.62**
Negative Affect Scale	**.11**	**.04**	**1.12***

*Note.*Δ R^2 = .05; R^2 = .25; OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*p < .05.

Fear factor. In conducting analyses with the categorical model, correlational analyses indicated that one peritraumatic emotion from the fear factor was correlated with phase five SUDS (i.e., helpless, $r = .31$, $p < .01$), and three peritraumatic emotions from the fear factor were correlated with phase four SUDS (i.e., worried, $r = .32$, $p < .01$; helpless, $r = .35$, $p < .01$; and anxious, $r = .25$, $p < .05$). Two hierarchical linear regressions were run. Results of the first regression ($n = 224$) indicated that only phase three SUDS (i.e., SUDS at baseline two; $\beta = .75$; $p < .001$) predicted phase five SUDS; helpless did not ($\beta = .35$; $p > .05$). Results of the second regression ($n = 224$) indicated that both phase three SUDS and worried were significantly positively associated with phase four SUDS (trauma phase; see Table 16).

Table 16. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During the Trauma Phase on the Fearful Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.18	.79	1.19
Age	.05	.04	1.05
Education	.05	.12	1.05
Minority Status	-1.36	.60	.26
Income	.69	.58	2.00
Marital Status	-.14	.64	.87
SUDS23	**.39**	**.18**	**1.47***
Anxious	-.09	.22	.91
Helpless	.40	.26	1.49
Worried	**.68**	**.29**	**1.96***

Note. $\Delta R^2 = .13$; $R^2 = .34$ ($f^2 = .52$); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

The results of the dimensional model again mirrored the categorical model. Specifically, results indicated that whereas phase three SUDS was significantly predictive of phase five SUDS (β = .78; $p < .01$; $n = 71$), the fear scale was not (β = .06; $p > .28$). However, both phase three SUDS and the fear scale were significantly positively associated with phase four SUDS ($n = 71$; see Table 17).

Table 17. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During the Trauma Phase on the Fear Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.10	.79	1.11
Age	.03	.04	1.03
Education	.03	.13	1.03
Minority Status	-1.21	.63	.30
Income	.65	.59	1.92
Marital Status	-.47	.64	.63
SUDS23	**.41**	**.18**	**1.51***
Fear Scale	**.16**	**.07**	**1.17***

Note. Δ $R^2 = .05$; $R^2 = .25$; OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

Dissociative factor. In conducting analyses with the categorical model, correlational analyses indicated that two of the peritraumatic emotions from the dissociative factor were significantly correlated with phase five SUDS (confused, $r = .32$, $p < .01$; numb, $r = .35$, $p < .01$), and two peritraumatic emotions from the dissociative factor were significantly correlated with phase four SUDS (i.e., confused, $r = .26$, $p < .05$; numb, $r = .27$, $p < .05$). Two hierarchical linear regressions were run. Results of the first regression ($n = 224$) indicated that both phase three SUDS and confused were significantly positively associated with phase five SUDS (SUDS at baseline three; see

Table 18). Results of the second regression (*n* = 224) indicated that only phase three SUDS (i.e., SUDS at baseline two; β = .43; *p* < .05) predicted phase four SUDS; neither of the peritraumatic variables predicted phase four SUDS (both βs < .37; both *p*s > .05).

Table 18. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During Baseline Three on the Dissociative Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.09	.59	1.09
Age	.03	.03	1.03
Education	.07	.11	1.08
Minority Status	-.121	.48	.89
Income	.37	.48	1.44
Marital Status	-.23	.51	.79
SUDS23	**.74**	**.15**	**2.08***
Numb	.22	.16	1.25
Confused	**.38**	**.15**	**1.47***

Note. ΔR^2 = .09; R^2 = .43 (f^2 = .75); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*p < .05.

The results of the dimensional model were similar to those of the categorical model. Specifically, results indicated that whereas both phase three SUDS and the dissociative scale were significantly positively associated with both phase five SUDS (*n* = 71; see Table 19), only phase three SUDS were predictive of phase four SUDS (β = .45; *p* < .05); the dissociative scale was not significantly predictive of the outcome variable (β = .10; *p* > .12; *n* = 71).

Table 19. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During Baseline Three on the Dissociative Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.17	.63	1.19
Age	.04	.03	1.04
Education	.01	.11	1.01
Minority Status	-.40	.51	.67
Income	.45	.50	1.57
Marital Status	-.25	.53	.78
SUDS23	**.78**	**.15**	**2.18***
Dissociative Scale	**.12**	**.05**	**1.13***

Note. $\Delta R^2 = .03$; $R^2 = .38$; OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

Additional analyses. Because categorical peritraumatic variables from different factors were found to be predictive of the outcome variables, additional analyses were conducted to determine which categorical emotion was the most predictive of the SUDS variable when forced to compete against each other. Two hierarchical linear regressions were conducted. G*Power 3 (Faul et al., 2007), the regressions had just adequate power to detect a large effect (79%) and did not have adequate power to detect a medium effect (37%). Results of the first regression ($n = 71$) indicated that, in addition to phase three SUDS, only confused (and not humiliated) predicted phase five SUDS (SUDS at baseline three); both phase three SUDS and confused were positively associated with the outcome variable (see Table 20).

Table 20. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During Baseline Three on Humiliated and Confused

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.32	.62	1.38
Age	.02	.03	1.02
Education	.03	.11	1.03
Minority Status	-.46	.50	.63
Income	.39	.49	1.48
Marital Status	-.21	.51	.81
SUDS23	**.77**	**.15**	**2.17***
Confused	**.32**	**.16**	**1.38***
Humiliated	.32	.17	1.37

Note. $\Delta R^2 = .07$; $R^2 = .41$ ($f^2 = .71$); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

Results of the second regression ($n = 71$) indicated that, in addition to phase three SUDS, only worried (and not humiliated) predicted phase four SUDS (i.e., trauma phase; see Table 21); both phase three SUDS and worried were positively associated with the outcome variable.

Table 21. Hierarchical Multiple Regression of Subjective Units of Distress (SUDS) Assessed at Time 2 During the Trauma Monologue on Humiliated and Worried

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-.05	.76	.95
Age	.04	.04	1.04
Education	.04	.12	1.04
Minority Status	-1.31	.62	.27
Income	.61	.58	1.83
Marital Status	-.27	.64	.76
SUDS23	**.44**	**.18**	**1.55***
Worried	**.62**	**.28**	**1.85***
Humiliated	.14	.23	1.15

Note. $\Delta R^2 = .07$; $R^2 = .28$ ($f^2 = .38$); OR = odds ratios; SUDS23 = subjective units of distress at Time 2 assessed at baseline 2.
*$p < .05$.

Summary. In predicting Time 2 SUDS variables, several individual categorical emotions were predictive of the outcome variable. Specifically, confused and humiliated significantly predicted phase five SUDS (i.e., baseline three), and worried and humiliated significantly predicted phase four SUDS (i.e., trauma phase). However, when confused and humiliated were forced to compete against each other, only confused was significantly predictive of phase five SUDS. Similarly, when worried and humiliated were forced to compete against each other, only worried significantly predicted phase four SUDS.

Several of the dimensional scales were predictive of the SUDS variables as well. Specifically, both the negative affect scale and the fear scale was significantly predictive of phase four SUDS. Further, both the negative affect scale and the dissociative scale significantly predicted phase five SUDS.

Hypothesis 2: The Peritraumatic Emotions Will Predict the Psychophysiological Variables

To examine the relationships between the peritraumatic emotions (both categorical and dimensional) and the psychophysiological variables, hierarchical linear regressions were conducted. The six covariates, and well as the relevant psychophysiological variable (i.e., HR, SC) collected at baseline phase three, were entered in the first step. For the categorical models, the significantly correlated peritraumatic variables (as determined by correlational analyses) were entered in the second step. For the dimensional models, one of the three scales (i.e., negative affect, fear, dissociative) was entered in the second block. The psychophysiological variables each served as an outcome variable for separate analyses.

Mplus software was used for these analyses. To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, R^2 was examined. G*Power 3 (Faul et al., 2007) indicated that the power for all the regressions using the categorical variables was excellent (i.e., 99% power to detect a both a large and a medium effect). Power for the dimensional models varied by outcome variable and is reported below. Effect sizes were conceptualized according to Cohen (1962)'s conventions: .2 is a "small" effect; .5 is a "medium" effect; and .8 is a "large" effect.

HR Time 1.

Negative affect factor. Results indicated that none of the categorical negative affect emotions were significantly correlated with phase four HR at Time 1 and phase five HR at Time 1 (all *r*s < .07; all *p*s > .18). Therefore, no regressions were run using these variables as predictors. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., 86% power).

However, similar to the findings for the categorical model, results indicated that the negative affect scale was not significantly predictive of either phase four HR (β = -.06; *p* > .51; *n* = 121) or phase five HR (β = .02; *p* > .75; *n* = 121).

Fear factor. Results indicated that none of the categorical fearful emotions were significantly correlated with phase four HR at Time 1 and phase five HR at Time 1 (all *r*s < .05; all *p*s > .15). Therefore, no regressions were run using these variables as predictors. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., 86% power). However, similar to the categorical model, results indicated that the fear scale was not significantly predictive of either phase four HR (β = -.26; *p* > .05; *n* = 121) or phase five HR (β = -.18; *p* > .13; *n* = 121).

Dissociative factor. For the categorical model, results of the correlations between the dissociative peritraumatic emotions (i.e., detached as if in a dream, confused, guilt, numb, and shocked) and the outcome variables (phase four HR, phase five HR) indicated that one of the peritraumatic emotions from the dissociative factor was significantly correlated with phase five HR (confused, *r* = .19, *p* < .05). None of the peritraumatic emotions from the dissociative factor was significantly correlated with phase four HR (all *r*s < .13; all *p*s > .15); thus, only one regression, predicting phase five HR, was conducted. Results indicated that only phase three HR (i.e., HR at baseline two; β = .79; *p* < .001) predicted phase five HR; confused did not (βs = .14; *p* > .10; *n* = 226). For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., 86% power). However, results indicated that the dissociative scale was not significantly predictive of either phase five HR (β = -.09; *p* > .44; *n* = 121) or phase four HR (β = -.12; *p* > .38; *n* = 121).

SC Time 1.

Negative affect factor. For the categorical model, one peritraumatic emotion from the negative affect factor was correlated with phase five SC (sad, $r = -.19$, $p < .05$) and with phase four SC (hurt, $r = -.18$, $p < .05$). Next, two hierarchical linear regressions were run. Results of the first regression ($n = 226$) indicated that only phase three SC predicted phase five SC (i.e., baseline three; $\beta = .61$; $p < .001$); sad did not predict the outcome variable ($\beta = -.01$; $p > .10$). Results of the second regression ($n = 226$) indicated that only phase three SC (i.e., SC at baseline two; $\beta = .63$; $p < .001$) predicted phase four SC; hurt did not predict phase four SC ($\beta = .01$; $p > .10$). For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., 85% power). However, results indicated that the negative affect scale was not significantly predictive of either phase five SC ($\beta = .00$; $p > .99$; $n = 120$) or phase four SC ($\beta = .001$; $p > .77$; $n = 120$).

Fear factor. For the categorical model, one peritraumatic emotion from the fear factor was correlated with phase five SC (anxious, $r = -.21$, $p < .05$). However, none of the peritraumatic emotions from the fear factor was significantly correlated with phase four SC (all rs < .07; all ps > .51); thus, only a regression using the peritraumatic variables to predict phase five SC was conducted ($n = 226$). Results indicated that both phase three SC ($\beta = .62$; $p < .001$) and anxious ($\beta = -.04$; $p < .01$) predicted phase five SC. However, when the analyses were rerun using the transformed phase three SC variable, only phase three SC predicted phase five SC ($\beta = .51$; $p < .001$); anxious was no longer significant ($\beta = -.02$; $p > .10$). For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e.,

85% power).Despite this, the fear scale was not significantly predictive of either phase four SC (β = .003; *p* > .48; *n* = 120) or phase five SC (β = -.009; *p* > .05; *n* = 120).

Dissociative factor. Correlational analyses indicated none of the dissociative peritraumatic emotions was significantly correlated with the outcome variables (i.e., phase four SC, phase five SC; all *r*s < .07; all *p*s > .31). Therefore, no regressions were run using these emotions as predictors. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 99% power) and the power to detect a medium effect was adequate (i.e., 85% power). However, similar to the categorical model, the dissociative scale was not significantly predictive of either phase four SC (β = -.001; *p* > .75; *n* = 120) or phase five SC (β = -.002; *p* > .71; *n* = 120).

HR Time 2. Prior to conducting hierarchical linear regressions examining the ability of the peritraumatic variables to predict phase four and phase five HR, bivariate correlations were run between each of the three peritraumatic variable factors and the two HR variables. None of the peritraumatic variables from any of the three factors was correlated with either of the outcome variables (all *r*s < .20; all *p*s > .05). Therefore, no regressions were conducted using either phase four HR at Time 2 or phase five HR at Time 2 as outcome variables. For the dimensional models, G*Power 3 (Faul et al., 2007) indicated that for the three regressions, the power to detect a large effect was excellent (i.e., 91% power); however, power to detect a medium effect was not adequate (i.e., 51% power). Results indicated that none of the three scales was significantly predictive of either phase four HR (all βs < .15; *ps* > .13) or phase five HR (all βs < .27; *ps* > .08).

SC Time 2.

Negative affect factor. For the categorical model, correlations between the negative affect peritraumatic emotions (i.e., angry, betrayed, disgust, embarrassed, hurt, sad, and humiliated) and the outcome variables (phase four SC, phase five SC)

indicated that none of these peritraumatic emotions was correlated with phase five SC (all *r*s < .07; all *p*s > .30). However, two peritraumatic emotions were correlated with phase four SC (disgust, $r = -.24$, $p < .05$; humiliated, $r = -.25$, $p < .05$). Because none of the negative affect peritraumatic emotions were correlated with phase five SC, only one hierarchical linear regression, using phase four SC as the outcome variable, was conducted ($n = 224$). Results indicated that only phase three SC ($\beta = .57$; $p < .001$) predicted phase four SC; neither disgust ($\beta = -.04$; $p > .05$) nor humiliated ($\beta = -.04$; $p > .05$) predicted this outcome variable. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 92% power); however, power to detect a medium effect was not adequate (i.e., 52% power). Results of these analyses indicated the negative affect scale was not significantly predictive of SC phase five ($\beta = .006$; $p > .20$; $n = 65$) or SC phase four ($\beta = -.008$; $p > .08$; $n = 66$).

Fear factor. For the categorical model, bivariate correlations between the fearful peritraumatic emotions (i.e., afraid, worried, helpless, anxious, and terrified) and the outcome variables (phase four SC, phase five SC) indicated that none of the peritraumatic variables was correlated with phase five SC (all *r*s < .01; all *p*s > .05). However, one peritraumatic emotion was correlated with phase four SC (afraid, $r = -.26$, $p < .05$). Because none of the peritraumatic variables was correlated with phase five SC, only a regression using the peritraumatic variables to predict phase four SC was conducted. Results indicated that both phase three SC and afraid predicted phase four SC ($n = 224$; see Table 22). Whereas phase three SC was positively associated with the outcome variable, afraid was negatively associated with phase four SC. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 91% power); however, power to detect a medium effect was not adequate (i.e., 51% power). Results of these analyses

were somewhat different than those of the categorical model; the fear scale was not significantly predictive of either phase five SC (β = .007; *p* > .37; *n* = 65) or phase four SC (β = -.008; *p* > .31; *n* = 66).

Table 22. Hierarchical Multiple Regression of Skin Conductance Amplitude (SC) Assessed at Time 2 During the Trauma Phase on the Fearful Peritraumatic Emotions

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.04	.08	1.04
Age	< -.01	< .01	1.00
Education	-.01	.01	.99
Minority Status	-.01	.07	.99
Income	.04	.06	1.04
Marital Status	-.11	.07	.90
SC23	**.51**	**.11**	**1.67***
Afraid	**-.07**	**.03**	**.93***

Note. ΔR^2 = .08; R^2 = .48 (f^2 = .92); OR = odds ratios; SC23 = skin conductance amplitude at Time 2 assessed at baseline 2.
*p < .05.

Dissociative factor. Because none of the dissociative peritraumatic emotions was correlated with the outcome variables (i.e., phase four SC, phase five SC; all *r*s < .21; all *p*s > .05), no regressions were run using these variables as predictors. For the dimensional model, G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was excellent (i.e., 91% power); however, power to detect a medium effect was not adequate (i.e., 51% power). Results of these analyses were somewhat different than those of the categorical model. Although the dissociative scale was not significantly predictive of phase five SC (β = .005; *p* > .49; *n* = 65), it was significantly negatively associated with phase four SC (*n* = 66; see Table 23).

Table 23. Hierarchical Multiple Regression of Skin Conductance Amplitude (SC) Assessed at Time 2 During the Trauma Phase on the Dissociative Scale

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	.08	.08	1.08
Age	< -.01	.01	.99
Education	-.02	.01	.98
Minority Status	-.02	.07	.98
Income	.09	.06	1.09
Marital Status	-.09	.07	.91
SC23	**.56**	**.11**	**1.75***
Dissociative Scale	**-.02**	**.01**	**.98***

*Note.*Δ R^2 = .03; R^2 = .43; OR = odds ratios; SC23 = skin conductance amplitude at Time 2 assessed at baseline 2.
*p < .05.

Summary. Results indicated that none of the individual categorical peritraumatic emotions, or the peritraumatic dimensional scales, predicted either HR or SC at Time 1. At Time 2, whereas none of the categorical or dimensional peritraumatic emotions predicted HR, one categorical emotion and one dimensional scale predicted SC. Specifically, both afraid and the dissociative scale significantly predicted phase four SC at Time 2.

Hypothesis 3: The SUDS Variables Will Predict PTSD

To examine the relationships between the SUDS variables and PTSD, hierarchical regressions were conducted. The six Time 1 covariates (age, level of education, income level, minority status, marital status, and rape versus physical assault) and phase three SUDS (i.e., second baseline SUDS at Time 1 and Time 2) were entered in the first step, and the SUDS variables for either phase five or phase four (Time 1 and Time 2) were entered in the second step. The two Time 2 PTSD variables

(PTSD diagnostic status and PTSD symptom severity) served as the outcome variables. Mplus software was used for these analyses. To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, McKelvey and Zavoina pseudo-R^2 (for the PTSD diagnostic variables) and R^2 (for PTSD symptom severity) were examined. Effect sizes for R^2 were conceptualized according to Cohen (1962)'s conventions (i.e., .2 is a small effect, .5 is a medium effect, and .8 is a large effect), and effect sizes for pseudo-R^2 were conceptualized according to Kirk (1996)'s conventions (i.e., .01 is a small effect; .06 is a medium effect; and .14 is a large effect).

PTSD diagnosis status. For these analyses, G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was adequate (i.e., power ranged from 84%); however, the power to detect a medium effect was not (i.e., 42% power). Results indicated that neither phase five SUDS at Time 1 (β = .09; $p > .10$) nor at Time 2 (β = .08; $p > .10$) was predictive of the outcome variable ($n = 55$). In addition, neither phase four SUDS at Time 1 (β = -.02; $p > .10$) nor at Time 2 (β = .06; $p > .10$) was predictive of PTSD diagnostic status ($n = 55$).

PTSD symptom severity. For these analyses, G*Power 3 (Faul et al., 2007) indicated that the power for these regressions was excellent (i.e., 99% power to detect both a large and a medium effect). Findings from these analyses indicated that both marital status and the phase five SUDS Time 2 variable were predictive of PTSD symptom severity ($n = 215$; see Table 24). Whereas phase five SUDS was positively associated with the outcome variable, marital status was negatively associated with PTSD symptom severity. In terms of phase four SUDS, only marital status (β = -13.91; $p = .05$) was predictive of PTSD symptom severity; neither of the phase four SUDS variables predicted PTSD symptom severity (both βs < 2.00; both ps > .10; $n = 215$).

Table 24. Hierarchical Multiple Regression of Posttraumatic Stress Disorder (PTSD) Symptom Severity on Subjective Units of Distress (SUDS) Assessed During Baseline Three

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-2.71	5.89	.07
Age	-.16	.36	.85
Education	-.30	1.21	.74
Minority Status	-.30	6.06	.74
Income	2.11	6.40	8.23
Marital Status	**-13.56**	**6.82**	**<.01***
SUDS13	-.09	2.01	.91
SUDS23	1.30	3.58	3.65
SUDS15	-.18	1.39	.84
SUDS25	**5.17**	**1.74**	**175.04***

Note. $\Delta R^2 = .13$; $R^2 = .25$ ($f^2 = .33$); OR = odds ratios; SUDS13 = subjective units of distress assessed at Time 1, baseline 2; SUDS23 = subjective units of distress assessed at Time 2, baseline 2; SUDS15 = subjective units of distress assessed at Time 1, baseline 3; SUDS25 = subjective units of distress assessed at Time 2, baseline 3.
*$p < .05$.

Hypothesis 4: The Psychophysiological Variables Will Predict PTSD

To examine the relationships between the psychophysiological variables and PTSD, hierarchical regressions were conducted. The six Time 1 covariates, and well as relevant phase three psychophysiological variables (i.e., HR, SC), were entered in the first step, and the corresponding psychophysiological variables (Time 1 and Time 2) were entered in the second step. The two Time 2 PTSD variables (PTSD diagnostic status and PTSD symptom severity) were considered separately as outcome variables. These analyses were conducted for both phase five and phase four psychophysiological variables. Mplus software was used for these analyses. To ascertain the predictive value

of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, McKelvey and Zavoina pseudo-R^2 (for the PTSD diagnostic variables) and R^2 (for PTSD symptom severity) were examined. Effect sizes for R^2 were conceptualized according to Cohen (1962)'s conventions (i.e., .2 is a small effect, .5 is a medium effect, and .8 is a large effect), and effect sizes for pseudo-R^2 were conceptualized according to Kirk (1996)'s conventions (i.e., .01 is a small effect; .06 is a medium effect; and .14 is a large effect).

PTSD diagnostic status.

HR. To examine the ability of the phase five HR variables (i.e., baseline three HR variables) or phase four HR variables (i.e., trauma phase HR variables) to predict PTSD, two hierarchical logistic regressions were conducted. G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was adequate (i.e., power ranged from 77-79%); however, the power to detect a medium effect was not (i.e., 37% power). Results of the first regression indicated that neither phase five HR at Time 1 (β = -.03; $p > .10$) nor at Time 2 (β = -.01; $p > .10$) was predictive of PTSD ($n = 49$). Furthermore, in the second regression, neither phase four HR at Time 1 (β = -.02; $p > .10$) nor at Time 2 (β = -.004; $p > .10$) predicted PTSD ($n = 50$).

SC. To examine the ability of the phase five or phase four SC variables to predict PTSD, two hierarchical logistic regressions were conducted. G*Power 3 (Faul et al., 2007) indicated that for these regressions, the power to detect a large effect was adequate (i.e., 76% power); however, the power to detect a medium effect was not (i.e., 36% power). Results of the first regression indicated that neither phase five SC at Time 1 (β = 1.66; $p > .10$) nor at Time 2 (β = .33; $p > .10$) predicted PTSD ($n = 48$). In the second regression, neither phase four SC at Time 1 (β = 2.04; $p > .10$) nor at Time 2 (β = -1.54; $p > .10$) predicted PTSD ($n = 48$).

PTSD symptom severity.

HR. To examine the ability of the phase five or phase four HR variables to predict PTSD symptom severity, two hierarchical linear regressions were conducted. For the first regression, G*Power 3 (Faul et al., 2007) indicated that the power was not adequate (i.e., 70% power to detect a large effect; 31% power to detect a medium effect). Results indicated that neither phase five HR at Time 1 (β = .06; $p > .10$) nor at Time 2 (β = .14; $p > .10$) was predictive of PTSD symptom severity ($n = 48$). For the second regression, G*Power 3 (Faul et al., 2007) indicated that the power was not adequate (i.e., 71% power to detect a large effect; 32% power to detect a medium effect). Results indicated that neither phase four HR at Time 1 (β = .62; $p > .10$) nor at Time 2 (β = -.27; $p > .10$) was predictive of PTSD symptom severity ($n = 48$).

SC. To examine the ability of the phase five or phase four SC variables to predict PTSD symptom severity, two hierarchical linear regressions were conducted. For the first regression, G*Power 3 (Faul et al., 2007) indicated that the power was excellent (i.e., 99% power to detect both a large and a medium effect). However, results indicated that neither phase five SC at Time 1 (β = 27.94; $p > .10$) nor at Time 2 (β = 1.22; $p > .10$) predicted PTSD symptom severity ($n = 216$). For phase four SC, G*Power 3 (Faul et al., 2007) again suggested that the power was excellent (i.e., 99% power to detect both a large and a medium effect). Results indicated that marital status, and phase four SC at Time 1 and Time 2 predicted PTSD symptom severity ($n = 216$; see Table 25). Interestingly, whereas Time 1 SC was positively associated with the outcome variable, both Time 2 SC and marital status were negatively associated with PTSD symptom severity.

Table 25. Hierarchical Multiple Regression of Posttraumatic Stress Disorder (PTSD) Symptom Severity on Skin Conductance Amplitude (SC) Assessed During the Trauma Phase

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	-7.26	6.01	< .01
Age	-.07	.50	.94
Education	.26	1.29	1.29
Minority Status	-6.46	6.87	< .01
Income	8.76	6.31	6399.66
Marital Status	**-20.41**	**7.72**	**< .01***
SC13	-24.64	14.30	< .01
SC23	1.86	22.38	6.44
SC14	**53.12**	**21.35**	**> 10^{23}***
SC24	**-48.27**	**21.42**	**< .01***

Note. $\Delta R^2 = .13$; $R^2 = .21$ ($f^2 = .27$); OR = odds ratios; SC13 = skin conductance amplitude assessed at Time 1, baseline 2; SC23 = skin conductance amplitude assessed at Time 2, baseline 2; SC14 = skin conductance amplitude assessed at Time 1, trauma phase; SC24 = skin conductance amplitude assessed at Time 2, trauma phase.
*$p < .05$.

Summary. Results indicated that neither the HR variables nor the SC variables significantly predicted PTSD diagnostic status. However, whereas none of the HR variables predicted PTSD symptom severity, both Time 1 phase four SC and Time 2 phase four SC predicted PTSD symptom severity.

Hypothesis 5: The Peritraumatic Variables, SUDS Variables, and Psychophysiological Variables Will Equivalently Predict PTSD

Analyses were conducted with the peritraumatic, SUDS, and psychophysiological variables separately to examine their prediction to PTSD variables. SPSS software was used. The six Time 1 covariates (age, level of education, income level, minority status,

marital status and rape versus physical assault) were entered in the first step for all analyses. To ascertain the predictive value of the individual variables, individual unstandardized betas were examined. To assess the amount of variance explained by each model, Nagelkerke pseudo-R^2 (for PTSD diagnostic status) and R^2 (for PTSD symptom severity) were examined. Effect sizes for R^2 were conceptualized according to Cohen (1962)'s conventions (i.e., .2 is a small effect, .5 is a medium effect, and .8 is a large effect), and effect sizes for pseudo-R^2 were conceptualized according to Kirk (1996)'s conventions (i.e., .01 is a small effect; .06 is a medium effect; and .14 is a large effect).

PTSD diagnostic status. For the following logistic regression analyses, Time 2 PTSD (meets or does not meet diagnostic status) served as the outcome variable.

Results of hierarchical regression analyses using the peritraumatic emotions (both dimensional and categorical models) to predict PTSD diagnostic status are reported in Chapter 2. Briefly, for the categorical models, G*Power 3 (Faul et al., 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (power ranged from 69-76%). Results indicated that whereas none of the negative affect emotions (Nagelkerke pseudo-R^2 = .11; all βs < .10; p > .10; n = 108), or the dissociative peritraumatic variables (Nagelkerke pseudo-R^2 = .12; all βs < .23; p > .10; n = 109) predicted PTSD diagnostic status, one of the fearful peritraumatic variables was significantly positively associated with the outcome variable (anxious; Nagelkerke pseudo-R^2 = .16; n = 109; see Table 5).

For the dimensional models, G*Power 3 (Faul et al., 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (84% power). However, results indicated that none of the scales significantly predicted PTSD (all βs < .10; ps > .08). In addition, only a limited amount of variance in PTSD was explained by the negative affect scale (Nagelkerke

pseudo-R^2 = .07; *n* = 108), the fear scale (Nagelkerke pseudo-R^2 = .09; *n* = 109), and the dissociative scale (Nagelkerke pseudo-R^2 = .08; *n* = 109).

With regard to phase five SUDS variables, G*Power 3 (Faul et al., 2007) indicated these regressions had adequate power to detect a large effect (84% power); power to detect a medium effect was not adequate (42% power). Neither phase five SUDS at Time 1 (β = .16; *p* > .10) nor at Time 2 (β = .13; *p* > .10) predicted PTSD (Nagelkerke pseudo-R^2 = .13; *n* = 55). Similarly, with regard to phase four SUDS, neither phase four SUDS at Time 1 (β = -.04; *p* > .10) nor at Time 2 (β = .09; *p* > .10) predicted PTSD (Nagelkerke pseudo-R^2 = .08; *n* = 55). For the psychophysiological variables, G*Power 3 (Faul et al., 2007) indicated these regressions did not have adequate power to detect either a large effect (power ranged from 44-46%) or a medium effect (19% power). Unsurprisingly then, for the four phase five psychophysiological variables (i.e., baseline three HR and SC variables at Time 1 and Time 2), none of the variables predicted PTSD (Nagelkerke pseudo-R^2 = .42; all βs < -.65; *p*s > .10; *n* = 46). Similarly, for the four phase four psychophysiological variables (i.e., trauma phase HR and SC variables at Time 1 and Time 2), none of the variables predicted PTSD (Nagelkerke pseudo-R^2 = .44; all βs < 4.08; *p*s > .05; *n* = 47).

In comparing these eight sets of predictors in their ability to predict PTSD diagnostic status, it is notable that the only analysis that yielded a predictive individual variable was the one utilizing the fear factor. However, based on the Nagelkerke R^2 values, the analysis using the phase four psychophysiological variables to predict PTSD explained the most variance (Nagelkerke pseudo-R^2 = .44). Contrary to expectations, the three sets of predictors did not predict equivalent amounts of variance in PTSD.

PTSD symptom severity. For the following hierarchical linear regression analyses, PTSD symptom severity served as the outcome variable.

Results of hierarchical regression analyses using the peritraumatic emotions (both dimensional and categorical models) to predict PTSD symptom severity are reported in Chapter 2. To reiterate, for the categorical models, G*Power 3 (Faul et al., 2007) indicated that the power to detect a large effect was excellent (i.e., 99% power) and was adequate to detect a medium effect (power ranged from 68-73%). Results of these analyses indicated that none of the negative affect emotions (R^2 = .13; all βs < 4.24; p > .10; n = 106), fearful peritraumatic variables (R^2 = .11; all βs < 4.20; p > .10; n = 107) or dissociative peritraumatic variables (R^2 = .18; all βs < 3.83; p > .05; n = 107) predicted PTSD symptom severity. For the dimensional models, G*Power 3 (Faul et al., 2007) indicated these regressions had excellent power to detect a large effect (99% power) and adequate power to detect a medium effect (83% power). Results of these analyses indicated that neither the negative affect scale (n = 107; R^2 = .09) nor the fear scale (n = 108; R^2 = .09) predicted the outcome variable. However, the dissociative scale was significantly positively associated with PTSD symptom severity (R^2 = .14; see Table 6).

Considering the phase five SUDS variables (i.e., baseline three SUDS variables), G*Power 3 (Faul et al., 2007) suggested that whereas the model had adequate power to detect a large effect (78% power), the power to detect a medium effect was not adequate (36% power). Despite this, phase five SUDS at Time 2 was significantly positively associated with PTSD symptom severity (R^2 = .22; n = 53; see Table 26), Considering the phase four SUDS variables (i.e., trauma phase SUDS variables), G*Power 3 (Faul et al., 2007) indicated that the regression had adequate power to detect a large effect (78% power); however, power to detect a medium effect was not adequate (36% power). Neither phase four SUDS at Time 1 (β = -.24; p > .10) nor at Time 2 (β = 1.75; p > .10) predicted PTSD symptom severity (R^2 = .11; n = 53) in these analyses.

Table 26. Hierarchical Multiple Regression of Posttraumatic Stress Disorder (PTSD) Symptom Severity on Subjective Units of Distress (SUDS) Assessed During Baseline Three

Variable	*Estimate (B)*	*SE*	*OR*
Rape/Assault	3.61	14.61	36.89
Age	-.07	.53	.94
Education	-1.95	1.62	.14
Minority Status	1.74	8.13	5.68
Income	-.42	7.85	.66
Marital Status	-10.15	8.64	< .01
SUDS13	-.33	1.97	.72
SUDS23	.68	3.09	1.97
SUDS15	.90	1.50	2.47
SUDS25	**3.97**	**1.65**	**52.88***

Note. $\Delta R^2 = .13$; $R^2 = .22$ ($f^2 = .28$); OR = odds ratios; SUDS13 = subjective units of distress assessed at Time 1, baseline 2; SUDS23 = subjective units of distress assessed at Time 2, baseline 2; SUDS15 = subjective units of distress assessed at Time 1, baseline 3; SUDS25 = subjective units of distress assessed at Time 2, baseline 3.
*$p < .05$.

Considering the four phase five psychophysiological variables (i.e., baseline three HR and SC variables at Time 1 and Time 2), G*Power 3 (Faul et al., 2007) indicated that the regression did not have adequate power (i.e., 43% power to detect a large effect; 18% power to detect a medium effect). Unsurprisingly, none of the variables predicted PTSD symptom severity ($R^2 = .39$; all βs < 11.34; *p*s > .10; $n = 44$). In examining the four phase four psychophysiological variables (i.e., trauma phase HR and SC variables at Time 1 and Time 2) G*Power 3 (Faul et al., 2007) indicated that the regression did not have adequate power (i.e., 44% power to detect a large effect; 19% power to detect a medium effect). Using the non-transformed variables, phase four SC

at Time 1 predicted PTSD symptom severity (β = 63.27; $p < .05$; $n = 45$). However, when these analyses were re-examined using the transformed phase three SC at Time 1 variable, none of the variables, including the phase four psychophysiological variables, predicted PTSD symptom severity ($R^2 = .41$; all βs < 52.70; ps > .05).

In comparing these eight sets of predictors in their ability to predict PTSD symptom severity, both the dissociative scale and one SUDS variable significantly predicted PTSD symptom severity. However, based on the R^2 values, the analysis utilizing the phase four psychophysiological variables to predict PTSD symptom severity explained the most variance ($R^2 = .41$). Similar to the other two sets of analyses and contrary to expectations, the three sets of predictors did not predict equivalent amounts of variance in PTSD symptom severity.

Discussion

The analyses in study 3 were intended to compare different methodologies that are associated with PTSD: retrospective reports of the peritraumatic experience, self-reported distress contemporaneous to the physiological assessment of a verbal trauma monologue (i.e., SUDS ratings) and more objectively ascertained indices of distress (i.e., psychophysiological measures) during a trauma monologue. Each of these responses was examined in relation to each other as well as several measures of PTSD. It was hypothesized that each of these three metrics would be related to the other two, and that all three would be equivalently predictive of PTSD. The results, in contrast to expectations, presented a more complicated picture.

The first set of analyses examined the relationship between the SUDS variables and the peritraumatic responses (Hypothesis #1). SUDS variables were looked at during both trauma monologues (i.e., Time 1 and Time 2), and self-reported distress was examined both in terms of activation (i.e., distress reported during the trauma narrative) and recovery (i.e., distress reported during the baseline period immediately following the

trauma narrative). In examining SUDS variables at Time 1, results using the categorical models indicated that two of the peritraumatic variables from the negative affect factor were predictive of SUDS recovery (i.e., angry and humiliated), none of the peritraumatic variables from the fear factor predicted either SUDS activation or recovery, and one peritraumatic variable from the dissociative factor was predictive of SUDS activation (i.e., shocked). Results using the dimensional models indicated that the negative affect scale was not predictive of either SUDS activation or recovery, and both the fear scale and the dissociative scale were predictive of SUDS activation. These findings were contrary to predictions.

Several aspects of these findings are noteworthy. First, the peritraumatic emotions differed in their prediction of activation versus recovery. For example, whereas the dissociative factor (i.e., shocked; dissociative scale) and the fear scale were predictive of activation, several negative affect emotions (i.e., anger and humiliation) were predictive of recovery. This is interesting because it provides the first empirical evidence that different reactions during a trauma may affect the specific types of reactions trauma survivors have in response to trauma reminders. Specifically, whereas certain peritraumatic responses may cause increased activation to trauma reminders (i.e., shock and fear), others may affect their recovery from this activation (i.e., anger and humiliation).

Second, unlike the other relationships, which were positive, anger was negatively associated with SUDS recovery. In particular, whereas increased peritraumatic humiliation was associated with more distress after the trauma monologue, increased peritraumatic anger was associated with less distress after the monologue. This may suggest that there is something unique about peritraumatic anger and its relationship to self-reported distress. Perhaps peritraumatic anger is protective; individuals who experience anger during a traumatic event are less likely to continue to carry their

distress outside of the event, and thus recover more quickly after a trauma narrative. This may be a product of a more appropriate assignment of blame; individuals who are able to experience anger peritraumatically may be more likely to blame the perpetrator, and less likely to blame themselves. Future research is needed to ascertain whether peritraumatic anger protects individuals from developing PTSD, and whether this relationship is mediated by self-blame.

The findings may have implications for trauma-focused therapy. For example, individuals who experience fearful or dissociative emotions peritraumatically may be more activated during trauma-focused therapy, and thus may benefit more from treatments that do not require them to relay their trauma account (e.g., Cognitive Processing Therapy – Cognitive Therapy Only (CPT-C); Resick, Galovski, et al., 2008). In contrast, individuals who experience humiliation during a traumatic event may require more cognitive therapy around issues of shame to ensure that they fully recover from the experience.

The current investigation also examined the relationships between the peritraumatic variables and Time 2 SUDS variables, which presented a different picture than the one demonstrated at Time 1. In particular, the negative affect factor (i.e., humiliated, negative affect scale) and the dissociative factor (i.e., confused, dissociative scale) were predictive of reported recovery from distress after the trauma monologue. For distress activation, the negative affect factor (i.e., humiliated; negative affect scale), the fear factor (i.e., worried; fear scale), and the dissociative factor (i.e., dissociative scale) predicted self-reported subjective distress (i.e., Time 2 SUDS) during the trauma phase. Although peritraumatic humiliation was predictive of both activation and recovery when compared with the other negative affect emotions, it was no longer predictive of either activation or recovery when compared with other significantly predictive peritraumatic responses (i.e., confused and worried, respectively). The finding that

peritraumatic confusion and the dissociative scale were predictive of recovery from distress may be indicative of the effects of a fragmented memory of the assault. Research has suggested that fragmented memory may maintain PTSD (Amir, Stafford, Freshman, & Foa, 1998; Foa & Kozak, 1993; Herman, 1992; van der Kolk & Fisler, 1996; van der Kolk & van der Hart, 1991); if this is the case, individuals who experience peritraumatic dissociation, particularly in the form of confusion, may benefit most from working to create a fluid narrative of the event in therapy.

In comparing the categorical versus dimensional models ability to predict the SUDS variables, it appears that whereas the categorical model may be somewhat superior in predicting recovery following the verbal trauma narrative, the dimensional model may be somewhat superior in predicting activation during the narrative. This provides further support for the idea that the two models provide useful, but different, information. It is also consistent with the findings from study 1, which suggested that the categorical variables were better at predicting the PTSD diagnosis, whereas the dimensional variables were better at predicting PTSD severity. In this study, the categorical variables were better at predicting recovery, which is consistent with a conceptualization of the PTSD diagnosis as a problem in recovery (e.g., Resick, Monson, & Chard, 2008). In contrast, the dimensional models, which were better at predicting PTSD severity in study 1, were also found to be better at predicting levels of activation during the narrative. This may be because activation during the trauma narrative reflects the severity of the distress experienced during the actual rape or assault.

The current investigation next examined the relationships between the peritraumatic responses and the psychophysiological variables (i.e., HR and SC) collected during the trauma monologue (Hypothesis #2). In the current study, none of the peritraumatic variables (categorical or dimensional) predicted HR at either Time 1 or

Time 2. Although this lack of findings was not predicted, it is consistent with the complex relationship found between HR and PTSD. Specifically, whereas some studies have found that individuals with PTSD demonstrate higher HR than individuals without PTSD (Gerardi, Keane, Cahoon, & Klauminizer, 1994; Orr, Lasko, Metzger, & Pitman, 1997), others studies have found that individuals with and without PTSD do not differ in terms of HR (e.g., Beckham et al., 2000; McFall, Veith, & Murburg, 1992).

Recent theorizing may be able to provide insight into these null findings. Specifically, researchers have suggested that autonomic control is not a continuum extending from sympathetic to parasympathetic activation. Instead, the relationship between sympathetic and parasympathetic activation can be more accurately viewed as two separate continuums that can influence each other (Berntson, Cacioppo, & Quigley, 1993). Therefore, increased HR may reflect sympathetic activation, parasympathetic withdrawal, or a combination of the two (e.g., Cacioppo, Uchino, & Berntson, 1994). It is possible that the results in of the current study (and, indeed, the conflicting results found regarding HR in studies of participants with PTSD) are a result of this quality of HR.

One other explanation for the findings of the current study is also possible. Using the same dataset, Griffin, Resick & Mechanic (1997) found that individuals who scored high on the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1994) demonstrated different patterns of physiological responses than individuals who scored low on the PDEQ. Further, the high dissociator group contained a larger proportion of participants (94%) who met PTSD diagnostic status at Time 1. Therefore, it is possible that the current study did not find a relationship between HR and the peritraumatic variables because the high and low dissociators were collapsed.

In contrast to the findings for HR, the current study did find a relationship between the peritraumatic variables and SC. Although none of the peritraumatic variables predicted SC at Time 1, both afraid and the dissociative scale were predictive

of SC activation at Time 2. This is in line with expectations and is also consistent with the conceptualized differences between HR and SC. Specifically, whereas HR can be the result of multiple autonomic processes, SC is thought of as a purer measure of sympathetic activation (Raskin, 1973).

Consistent with Griffin et al. (1997), both of the significant SC findings were negatively related to the outcome variable. That is, higher levels of peritraumatic fear and higher scores on the dissociative scale were associated with lower levels of SC activation during the trauma phase at Time 2. In terms of the dissociation scale, it is possible that individuals who dissociate peritraumatically in an effort to remove themselves psychologically from the assault may employ this same strategy during a trauma-assessment; this would account for less activation both during and immediately after the trauma narrative. The fact that the dissociative scale was also predictive of PTSD indicates that this strategy, while effective for decreasing arousal in the moment, is not protective against the subsequent interference with recovery.

Although these findings are consistent with the dissociative construct, they do not explain why increased peritraumatic fear is associated with less activation. However, in considering the relationship between SC and PTSD (see below), these findings are interpretable. The current study found that, whereas increased SC activation at Time 1 significantly predicted higher levels of PTSD symptom severity, increased SC activation at Time 2 significantly predicted lower levels of PTSD symptom severity. Returning to the findings regarding peritraumatic fear and SC, this would suggest that individuals who experience more fear peritraumatically show less SC at Time 1 and have less severe levels of PTSD. It may be that this is a reflection of a normative response to a traumatic event; individuals who experience high levels of fear (a normative reaction) recover in a normative manner (i.e., they do not develop PTSD).

The relationship between the categorical and dimensional models in their prediction of the psychophysiological variables was similar to the pattern identified regarding their ability to predict the SUDS variables. Specifically, whereas the categorical models were somewhat superior in predicting recovery, the dimensional models were somewhat superior in predicting activation. At first glance, one finding appears to be in contradiction of this claim. Specifically, at Time 2, peritraumatic fear as a categorical variable predicted SC activation, whereas the fear scale, a dimensional variable, did not.

An examination of the odds ratios presents a different picture. Although not significant, the odds ratio for the fear scale (OR = .99) was actually slightly larger than the significant odds ratio for peritraumatic fear (OR = .93). Therefore, the difference in significance was presumably due to power limitations (*n* = 224 for the categorical model; *n* = 66 for the dimensional model) rather than a reflection of predictive ability. Overall then, it appears that whereas the categorical model is better at predicting recovery during a trauma narrative, the dimensional model is better at predicting activation.

For comparative purposes, the current study examined the ability of the SUDS variables (Hypothesis #3) and the psychophysiological variables (HR, SC; Hypothesis #4) to predict PTSD. Somewhat surprisingly, none of the SUDS variables or the psychophysiological variables predicted PTSD diagnostic status. These results were contrary to expectations. These finding may have been due to limited power; each of these analyses included ten independent variables and the sample sizes ranged from 48 to 55. Therefore, no firm conclusions can be drawn from this null finding. However, it is also possible that the variables collected during the trauma narrative were not predictive of PTSD diagnostic status because high and low dissociators were combined in the analyses (as discussed above; see Griffin et al., 1997). As such, a division of the sample by levels of peritraumatic dissociation may have produced significant findings for both

the SUDS ratings and the psychophysiological data in their prediction of PTSD at Time 2.

In contrast to the findings for diagnostic status, several of the variables collected during the trauma monologue were predictive of PTSD symptom severity. Results indicated that Time 2 SUDS recovery was predictive of PTSD symptom severity, and both Time 1 and Time 2 SC activation were predictive of PTSD symptom severity. Both Time 2 SUDS and Time 1 SC were in expected directions; increased self-reported distress and increased skin conductance amplitude, respectively, were predictive of increased levels of PTSD symptoms. However, as discussed above, the relationship between Time 2 SC activation was not in the expected direction; increased SC amplitude during the trauma phase was associated with lower levels of PTSD symptoms. This is not in line with most past research (i.e., individuals with PTSD have been shown to demonstrate greater SC response to idiographic trauma cues; Pole, 2007), although it is consistent with Griffin et al. (1997), who argued that this could be the product of a dissociative subtype of PTSD that demonstrates a suppression effect in response to trauma cues. Taken together, these findings tentatively suggest that, over time, higher levels of SC amplitude during a trauma narrative may actually be indicative of a less severe peritraumatic response and may be associated with better long-term functioning.

The final set of analyses examined each of the groups of variables (i.e., peritraumatic variables, SUDS variables, psychophysiological variables) in their ability to predict PTSD (Hypothesis #5). It was expected that each set of predictors (i.e., the peritraumatic variables, the SUDS variables, and the psychophysiological variables) would be equally predictive of PTSD. However, this was not the case. Whereas one of the individual peritraumatic emotions was significantly predictive of PTSD diagnostic

status (i.e., anxiety), none of the individual SUDS variables or the psychophysiological variables were predictive of this outcome variable.

This finding must be tempered by a consideration of total variance explained and power limitations. Specifically, whereas the sample used to predict PTSD based on the peritraumatic variables ranged from 108-109, the sample used to predict PTSD based on the SUDS variables was 55 and the sample used to predict PTSD based on the psychophysiological variables ranged from 46-47. Further, whereas the models including the peritraumatic variables explained between.07 -.16 of the variance in PTSD, the SUDS and psychophysiological variables tended to explain more. For example, while the SUDS variables explained an approximately equivalent amount of variance than the peritraumatic variables (between .08 and .13) in PTSD diagnostic status, the psychophysiological variables explained notably more variance in the outcome variable (between .42 and .44). It is possible that this is in part due to the number of predictors used in each model; the smallest number of predictors was used in the peritraumatic models (i.e., seven) while the largest number of predictors was used by the psychophysiological analyses (i.e., eighteen). Due to this confound, it is difficult to state conclusively the best predictors of PTSD diagnostic status. However, it may be that the physiological variables are actually the best predictors of PTSD. It is also worth noting that, similar to the caveat discussed in chapter 3, in the absence of a statistical test, it is unclear if the “larger” pseudo-R^2 values are actually statistically greater than the “smaller” pseudo-R^2 values.

Interestingly, whereas none of the psychophysiological variables was predictive of PTSD symptom severity, one of the peritraumatic variables (i.e., the dissociative scale) and one of the SUDS variables (i.e., distress recovery at Time 2) was predictive of this outcome. This is particularly surprising with regard to the SUDS variable because the model was under powered; for this analysis, the sample included only 54 participants

and ten independent variables were included as predictors. These findings also suggest that self-reported distress during a trauma narrative, similar to the peritraumatic dissociative model, may be more useful in predicting PTSD symptom severity as opposed to diagnostic status.

It is possible that these findings provide important information about the relationship between retrospectively reported peritraumatic experiences and responses to a physiological assessment. Specifically, it is possible that memory bias influences responses to a trauma monologue such that subjective distress during a trauma monologue is indicative of the severity of the response both during, and subsequent to, a traumatic event. In contrast, retrospectively reported categorical peritraumatic emotions may predict the type of symptoms individuals experience subsequent to a traumatic event. The fact that these two measures appear to provide different, but equally important, information in considering subsequent psychopathology is consistent with researchers who have argued that the memory of the event (including forgetting and memory deficits) instead of "biasing" reports, may actually provide additional information to researchers and clinicians (e.g., Rubin et al., 2008). If the current findings are an accurate depiction of the relationship between retrospectively reported categorical peritraumatic emotions and responses to a trauma narrative, they suggest that categorical retrospective reports may be best suited for predicting the nature of the future symptoms, whereas responses to a trauma monologue are more similar to a dimensional conceptualization of the peritraumatic experience; both of these constructs may assist in predicting the severity of the psychopathology. Future research is needed to examine this possibility.

CHAPTER 5. GENERAL DISCUSSION

Summary of Findings

The purpose of the three studies described in this investigation was to determine the relationship between the A2 peritraumatic responses and additional peritraumatic experiences, to examine the predictive value of these responses with regard to PTSD versus other psychopathological diagnoses that are either similar (e.g., MDD) or different (e.g., alcohol and substance dependence) from PTSD, and to compare the retrospective reports of the peritraumatic experience with data gathered during a laboratory-based trauma assessment (i.e., HR, SC, and SUDS ratings). The results indicate that considering the peritraumatic emotions from a categorical, rather than a dimensional, perspective is most useful for predicting PTSD diagnostic status, whereas the dimensional model is useful in predicting PTSD symptom severity. Further, contrary to the *DSM-IV* definition (APA, 1994), other peritraumatic responses beyond fear, helplessness, and horror appear to be relevant to the development of PTSD. Specifically, peritraumatic anxiety appears to be an important peritraumatic response for predicting the subsequent development of PTSD. Interestingly, none of the currently listed A2 emotions was predictive of PTSD.

In contrast to research suggesting that the peritraumatic experience is unable to discriminate between PTSD and other forms of psychopathology (e.g., Creamer et al., 2005; Punamäki et al., 2005; Reynolds & Brewin, 1999), the current study found that, although peritraumatic anxiety was predictive of PTSD, none of the categorical peritraumatic responses, nor the peritraumatic dimensional scales, were predictive of other forms of psychopathology (i.e., MDD; alcohol/substance dependence disorder). This finding contrasts with expectations. The findings of the current study may suggest that the peritraumatic response is unique to PTSD and that it is not predictive of other forms of psychopathology. However, it is also possible that the current results are a

product of the short period of time between the trauma and the assessment. The peritraumatic experience may not be able to predict the immediate development of MDD or alcohol/substance dependence disorder, but may be able to predict these disorders after a longer period of time. Future research is needed to examine this possibility.

With respect to the relationships between the peritraumatic responses and reactions during a trauma monologue, the current investigation revealed a complex picture. The dimensional scales, as well as a number of categorical peritraumatic responses (i.e., shocked, humiliated, worried, and confused), significantly predicted self-reported distress during exposure to an idiographic trauma narrative. Notably, none of the categorical responses that were predictive of the SUDS variables corresponded to the responses predictive of PTSD (i.e., anxious), although they did correspond somewhat to the A2 emotions (i.e., shocked). Of note, this is only the case inasmuch as shocked is actually a proxy for horror.

In terms of psychophysiological responses, none of the peritraumatic responses predicted HR. In contrast, one of the scales (i.e., dissociative scale) and one of the categorical responses (i.e., afraid) predicted skin conductance, and these overlapped somewhat both with the responses that predicted PTSD symptom severity (i.e., dissociative scale) and the A2 emotions (i.e., afraid). However, whereas one peritraumatic response predicted PTSD diagnostic status (i.e., anxiety), none of the SUDS ratings or the psychophysiological variables predicted this outcome. These results suggest that, although the peritraumatic response is to some extent predictive of responses during exposure to an idiographic trauma narrative, as well as the severity of the posttraumatic response, the peritraumatic experience, and not responses to the trauma monologue, is solely predictive of the PTSD diagnosis.

Three other studies have used this dataset to examine the relationship between physiological responding during the trauma monologue and PTSD symptoms (i.e., Griffin

et al., 1997; Gutner et al., 2010; Pineles et al., 2011). None of these studies examined how the psychophysiological variables predicted PTSD diagnosis at Time 2. However, two of the studies examined the relationship between the psychophysiological variables and PTSD symptoms (i.e., Gutner et al., 2010; Pineles et al., 2011). In contrast to the findings of the current investigation, both Gutner et al. and Pineles et al. found relationships between the psychophysiological variables and PTSD symptoms severity. These contrasting results appear to be a product of methodological differences. Specifically, unlike the current investigation, both studies controlled for baseline levels of PTSD (i.e., PTSD symptoms at Time 1) and used difference scores (i.e., HR at baseline three minus HR at baseline two) rather than covariates (i.e., HR at baseline three controlling for HR at baseline two). In addition, whereas the current investigation controlled for six demographic variables, neither Gutner et al. nor Pineles et al. controlled for any demographic variables.

The two studies also had additional differences in comparison to the current investigation. For example, Pineles et al. (2011) only included participants with complete data, thus creating a smaller sample than the one used in the current study. Further, these authors centered their "trauma reactivity" variable (i.e., the difference score created by subtracting the means of two different psychophysiological variables). This may explain why Pineles et al. found a significant relationship between HR and PTSD symptoms, whereas the current investigation did not. The Gutner et al. (2010) study controlled for peritraumatic dissociation; this is consistent with Griffin et al. (1997)'s finding that this dataset included high and low dissociators who responded differently to trauma cues. In addition, Gutner et al. examined the psychophysiological data differently in another respect; whereas the current investigation examined baseline three (while controlling for baseline two) and the trauma phase (while controlling for baseline two), Gutner et al. examined difference scores between baseline three and baseline one, and

the trauma phase and baseline one. Further, in examining SC, these authors looked at SC response frequency rather than SC amplitude. Despite these differences, similar to the current investigation, the authors did not find a significant relationship between PTSD symptoms and psychophysiological reactivity. However, they did find a significant relationship between the psychophysiological variables and the PTSD symptom clusters, specifically the reexperiencing and numbing clusters.

In comparing the current investigation to the other studies that have used this dataset, it appears that the differing results are indeed a product of methodological differences. It also provides suggestions for future research directions. Specifically, it is currently unclear whether examining the PTSD symptom clusters rather than just the diagnosis or total symptom severity, using differences scores rather than controlling for covariates, or controlling for Time 1 PTSD symptoms would improve the predictive ability of the peritraumatic variables. Taking these methodological differences into account may improve the predictive ability of the peritraumatic variables examined in this investigation.

Strengths and Limitations

The current study has a number of notable strengths. In particular, it is the first longitudinal study to examine the predictive value of the peritraumatic experience in predicting both PTSD diagnostic status and symptom severity, other comorbid forms of psychopathology (i.e., MDD, alcohol/drug dependence), and other measures of distress collected during a trauma monologue (i.e., SUDS variables, psychophysiological responses). In addition, by including a large number of peritraumatic responses (i.e., not those limited to the emotions described in A2), it provides the first longitudinal examination of the predictive value of a range of peritraumatic emotions and cognitions. The assessment of the peritraumatic experience is a particular strength of the current study; whereas nearly all of the other studies that have examined the peritraumatic

response have done so using data collected months or years after the event, the current study assessed the peritraumatic response within two weeks of the trauma. This allowed for a reduction in many of the biases associated with retrospective reporting.

Despite these strengths, the study suffers from a number of limitations. One such limitation in the current study is power. Although power was adequate for the majority of the analyses, it was limited for analyses using the categorical peritraumatic variables to predict PTSD, MDD, and substance dependence diagnostic status; for analyses using the dimensional peritraumatic models to predict SUDS variables and the psychophysiological variables at Time 2; and for analyses using SUDS and the psychophysiological variables to predict both PTSD diagnostic status and PTSD symptom severity. Therefore, the null findings demonstrated here cannot be taken as indicative of the true predictive power of these variables.

It should be noted, however, that despite the limited power to detect a medium effect, the analyses tended to have excellent power for detecting a large effect. Literature suggests that the majority of effects found for PTSD diagnostic status (e.g., Koren, Arnon, Lavie, & Klein, 2002; Luthra et al., 2009; Zinzow et al., 2010), PTSD symptom severity (e.g., LaFauci Schutt & Marotta, 2011; Rademaker, van Zuiden, Vermetten, & Geuze, 2011), and alcohol/substance dependence diagnostic status (e.g., Nishimura, 2009) are large. Therefore, overall, the current study was adequately powered to detect the types of effects that are typically found for PTSD and alcohol/substance dependence. In contrast, the power may have been somewhat limited for predicting MDD, the SUDS variables, and psychophysiological variables. Specifically, although large effects have been found for MDD (e.g., Zinzow et al., 2010) other studies have found small to medium effect sizes (e.g., Ellison & Flannelly, 2009; Heun & Hein, 2005). Further, effect sizes for SUDS variables tend to be medium (e.g., Hood, Antony,

Koerner, & Monson, 2010; Smits, Tart, Presnell, Rosenfeld, & Otto, 2010) and effect sizes for HR and SC tend to be small (e.g., Pole, 2007).

It is questionable whether low power significantly compromised the findings of the current study. With limited power, the study may have failed to detect significant results; however, it did not affect the effect sizes or the amount of variance explained. This caveat is further highlighted by examining the amount of variance explained by the models using the SUDS and psychophysiological variables; although none of the individual variables predicted the outcomes and the overall effect was not significant, the models explained a sizable proportion of the variance. Because the current study examined effect sizes as well as significance, the low power is only a partial limitation in the current study. However, additional studies with more sizable samples are needed before any firm conclusions regarding significance can be made.

Another limitation of the current study was the absence of a statistical test to compare whether differences in pseudo-R^2 values were significantly different. This limitation makes it difficult to conclude whether the size differences observed in the current investigation are statistically relevant or if they are a product of chance. However, despite the absence of a statistical test to examine this question, the fact that, in the prediction of the PTSD diagnosis, some of the models (e.g., the peritraumatic models, which explained between .07 -.16 of the variance) explained much less variance in the diagnosis than others (e.g., the psychophysiological models, which explained between .42-.44 of the variance) does suggest that there may be more to the findings than chance alone. Further, although the lack of a statistical test to compare pseudo-R^2 values does affect the ability to draw conclusions in terms of the models themselves, it does not limit the ability to determine if the individual predictors contribute significantly to the outcomes.

Another possible limitation of the current study was the combining of alcohol and substance dependence disorders. Even after combining these two diagnoses, the number of individuals in this sample who were dependent on either alcohol or substances was small (*n* = 23). It is unclear whether the peritraumatic variables would be predictive of each of these diagnoses separately, or whether the peritraumatic variables would be predictive of this combination were the sample larger. Future research is required to answer this question.

A further potential limitation associated with the analyses involving alcohol and substance dependence disorder was the decision to not control for these diagnoses at baseline. This decision was made in an effort to ensure that the predictors were constant between analyses (i.e., for PTSD, MDD, and alcohol/substance dependence disorder). This allowed for a more accurate test of the predictive ability of the peritraumatic variables between diagnoses. However, by not controlling for the baseline diagnoses, it is possible that individuals who had these disorders prior to the traumatic event were included. This is particularly true for alcohol and substance dependence, since participants would not have been able to develop a dependence on substances within a month (i.e., between the trauma and their assessment at Time 1). Controlling for baseline symptoms at Time 1 in future analyses may increase the predictive ability of the peritraumatic emotions, because they may be more able to predict diagnoses that are a result of the trauma, rather than those that predate it. Similarly, examining the ability of the peritraumatic emotions to predict substance abuse, rather than dependence, might have increased the predictive ability of the emotions because individuals who had experienced trauma may have progressed to abuse, but not dependence, at the time of the assessment.

The make-up of the sample may also limit generalizability. Specifically, the sample consisted of female victims of completed rape or first degree assault who

reported their experiences to authorities. Thus, it is possible that this sample overrepresented victims of severe crimes (Kaysen, Morris, Rizvi, & Resick, 2005). Therefore, it is possible that these findings will not be replicated in samples for which individuals have experienced less severe crimes. For example, because the current study only included rape victims who had experienced a completed rape; the peritraumatic responses experienced by these women may differ from those who may have avoided an assault or experienced a “near miss” (Testa, VanZile-Tamsen, Livingston, & Koss, 2004). However, in practice it would be difficult to capture individuals who had experienced a "near miss," because it is not always clear in these cases if the assailant's intent was rape. In addition, the current study only examined interpersonal traumas; therefore, the findings may not reflect the peritraumatic responses of individuals who have experienced non-interpersonal traumas (e.g., natural disasters). Finally, this study only included female crime victims; it is unclear whether the results will generalize to men as well. Additional research is required to determine if these findings generalize to other traumatic events and other genders.

As in any study assessing the peritraumatic experience, the current study is limited by the utilization of retrospective reports. However, the current study significantly improves on past studies that require participants to report on these experiences months or years later by assessing peritraumatic responses within two weeks after the traumatic event. A further potential limitation of the current study is that, whereas the current investigation focused exclusively on emotional and cognitive peritraumatic reactions, the peritraumatic response is not limited to these; it also can include physiological responses and behaviors (see Bovin & Marx, 2011, for a full review). It is unclear how inclusion of these additional responses might influence the longitudinal prediction of PTSD and other disorders. However, research using both this dataset and another in a cross-sectional design does suggest that other peritraumatic responses (e.g., peritraumatic behaviors)

are associated with posttrauma adjustment shortly after the trauma (i.e., Rizvi et al., 2008).

The assessment of the peritraumatic experience in this study improves upon past studies by using a large number of peritraumatic responses. However, the interview used to assess peritraumatic responses did not account for temporal sequences of responses (Rizvi et al., 2008). That is, for example, there is no way of knowing whether individuals experienced certain peritraumatic responses prior to experiencing others. Research does suggest that the temporal order can provide important information about how a trauma survivor responds in therapy. For example, Schauer and Elbert (2010) have argued that high emotional arousal may temporally proceed certain behavioral responses (e.g., tonic immobility), which may in turn precede more cognitive responses (e.g., peritraumatic dissociation). The authors argue that this is clinically relevant because individuals who do not move to the dissociative phase during a traumatic event are less likely to shut down during exposure therapy. Future research is needed to determine if the temporal order of other peritraumatic responses (e.g., the emotions examined in the current study) impact the development and treatment of subsequent PTSD symptoms.

Another potential limitation associated with the way in which the peritraumatic emotions were assessed relates to a question of severity versus duration. Specifically, in the current study the peritraumatic emotions were assessed on a dimensional scale examining the duration of the experience; participants were asked to report on how often they had experienced each peritraumatic emotion on a scale ranging from *none of the time* to *all of the time* (see Appendix A). It is possible that if the peritraumatic emotions were assessed in terms of the intensity of the emotion (e.g., participants were asked to rate how severe their experience of each emotion was), the dimensional scales created in this study might have been more predictive of PTSD. This seems plausible,

considering that arousal is probably better operationalized in terms of severity rather than duration. However, in practice, this operationalization might be difficult to achieve; although one could imagine various levels of sadness, it is difficult to imagine different levels of terror.

A further potential limitation regarding the methodological approach to the peritraumatic variables was the decision to center them prior to examining their predictive ability. This decision was made in order to reduce multicollinearily. However, by centering the variables, it is possible that the range of variance was inadvertently compromised, thus limiting the predictive value of the emotions.

One final limitation worth noting is the current study's conceptualization of "shocked" as a proxy for "horror." Although it is possible that participants defined shocked as a synonym for horror, it is also possible that they interpreted shocked as a less severe state of emotional experience (i.e., more "surprised" than "terrified"). Although shocked is the closest approximation in the current study, it may not accurately capture what the *DSM* was conceptualizing when including "horror" in criterion A2. Future research is needed to determine if "horror" behaves similarly to "shocked" in predicting PTSD.

Implications and Conclusions

Since the introduction of the diagnosis of PTSD, the field has struggled with whether the traumatic stressor should be defined only by its objective qualities or by a combination of the objective characteristics of the event and an individual’s subjective reaction to it. Many researchers have criticized the current conceptualization of the subjective aspect of the definition of trauma (i.e., Criterion A2) because it is not positively predictive of PTSD (Breslau & Kessler, 2001; Schnurr et al., 2002) and too narrowly defined (Brewin et al., 2000a; Brunet et al., 2001; Roemer et al., 1998; Weathers & Keane, 2007). The current study has addressed both of these criticisms by examining

the predictive value of a more broadly envisioned view of the peritraumatic experience. Results of the current study are consistent with those of past research (e.g., Breslau & Kessler, 2002; Schnurr et al., 2002) in finding that the current model for the subjective traumatic response (i.e., the experience of peritraumatic fear, helplessness, or horror) is not predictive of PTSD. However, the current study indicates that there are aspects of the peritraumatic experience (i.e., peritraumatic anxiety) that are predictive of PTSD.

Criterion A2 continues to be criticized for lacking predictive value. However, if Criterion A2 is conceptualized as a description of common reactions to trauma, rather than as a predictor of future psychopathology, the current study suggests that this is appropriate; peritraumatic fear, helplessness, and horror were each experienced by more than 90% of the sample at some point during the traumatic event. However, if the field wishes to have Criterion A2 be predictive of the subsequent development of PTSD, the current study suggests that it should consider including peritraumatic anxiety (which was predictive of PTSD) rather than peritraumatic fear, helplessness, and horror (which were not). However, based on the small effect of this one predictive variable, it is possible that, if the purpose of A2 is to predict future psychopathology, including A2 may not adequately serve this goal.

In addition to having implications about the definition of trauma, the current findings may also have utility for designing interventions. Specifically, the current study suggests that individuals who experience peritraumatic anxiety are more likely to subsequently develop PTSD within the first three months of the trauma than those who do not. This may have implications for early intervention; that is, identifying individuals who have this peritraumatic experience could permit mental health professionals to intervene more quickly and potentially reduce individuals' chances of developing the full-blown disorder. Although the current study suggests that these findings may be specifically relevant for PTSD, as opposed to other forms of psychopathology (i.e., MDD,

alcohol/substance dependence disorder), future research is needed to determine whether this is a product of high levels of comorbidity or the ability of the peritraumatic experience to predict only the development of temporally proximal, rather than distal, forms of psychopathology.

The current study also provides information about how the peritraumatic experience overlaps with a laboratory-based recall procedure. Importantly, the peritraumatic experience was found to be somewhat predictive of self-reported distress and psychophysiological reactivity in the laboratory. This lends credence to the notion that, although a physiological assessment of the participant's memory of the traumatic event may not capture information identical to what was experienced peritraumatically, it is influenced by the peritraumatic experience. Further, the finding that the information gleaned from the trauma monologue (i.e., SUDS ratings and psychophysiological responses) and the information from the retrospectively reported peritraumatic experiences differed in the aspects of PTSD they were able to predict suggests that responses to the trauma monologue provide important information about the trauma that cannot necessarily be captured from peritraumatic retrospective reports alone, and vice versa.

Although more work is needed, the current investigation provides important insight into the relevance of the peritraumatic experience. Knowledge of the peritraumatic experience has the potential to not only predict who will develop PTSD, but also provide insight into how to treat at-risk individuals. The current study also suggests several avenues for future research. For example, it is still unclear whether reports of the peritraumatic experience remain constant. It is possible that, over time, memory biases will cause retrospective reports to look more similar to responses to trauma cues. Further, it may be that what starts the development of PTSD (e.g., the peritraumatic experience) may not be what maintains it (e.g., responses to trauma cues). This remains

an empirical question. In addition, the current study identified both categorical and dimensional peritraumatic responses that are associated with PTSD. However, it is unclear whether these responses also affect how traumatized individuals will respond to therapy. Examining these questions has the potential to provide the field with new insight about the development and maintenance of PTSD, as well as how to most effectively treat the individuals who develop this devastating disorder.

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Footnotes

[1]The results refer to the dissociative factor including the "shocked" variable. The analyses using the dissociative factor without the "shocked" variable were identical to those with the "shocked" variable for both the categorical and dimensional models. Therefore, the results of the analyses without "shocked" are not reported.

Appendix A

Modified Version of the Standardized Trauma Interview

How did you feel emotionally during the (most recent) assault? *(Read the list and mark (0) to (4) next to each feeling below)*

0 – None of the time
1 – A little bit of the time
2 – Some of the time
3 – Most of the time
4 – All of the time

14) ------- Calm
15) ------- Afraid
16) ------- Worried
17) ------- Detached, as if in a dream
18) ------- Angry
19) ------- Confused/disoriented
20) ------- Betrayed
21) ------- Helpless
22) ------- Disgusted/repulsed
23) ------- Anxious
24) ------- Guilty
25) ------- Numb
26) ------- Embarrassed
27) ------- Hurt
28) ------- Sad
29) ------- Humiliated
30) ------- Shocked/surprised
31) ------- Terrified